Appendix 3A

California Department of Food and Agriculture
Statewide Plant Pest Prevention and Management Program

Human Health Risk Assessment

Urban/Residential and Nursery Treatments, Pierce's Disease Control Program

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A....................Applicator
a.i. ....Active Ingredient
AADD....................Annual Average Daily Dose
ADD....................Average Daily Dose
AF ....Soil Adherence Factor
AR....................Application Rate
AT ....Averaging Time
ATPD....................Acres Treated Per Day
ATSDR ....Agency for Toxic Substances and Disease Registry
BW....................Body Weight
C....................Chemical Concentration
CCR....................California Code of Regulations
CDFA....................California Department of Food and Agriculture
CDPH....................California Department of Public Health
CEDEN ....California Environmental Data Exchange Network
CF....................Conversion Factor
CIF ....Canopy-Interception Factor
CNW ....Combined-Nursery Worker
CR ....Contact Rate
CRANK....................Comprehensive Risk ANalysis Kalculator
CSF ....Cancer Slope Factor
CSM ....Conceptual Site Model
DAF....................Dermal Absorption Factor
DFR_t....................Dislodgeable Foliar Residue
DPAR....................During and Post-Application Resident
DPR....................California Department of Pesticide Regulation
DtO....................Drift to Object
DTSC ....Department of Toxic Substances Control
DtT....................Drift to Turf
DWB ....Downwind Bystander
DWE ....Drinking Water Exposure

ED ....Exposure Duration

EEC ....Estimated Environmental Concentration

EF ....Exposure Frequency

EFH ....USEPA's Exposure Factors Handbook: 2011 Edition (USEPA, 2011p)

ERA....................Ecological Risk Assessment Report for Urban/Residential and Nursery Treatments, Pierce's Disease Control Program

ET....................Exposure Time

EV ....Event Frequency

EV_{HtM} ....Frequency of Hand-to-Mouth Events per Hour

EV_{OtM} ....Frequency of Object-to-Mouth Events per Hour

F ....Pesticide Retained to Foliage (%)

Fai_{Hands}....................Fraction of Total Residue on Hands

F_{AR}....................Fraction of Transferable a.i.

F_D ....Fraction of Residue that Dissipates per Day

FI ....Fraction Ingested

F_M ....Fraction of Hand Surface Area Mouthed per Event

F_O ....Fraction of Total Residue on Object

f_{oc}....................Fraction of Organic Carbon

GWPAs ....Groundwater Protection Areas

GWPL ....Groundwater Protection List

GWSS ....Glassy-Winged Sharpshooter

HHRA ....Human Health Risk Assessment

HR ....Residue Available on Hand

HSDB....................Hazardous Substances Data Bank

HtM ....Hand-to-Mouth

ILS....................Index Lifestage

IPM ....Integrated Pest Management

IRIS ....Integrated Risk Information System

IR_S ....Soil Ingestion Rate

IR_V....................Vegetation Ingestion Rate

IR_W ....Water Ingestion Rate

K_{oc} .... Soil Organic Carbon-Water Partitioning Coefficient
K_{ow} .... Octanol-Water Partition Coefficient
ML .... Mixer-Loader
MLA .... Mixer-Loader-Applicator
MOE .... Margin of Exposure
N/A .... Not Applicable
NDA .... No Data Available
NIEHS .... National Institute of Environmental Health Sciences
NO(A)EL/ NOAEL .... No Observable (Adverse) Effect Level
NOC .... Not of Concern
N_{REP} .... Number of Replenishment Intervals per Hour
OEHHA .... Office of Environmental Health Hazard Assessment
OPHED .... Occupational Pesticide Handler Exposure Data
OR_t .... Residue Available on Object
OSD .... Off-Site Drift
OtM .... Object-to-Mouth
PAL .... Post-Application Loader
PAR .... Post-Application Resident
PCF .... Physical, Chemical, and Environmental Fate
PDCP .... Pierce's Disease Control Program
PDP .... Pesticide Data Program
PEIR .... Program Environmental Impact Report
PMDS .... Program Material Data Sheet
POE .... Polyoxyethylene
ppm .... parts per million
PPE .... Personal Protective Equipment
PRZM .... Pesticide Root Zone Model
PTC .... Potential Toxicological Concern
PWC .... Pesticide in Water Calculator
RAGS .... Risk Assessment Guidance to Superfund
RCD .... Risk Characterization Document
RED .... Reregistration Eligibility Decision

REI	Restricted Entry Interval
RPA	Request for Preliminary Analysis
RTI	Retreatment Interval
SA	Surface Area
SADD	Subchronic Average Daily Dose
SA_H	Surface Area of Hand
SAM_O	Object Surface Area Mouthed per Event
SDS	Safety Data Sheet
SE	Extraction by Saliva
SIDS	Screening Information Dataset System
SOP	U.S. Environmental Protection Agency Standard Operating Procedures for Residential Pesticide Exposure Assessment (USEPA, 2012l)
Statewide PEIR	California Department of Food and Agriculture (CDFA). 2014a. Statewide Plant Pest Prevention and Management Program Environmental Impact SCH # 2011062057 (Statewide PEIR)
SURF	Surface Water Monitoring Database
SWRCB	State Water Resources Control Board
TC	Transfer Coefficient
TDE	Turf Dermal Exposure
T-REX	Terrestrial Residue Exposure
TSCF	Transpiration Stream Concentration Factor
TTR_t	Transferable Turf Residue
UE	Unit Exposure
UNEP	United Nations Environmental Programme
USDA	United States Department of Agriculture
USEPA	U.S. Environmental Protection Agency
VDE	Vegetation Dermal Exposure
VUF	Vegetation Uptake Factor
θ	Soil-Water Content by Volume
ρ	Soil Bulk Density

1 Executive Summary

This Human Health Risk Assessment (HHRA) is conducted as a supplement to the HHRA conducted as part of the Statewide Plant Pest Prevention and Management Program Environmental Impact Report (PEIR)(CDFA, 2014a). Eight new alternative scenarios for soil or foliar applications with Safari® 20 SG, Merit® 2F, or Marathon® II Greenhouse and Nursery Insecticide for the control of glassy-winged sharpshooters were assessed. A ninth alternative scenario was not assessed directly but is discussed as comparable to one of the assessed eight scenarios. The methods used in this risk assessment largely follow those methods used in the previous risk assessment in the Statewide PEIR. Where methods differ, the new assumptions or receptors are discussed.

The application of Safari 20 SG or Marathon II Greenhouse and Nursery Insecticide could occur in nursery loading docks or nursery production area settings with foliar applications made to containerized host plants using a mechanically pressurized sprayer, hydraulic sprayer, backpack sprayer, boom sprayer, and/or aerial application via aircraft. Whereas, Merit 2F applications could be made to host plants as foliar, soil drench, or soil injection applications in urban/residential setting using a mechanically pressurized sprayer and/or backpack sprayer.

Acute, subchronic, and chronic dermal, inhalation, and ingestion exposures were considered for residents present during and after pesticide application and the following age groups were included: <2 year-old, 2-<16 year-old and 16-< year-old. Other receptors considered were the resident downwind of pesticide applications and personnel responsible for the handling and application of pesticides. Environmental media considered to contain pesticide residue included inedible vegetation, edible vegetation, turf, soil and air.

Risk was quantitatively assessed using the Margin of Exposure (MOE) technique. For this HHRA, the target MOE value that indicates an unlikely adverse impact to human health is 300. MOE values less than 300 indicate the potential for adverse impacts to health; MOE values greater than 300 indicate that adverse health impacts are unlikely. MOE values calculated for this HHRA ranged from approximately 400 to greater than 10^{13}. This indicates that exposure to pesticides during the Proposed Program is unlikely to result in adverse impacts to human health.

The magnitude of an MOE is indicative of the general safety of exposure, with larger MOEs generally indicating smaller potential health risk. Comparatively large MOEs should not, however, be interpreted as encouraging a receptor to unnecessarily come into contact with environmental media containing pesticides.

2 Introduction

This Human Health Risk Assessment (HHRA) evaluates available pesticide application scenarios within the California Department of Food and Agriculture's (CDFA) Pierce's Disease Control Program (PDCP) for the control of glassy-winged sharpshooter (GWSS) in urban/residential and nursery settings, herein referred to as the "Proposed Program". This document is a supplement to the CDFA Statewide Plant Pest Prevention and Management Program Environmental Impact Report SCH # 2011062057 (Statewide PEIR) (CDFA, 2014a).

2.1 Purpose of the Human Health Risk Assessment (HHRA)

The purpose of this HHRA is to estimate the human health risk from pesticides used under the Proposed Program. Specifically, this HHRA focuses on pesticide applications that may be conducted under the Proposed Program to control glassy-winged sharpshooters. The HHRA evaluates the potential risk to human health following pesticide applications. When available, these scenarios would provide options for treatment of GWSS; they would be utilized in addition to previously analyzed treatment scenarios.

2.2 Approach

A detailed discussion of the approach for the HHRA process is provided in the Statewide PEIR, Volume 3, Appendix B, Human Health Risk Assessment (CDFA, 2014a).

This HHRA was conducted by using models and exposure data developed primarily by the United States Environmental Protection Agency (USEPA) in the context of typical pesticide application methods and settings in California. The HHRA depends on these USEPA exposure models to estimate chemical environmental concentrations and risk estimates. The majority of these models, described in detail in the applicable sections of the Statewide PEIR (CDFA, 2014a), are Microsoft Excel-based user interface packages that allow for input of information specific to the Proposed Program, as well as default data when site-specific data are not available. Since multiple models were required for this HHRA and some models require the output of previous models as their input, it was convenient to integrate several models into one Excel workbook so that information from all models could be combined into a single risk estimate as the final output for each application scenario. This Excel workbook, developed by Blankinship & Associates and Ardea Consulting under contract with CDFA, is referred to as the Comprehensive Risk ANalysis Kalculator (CRANK), providing a consolidated tool to estimate risk for the HHRA as well as the Ecological Risk Assessment (ERA).

Staff from the California Department of Pesticide Regulation (DPR), California Department of Public Health (CDPH), and Office of Environmental Health Hazard Assessment (OEHHA) reviewed and commented on the Proposed Program's HHRA. The purpose of this involvement was to allow for peer review, facilitate the exchange of information, collaborate on methods to assess and protect human health and the environment and clearly communicate these methods and results to the public.

3 Hazard Identification

The first step in conducting the HHRA is a planning process called Hazard Identification (OEHHA, 2001a). This included identification of the ingredients of the pesticide products and adjuvants and the use scenarios that are anticipated under the Proposed Program. Pesticide and adjuvant ingredients were determined from pesticide manufacturers' label and safety data sheet (SDS). Details regarding the application of chemicals that impact the estimation of potential risk are:

- Type of chemical
- Concentration of chemical
- Application method (e.g., soil injection, fumigation, spraying)
- Duration and frequency of applications
- Rate of application
- Area of application
- Setting in which activity would occur (e.g., agriculture, residential)

Pierce's Disease Control Program (PDCP) works to minimize the impact of Pierce's Disease and its vectors in California. Pierce's disease is a deadly disease of grapevines, caused by the bacterium *Xylella fastidiosa*, which is spread by a xylem-feeding leafhopper, the glassy-winged sharpshooter (GWSS). For the PDCP, CDFA's involvement includes early detection, identification and diagnosis, rapid response, use of integrated pest management (IPM) practices, use of biological control, establishment and enforcement of PDCP quarantine regulations, and implementation of detection, eradication, exclusion, and control projects.

3.1 Application Scenarios

As part of the Statewide PEIR (CDFA, 2014a), 59 application scenarios were analyzed in the PDCP. The application scenarios analyzed in this HHRA were not substantially similar to any of the previously analyzed scenarios. In the PEIR, four soil drench scenarios with Safari 20 SG were analyzed for a nursery setting. In the PEIR, soil drench applications were routinely combined with foliar applications of different pesticides and analyzed as such. In this assessment, Safari 20 SG (a.i.-dinotefuran, inert-sodium dodecylbenzene sulfonate) with the adjuvant No Foam B® (containing dodecylbenzene sulfonate, isopropyl alcohol, ethanolamine, polyoxyethylene (POE) nonylphenol, and sodium xylene sulfonate) was analyzed as foliar spray in a nursery setting on the loading dock (PDCP-64) or in the nursery production area (PDCP-65). Under the Proposed Program, Safari 20 SG with the adjuvant No Foam B could be applied on a loading dock or in the production areas as a foliar spray to nursery stock plants using a mechanically pressurized sprayer, backpack sprayer, hydraulic sprayer, or boom sprayer. Additionally, Safari 20 SG (without an adjuvant) may be applied to all nursery stock throughout the entire nursery using a mechanically pressurized sprayer, hydraulic sprayer (PDCP-66), or as an aerial application from aircraft (PDCP-66 Aerial).

Consistent with the PEIR, CDFA defined the product application rate and other application details for each of the specific scenarios in the Program Material Data Sheet (PMDS) found in Appendix A: Program Material Data Sheets. The defined application rate in PDCP-64, a foliar application of Safari 20 SG to 3750 ft^2 on the loading dock, is 0.22 lb/Ac of dinotefuran. The defined application rate in PDCP-65, a foliar application of Safari 20 SG to 0.75 acres in the nursery production area, is 0.22 lb/Ac of dinotefuran. The defined application rate in PDCP-66, a foliar application of Safari 20 SG to the entire nursery (130 acres), is 0.22 lb/Ac of dinotefuran. In the PEIR, one soil drench scenario with Merit 2F (a.i.-imidacloprid, inert-glycerin) was analyzed for a residential setting. In an addendum to the PEIR, Merit 2F was assessed for the eradication of Japanese beetles through application to turf or ornamental groundcover (CDFA, 2016a). Two new scenarios including application of Merit 2F in residential settings were directly analyzed in this HHRA. In this assessment, Merit 2F was analyzed in an urban/residential setting when applied as a foliar spray (PDCP-70) and soil drench (PDCP-71). A third scenario (PDCP-72), is not directly analyzed, but is discussed (see below).

Merit 2F could be applied under the Proposed Program as a foliar spray to host plants using a mechanically pressurized sprayer or a backpack sprayer. The soil drench applications of Merit 2F could be made to ornamental plants or groundcover as well as citrus and other fruit trees using a mechanically pressurized sprayer. The defined application rate in PDCP-70, a foliar application of Merit 2F to 15 acres in a residential setting, is 0.023 lb/Ac of imidacloprid. The defined application rate in PDCP-71, a soil drench application of Merit 2F to 15 acres in a residential setting, is 0.4 lb/Ac of imidacloprid.

An additional scenario, PDCP-72, also entailed application of Merit 2F to 15 acres in residential settings. Merit 2F could be applied in PDCP-72 at 0.4 lb /Ac of imidacloprid to the soil underneath shrubs and trees, including groundcover and fruit trees, as a soil injection. PDCP-72 was considered substantially similar to the concurrently proposed scenario PDCP-71 (a soil drench application) because the two scenarios were identical in most aspects, including application site, application rate, applications per year, and retreatment intervals. The scenarios differed in that PDCP-72 is applied as a soil injection and PDCP-71 is applied as a soil drench application. Because exposure to all receptors in residential settings is anticipated to be less through soil injection than soil drench application, PDCP-71 was considered health protective of PDCP-72. In subsequent sections of this assessment, any exposures or risks discussed in reference to PDCP-71 also apply to PDCP-72.

Two soil drench scenarios with Marathon II Greenhouse and Nursery Insecticide were analyzed for a nursery setting in the Statewide PEIR. In the PEIR, the soil drench application scenarios were routinely combined with foliar applications of different pesticides and analyzed as such. In this assessment, Marathon II Greenhouse and Nursery Insecticide (a.i.-imidacloprid, inert-glycerin) with the adjuvant No Foam B (containing dodecylbenzene sulfonate, isopropyl alcohol, ethanolamine, POE nonylphenol, and sodium xylene sulfonate) was analyzed as a foliar spray in a nursery setting on the loading dock (PDCP-77) or in the nursery production area (PDCP-78). Marathon II Greenhouse and Nursery Insecticide with the adjuvant No Foam B could be applied on a loading dock or in the production areas as a foliar spray to nursery stock plants using a mechanically pressurized sprayer, backpack sprayer, or hydraulic sprayer.

The defined application rate in PDCP-77, a foliar application of Marathon II Greenhouse and Nursery Insecticide to 3750 ft^2 on the loading dock, is 0.027 lb/Ac of imidacloprid. The defined application rate in PDCP-78, a foliar application of Marathon II Greenhouse and Nursery Insecticide to 0.75 acres in the nursery production area, is 0.027 lb/Ac of imidacloprid.

None of the scenarios described were considered substantially similar to the scenarios analyzed in the Statewide PEIR or the subsequent Japanese Beetle addenda (CDFA, 2014a, CDFA, 2016a, CDFA, 2017a). Therefore, PDCP-64, PDCP-65, PDCP-66, PDCP-66 Aerial, PDCP-70, PDCP-71, PDCP-77, and PDCP-78 were directly analyzed in this HHRA. In addition, PDCP-72 was indirectly addressed through analysis of PDCP-71.

3.2 Active and Inert Ingredients of Concern and Environmental Fate Properties

The HHRA utilized information found on pesticide labels and SDS to determine the list of active and inert ingredients. Pesticide ingredients, including adjuvants, and their percent compositions are listed by scenario in Table 1 below. Because inert ingredients are often considered confidential business information, their identity is not disclosed and as a result they could not be assessed. No other chemicals were listed on the label or SDS and, therefore, could not be evaluated. Pesticide ingredients were researched for chemical and physical characteristics, including toxicity, as well as its environmental fate properties in a manner consistent with the methodology used in the Statewide PEIR.

Table 1: Pesticide and Adjuvant Product Compositions by Chemical

Application Scenario	Product Name	Product Application Rate	Ingredient	% Ingredient Composition of Product	Application Rate
PDCP-64	Safari 20 SG	8 oz/100 gal	Dinotefuran	20.00%	0.22
PDCP-64	Safari 20 SG	8 oz/100 gal	Sodium dodecylbenzene sulfonate	5.00%	0.0544
PDCP-64	No Foam B	16 fl. oz./100 gal	Dodecylbenzene sulfonate	5.70%	0.136
PDCP-64	No Foam B	16 fl. oz./100 gal	Ethanolamine	5.44%	0.13
PDCP-64	No Foam B	16 fl. oz./100 gal	Isopropyl alcohol	2.10%	0.05
PDCP-64	No Foam B	16 fl. oz./100 gal	POE Nonylphenol	12.86%	0.307
PDCP-64	No Foam B	16 fl. oz./100 gal	Sodium xylene sulfonate	1.00%	0.024
PDCP-65	Safari 20 SG	8 oz/100 gal	Dinotefuran	20.00%	0.22
PDCP-65	Safari 20 SG	8 oz/100 gal	Sodium dodecylbenzene sulfonate	5.00%	0.0544
PDCP-65	No Foam B	16 fl. oz./100 gal	Dodecylbenzene sulfonate	5.70%	0.136
PDCP-65	No Foam B	16 fl. oz./100 gal	Ethanolamine	5.44%	0.13
PDCP-65	No Foam B	16 fl. oz./100 gal	Isopropyl alcohol	2.10%	0.05
PDCP-65	No Foam B	16 fl. oz./100 gal	POE Nonylphenol	12.86%	0.307
PDCP-65	No Foam B	16 fl. oz./100 gal	Sodium xylene sulfonate	1.00%	0.024
PDCP-66	Safari 20 SG	8 oz/100 gal	Dinotefuran	20.00%	0.22
PDCP-66	Safari 20 SG	8 oz/100 gal	Sodium dodecylbenzene sulfonate	5.00%	0.0544
PDCP-66 Aerial	Safari 20 SG	8 oz/100 gal	Dinotefuran	20.00%	0.22

Application Scenario	Product Name	Product Application Rate	Ingredient	% Ingredient Composition of Product	Application Rate
PDCP-66 Aerial	Safari 20 SG	8 oz/100 gal	Sodium dodecylbenzene sulfonate	5.00%	0.0544
PDCP-70	Merit 2F	1.5 fl oz/100 gal	Imidacloprid	21.40%	0.023
PDCP-70	Merit 2F	1.5 fl oz/100 gal	Glycerin	10.00%	0.011
PDCP-71	Merit 2F	0.2 fl oz/in truck diameter	Imidacloprid	21.40%	0.4
PDCP-71	Merit 2F	0.2 fl oz/in truck diameter	Glycerin	10.00%	0.19
PDCP-72	Merit 2F	0.2 fl oz/in truck diameter	Imidacloprid	21.40%	0.4
PDCP-72	Merit 2F	0.2 fl oz/in truck diameter	Glycerin	10.00%	0.19
PDCP-77	Marathon II Greenhouse and Nursery Insecticide	1.7 fl oz/100 gal	Imidacloprid	21.40%	0.027
PDCP-77	Marathon II Greenhouse and Nursery Insecticide	1.7 fl oz/100 gal	Glycerin	10.00%	0.012
PDCP-77	No Foam B	16 fl. oz./100 gal	Dodecylbenzene sulfonate	5.70%	0.062
PDCP-77	No Foam B	16 fl. oz./100 gal	Ethanolamine	5.44%	0.06
PDCP-77	No Foam B	16 fl. oz./100 gal	Isopropyl alcohol	2.10%	0.023
PDCP-77	No Foam B	16 fl. oz./100 gal	POE Nonylphenol	12.86%	0.141
PDCP-77	No Foam B	16 fl. oz./100 gal	Sodium xylene sulfonate	1.00%	0.011
PDCP-78	Marathon II Greenhouse and Nursery Insecticide	1.7 fl oz/100 gal	Imidacloprid	21.40%	0.027
PDCP-78	Marathon II Greenhouse and Nursery Insecticide	1.7 fl oz/100 gal	Glycerin	10.00%	0.012
PDCP-78	No Foam B	16 fl. oz./100 gal	Dodecylbenzene sulfonate	5.70%	0.062
PDCP-78	No Foam B	16 fl. oz./100 gal	Ethanolamine	5.44%	0.06
PDCP-78	No Foam B	16 fl. oz./100 gal	Isopropyl alcohol	2.10%	0.023
PDCP-78	No Foam B	16 fl. oz./100 gal	POE Nonylphenol	12.86%	0.141
PDCP-78	No Foam B	16 fl. oz./100 gal	Sodium xylene sulfonate	1.00%	0.011

4 Toxicity Dose-Response Assessment

The second step in the HHRA process is the assessment of toxicity (OEHHA, 2001a). All chemicals have some degree of toxicity and no substances are completely non-toxic. This fundamental concept of toxicology is expressed by Philippus Von Hohenheim (also known as Paracelsus), a 16th century physician and scientist (Pachter, 1951), in his famous maxim: “All things are poison, and nothing is without poison: only the dose permits something not to be poisonous.” Accordingly, understanding the toxicity of pesticide active and inert ingredients and adjuvants, and the potential dose that human receptors might receive as part of Proposed Program, is critical. Two fundamentally different toxicological responses may transpire following exposure depending on the end response: cancerous and non-cancerous health effects. Toxicity values are quantitative values that describe the relationship between an estimated dose and the probability of developing cancer or the likelihood of producing non-cancerous health effects.

Non-cancerous health effects (e.g. difficulty breathing, neurological effects) were evaluated using no observable adverse effect levels (NO(A)ELs). A NO(A)EL is the highest exposure level at which there are no statistically or biologically significant increases in the frequency or severity of adverse effects between the exposed population and its control (USEPA, 1993q). When multiple, suitable NO(A)ELs were available in the literature, the most sensitive effect level was selected. All NO(A)ELs used in this assessment are reported in units of milligrams of chemical per kilogram body weight (BW) per day (mg/kg-day). Extrapolations were made and uncertainty factors applied to NO(A)ELs selected from the literature for use in estimating risk. Extrapolation and uncertainty include using animal studies and/or surrogate chemicals. Use of the most sensitive effect level along with conservative extrapolation and uncertainty factors is generally considered health-protective of a representative cross section of the general population.

Consistent with the methods described in the Statewide PEIR, NO(A)ELs were obtained for each assessed chemical for the available and relevant routes of exposure. Refer to Section 4.3 for a description of critical NO(A)ELs selected for risk assessment.

Cancer risk was not characterized in this risk assessment because none of the active of inert ingredients show evidence of carcinogenicity (USEPA, 2015a).

Data sources reviewed in the toxicity assessment are presented in Section 4.2 below.

4.1 Mechanism of Action and Target Organs and Systems

Toxicity studies are often conducted using single chemicals rather than a combination of chemicals that may be found in a specific pesticide formulation. An HHRA typically evaluates each chemical individually, and then combines the risks from multiple chemicals with the same effects to get a final, combined representation of risk.

As a health-protective and conservative approach, the cumulative risk of pesticide active and inert ingredients were estimated regardless of their mechanism of action (e.g., acetylcholinesterase inhibition), target organ (e.g., liver), or target system (e.g., nervous system). The most sensitive effect considered to be relevant for each chemical by the USEPA or other authoritative agency was used as the basis for risk characterization. By assuming exposure to each chemical contributes toward cumulative adverse health effects, the potential risk to human health was likely overestimated, and, as a result, health protective and conservative in nature. This methodology is consistent with the approaches described in the *USEPA Risk Assessment Guide to Superfund (RAGS)* and *USEPA General Principles for Performing Aggregate Exposure and Risk Assessment* which provides guidance on assessing aggregate chemical risk and aggregate exposure pathway risk (USEPA, 2001e; USEPA, 2004i).

4.2 Data Sources

The toxicity assessment reviewed the following data sources. In the event that no conflicting or suspect data were found, other sources were used to corroborate the initial data found. The most conservative and health-protective data were used when two or more data points existed: Any sources utilized during previous Statewide PEIR analyses were also considered.

- USEPA Reregistration Eligibility Decision (RED) documents (USEPA, 2017e)
- USEPA Human Health Risk Assessment (HHRA) documents (USEPA, 2017f)
- DPR Risk Characterization Documents (RCD)(DPR, 2017a)
- Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles (ATSDR, 2017a)
- OEHHA Toxicity Criteria Database (OEHHA, 2017a)
- United Nations Environmental Programme (UNEP) Screening Information Dataset System (SIDS) Initial Assessment Profiles (UNEP, 2017a)
- United States Department of Agriculture (USDA) Human Health Risk Assessments (USDA, 2017a)
- Hazardous Substances Data Bank (HSDB) (HSDB, 2017a)

4.3 Toxicity Endpoints Selected for Risk Characterization

Critical NO(A)ELs used for risk characterization were identified and selected from the literature in a manner consistent with the methods described in the Statewide PEIR. Each pesticide or adjuvant ingredient was categorized into one of three categories for each evaluated exposure route (oral, inhalation, dermal) depending on the toxicity information available. These categories of classification are Not of Concern (NOC), Potential Toxicological Concern (PTC), or No Data Available (NDA). Chemicals evaluated as NOC are not of toxicological concern for a particular exposure route based on the criteria described previously in the Statewide PEIR. Chemicals evaluated to be of potential toxicological concern for specific exposure routes were deemed PTC for that exposure route and available NO(A)ELs were used to characterize risk quantitatively using the methods described in Section 6. If toxicological data were not available for a given chemical, a suitable surrogate was selected, when possible, based on its similarity in chemical structure and physical properties. If a suitable surrogate could not be found for which relevant toxicological data were available, the chemical was deemed NDA. The risk for chemicals designated NDA could not be evaluated.

The critical NO(A)ELs selected for risk characterization are presented in Appendix B: Critical NO(A)ELs Selected for Risk Characterization.

5 Exposure Assessment

The third step in the HHRA was to estimate how much pesticide or adjuvant exposure an individual (referred to as a "receptor" for this HHRA) would receive (OEHHA, 2001a). Exposure is commonly defined as contact of visible external physical boundaries (i.e., external boundaries such as the mouth, nostrils, and skin) with a chemical. In an exposure assessment, factors related to human behavior and characteristics that affect their exposure are often utilized for both qualitative and quantitative purposes. These parameters that influence the extent to which a receptor is exposed to a chemical are referred to as exposure factors (USEPA, 2011p). Exposure is dependent upon the intensity, frequency, and duration of contact. The intensity of contact is typically expressed in terms of the concentration of chemical per unit mass or volume (i.e., µg/g, µg/L, mg/m^3, ppm, etc.) in the media (i.e., soil, air, water, etc.) to which receptor is exposed. Dose refers to the amount of chemical to which receptors are exposed that crosses the external boundary. Dose is dependent upon chemical concentration and the rate of intake (i.e., inhalation or ingestion) or uptake (i.e., dermal absorption) and may be normalized to receptor body weight as a function of time (i.e., mg/kg-day). The receptor average daily dose (ADD) rates is estimated as shown below:

$$ADD = \frac{C * CR * ED * EF}{BW * AT}$$

Where:

ADD = average daily dose (mg/kg-day);
C = chemical concentration (mg/L, mg/m^3; mg/cm^2, mg-medium/d);
CR = contact rate (L/day; m^3/day; cm^2/day, mg/d);
ED = exposure duration (years);
EF = frequency of exposure events (days/year);
BW = body weight (kg); and
AT = averaging time (days).

The chemical concentration (C), also expressed as an estimated environmental concentration (EEC), refers to the amount of pesticide residue in the media of interest, and contact rate (CR) refers to the rate of ingestion, inhalation, or dermal deposition per day. Exposure duration refers to the length of time that contact occurs and is affected by activity patterns. Exposure frequency (EF) is the number of exposure events over a specified time period. Body weight (BW) and averaging time (AT) are specific to the receptor and exposure scenarios being evaluated. For the average daily dose (ADD), a single-day exposure to a receptor was calculated using an exposure duration and averaging time of 1 day. For subchronic exposure, the subchronic average daily dose (SADD) is calculated using an averaging time factor, which is the number of days over which the exposure is averaged. In this HHRA, the subchronic averaging time was assumed to be 30 days, which is consistent with the exposure duration. Absorbed doses may be estimated by applying an absorption factor. For chronic exposure, the annual average daily dose (AADD) is calculated using an averaging time factor, which is the number of days over which the exposure is averaged. In this HHRA, the chronic averaging time is receptor-specific and consistent with methods used in the Statewide PEIR, unless otherwise specified. Absorbed doses may be estimated by applying an absorption factor.

The exposure assessment portion of the HHRA was divided into two parts. The first part was to estimate the concentration of pesticides in the environment through fate and transport processes. This included estimating the concentration of pesticide residues that may be found in the air, water, soil, and contained in/on the plant. This methodology took into account the total amount of pesticide applied, along with chemical-specific mechanisms of dispersal or degradation that may occur during or shortly after application. The next part in determining human exposure (ADD, SADD, and AADD) was to estimate how much of the EEC would be absorbed by the receptor. The three main uptake pathways addressed in the HHRA were inhalation, ingestion, and dermal absorption. Receptor exposure and estimated environmental concentrations (EECs) are each discussed in further detail below.

5.1 Conceptual Site Model

A conceptual site model (CSM) is a written and graphical presentation of predicted pathways between the pesticide application and receptor exposure (i.e., inhalation, dermal contact, or ingestion). It includes a description of the complete exposure pathways and outlines the primary release mediums, impacted media, and potential routes of exposure for each receptor. A complete exposure pathway exists when pesticide or adjuvant can be traced, or expected to travel, from the point of application to plants, soil, or air and eventually to a receptor. An exposure pathway that is not complete means that it is unlikely for that receptor to be exposed to a pesticide or adjuvant through that exposure pathway. The CSM identifies multiple pathways through which receptors can be exposed to pesticides as part of the Proposed Program.

Receptors that were considered for exposure included the Mixer-Loader-Applicator (MLA), Post-Application Loader (PAL), Combined-Nursery Worker (CNW), Downwind Bystander (DWB), Post-Application Resident (PAR), and the During and Post-Application Resident (DPAR). The MLA is the occupational worker who mixes, loads, and applies pesticide and adjuvant products. The PAL is a nursery employee that transports treated, containerized plants. The CNW is an occupational worker who is assumed to both handle pesticides and loads treated plants (i.e., a combination of the MLA and the PAL). The DWB is any human receptor 25 feet away from an application in a residential or nursey setting who may be exposed to off-site drift. The PAR is an individual living in an urban/residential area who has the potential to come into contact with active, inert, or adjuvant residues following residential treatments. The DPAR is a person present 25 feet downwind of a residential application and also has the potential to be exposed to pesticide, inert, or adjuvant residues after the treatment (i.e., a combination of the DWB and PAR). The receptors considered will be discussed in greater detail in Section 5.4.

The starting point of the CSM is the application technique which considers the release of pesticide and/or adjuvant into the environment. The next exposure step following an application depends on the environmental media that pesticide and/or adjuvant reaches after application. Pesticide and/or adjuvant residues may be found in the soil, air, water, turf, and vegetation, and receptors present at the time of the application. Turf or other plants present within the treated area may be exposed to pesticide via direct application, drift, and uptake from the soil.

Following an application, the potential exists for off-site movement via aerial drift (hereinafter referred to as "drift") such that pesticide and/or adjuvant residues may be present in surfacewater and adjacent untreated areas. Downwind Bystanders (DWBs) may be present and be exposed to a pesticide and/or adjuvant by aerial drift through the inhalation or dermal pathways. Note that, for soil drench , off-site drift is minimal as applications are not made when wind is present, low-pressure nozzles are used, water droplet sizes are large, and all spray is directed at the ground.

Once a pesticide and/or adjuvant is present in an environmental media, three routes of exposure exist for a receptor to become exposed: ingestion, dermal, and inhalation.

The CSMs for applications in nursery and residential settings the Proposed Program are presented in Figure 1-Figure 3.

Figure 1: Pierce's Disease Control Program Activities Nursery Conceptual Site Mode1

Primary Source	Primary Release	Secondary Source	Impacted Media	Exposure Routes	Adult, 2<16 Child, 0<2 Child Downwind Bystander (DWB)	Mixer/Loader/ Applicator (MLA)	Post-Application Loader (PAL)	Combined Nursery Worker (CNW)
Foliar Application (Backpack Sprayer, Mechanically Pressurized Sprayer, Hydraulic Sprayer, Boom Sprayer, Aerial)			Air	Dermal	X	X	O	X
				Inhalation	X	X	O	X
	Droplets, Vapor or Mist		Soil	Dermal	O	O	X	X
				Incidental Ingestion	O	O	O	O
		Treated Vegetation	Ornamental and Edible Vegetation	Dermal	O	X (a)	X	X
				Hand-to-Mouth	O	O	O	O
				Dermal	O	X	X	X
				Hand-to-Mouth	O	O	O	O
				Intentional Ingestion	O	O	O	O

Key:
X - Complete Exposure Pathway
O - Incomplete, Inconsequential, or *De Minimis* Exposure Pathway

Notes:
(a) The MLA is not expected to come into dermal contact with treated plants
Worker exposure scenarios assume that all appropriate personal protective equipment (PPE) is worn according to the product label and California law
MLA, PAL, and CNW were not evaluated for pesticide ingestion because it was assumed these receptors are properly trained not to consume pesticide
No exposure was evaluated for the post-purchase consumer to treated plants in nursery

Figure 2: Pierce's Disease Control Program Activities Residential Conceptual Site Model - Foliar

Primary Source	Primary Release	Secondary Source	Impacted Media	Exposure Routes	Mixer/Loader/ Applicator (MLA)	Adult, 2<16 Child, 0<2 Child Downwind Bystander (DWB)	Adult Post-Application Resident (PAR)	2<16 Child Post-Application Resident (PAR)	0<2 Child Post-Application Residents (PAR)	Adult During & Post-Application Residents (DPAR)	2<16 Child During & Post-Application Residents (DPAR)	0<2 Child During & Post-Application Residents (DPAR)
Foliar Sprayers (Backpack Sprayer, Mechanically Pressurized Sprayer)			Air	Dermal	X	X	O	O	O	X	X	X
				Inhalation	X	X	O	O	O	X	X	X
	Droplets, Vapor, or Mist		Turf/ Ground cover	Dermal	O	O	X	X	X	X	X	X
				Hand-to-Mouth	O	O	O	X	X	O	X	X
				Object-to-Mouth	O	O	O	X	X	O	X	X
			Soil	Dermal	O	O	X	X	X	X	X	X
				Pica Ingestion	O	O	O	X	X	O	X	X
		Treated Vegetation	Landscape Vegetation	Dermal	X	O	X	X	X	X	X	X
				Hand-to-Mouth	O	O	O	X	X	O	X	X
				Ingestion Edible Vegetation	O	O	X	X	X	X	X	X

Key:
X - Complete Exposure Pathway
O - Incomplete, Inconsequential, or *De Minimis* Exposure Pathway

Notes:
Worker exposure scenarios assume that all appropriate personal protective equipment (PPE) is worn according to the product label and California law
MLA was not evaluated for pesticide ingestion because it was assumed this receptor is properly trained not to consume pesticide
Exposure pathways for incidental soil ingestion expected to be *de minimis* compared to pica soil ingestion
For exposure via hand-to-mouth, object-to-mouth, and soil ingestion, the Child PARs were assumed to be health protective of the adult PAR

Figure 3: Pierce's Disease Control Program Activities Residential Conceptual Site Model - Soil Drench

Primary Source	Primary Release	Secondary Source	Impacted Media	Exposure Routes	Mixer/Loader / Applicator (MLA)	Adult, 2<16 Child, 0<2 Child Downwind Bystander (DWB)	Adult Post-Application Resident (PAR)	2<16 Child Post-Application Resident (PAR)	0<2 Child Post-Application Residents (PAR)	Adult During & Post-Application Residents (DPAR)	2<16 Child During & Post-Application Residents (DPAR)	0<2 Child During & Post-Application Residents (DPAR)
Soil Drench (Mechanically Pressurized Sprayer), Soil Injection	→		Air	Dermal	X	O	O	O	O	O	O	O
				Inhalation	X	O	O	O	O	O	O	O
	→	Saturated Soil	Landscape Vegetation	Dermal	O	O	O	O	O	O	O	O
				Hand-to-Mouth	O	O	O	O	O	O	O	O
				Ingestion Edible Vegetation	O	O	X	X	X	X	X	X
			Soil/Thatch	Dermal	O	O	X	X	X	X	X	X
				Pica Ingestion	O	O	O	X	X	O	X	X

Key:

X - Complete Exposure Pathway

O - Incomplete, Inconsequential, or *De Minimis* Exposure Pathway

Notes:

Worker exposure scenarios assume that all appropriate personal protective equipment (PPE) is worn according to the product label and California law

Inhalation exposure to the appliator is considered *de minimis* during direct application to soil. However, the USEPA Occupational Pesticide Handler Exposure Database (USEPA, 2016c) does not distinguish the ML from the MLA. As a result, the exposure to the MLA was considered health protective of the ML

MLA was not evaluated for pesticide ingestion because it was assumed this receptor is properly trained not to consume pesticide

Ground-directed soil drench applications are expected to result in *de minimis* drift to downwind bystanders

For exposure via soil ingestion, the Child PARs were assumed to be health protective of the adult PAR

Exposure pathways for incidental soil ingestion expected to be *de minimis* compared to pica soil ingestion

Dermal exposure due to overspray on turf during soil drench applications is expected to be *de minimis* compared to direct dermal exposure to treated soil

Soil drench applications are considered health protective of soil injection applications, due to the greater anticipated exposure via drench application

5.2 Physical, Chemical, and Environmental Fate Properties

Consistent with the methods described in the Statewide PEIR, data on physical, chemical, and environmental fate (PCF) properties were reviewed from the sources below. Any sources utilized during previous Statewide PEIR analyses were also considered:

- USEPA Reregistration Eligibility Decision (RED) documents (USEPA, 2017e)
- DPR Risk Characterization Documents (RCD) (DPR, 2017a)
- ATSDR Toxicological Profiles (ATSDR, 2017a)
- Hazardous Substances Data Bank (HSDB) (HSDB, 2017a)

Final PCF values utilized in the risk analysis were calculated consistent with the methods described in the Statewide PEIR. The PCF data selected and estimated final values are available in Appendix C: Physical, Chemical, and Fate Properties Selected for Exposure Analysis.

5.3 Estimating Pesticide Environmental Concentrations

The EEC is defined as the predicted concentration of pesticide within an environmental compartment (i.e., soil, water, plant tissue, or a specific organism) based on estimates of quantities applied, application methods, chemical-specific fate and transport properties, and the nature and characteristics of the application and surrounding area.

Because no empirical data are available for the Proposed Program, EECs are estimated using various models that have been developed for use in risk assessments. These models are designed to use conservative assumptions and in many cases are not capable of modeling all of the complex fate and transport processes that can occur once a pesticide and/or adjuvant is(are) released into the environment. Typical fate properties that tend to decrease the concentration of pesticide chemicals include aerobic degradation, anaerobic degradation, photodegradation, absorption, solubilization, and volatilization. Key transport properties that may not be accounted for are dilution and partial transfer between media such as plants, soil, water, and air. Therefore, most of the EECs represent an upper-bound, conservatively high value since not all fate and transport properties have been modeled.

Most procedures for estimating EECs for the Proposed Program are consistent with those used in the Statewide PEIR (CDFA, 2014a). The assumptions that differ between the Proposed Program and the Statewide PEIR (CDFA, 2014a) are presented below.

Please see Section 3.1 for specific details about the Program scenarios assessed.

5.3.1 Occupational Exposure Values

For occupation exposure assessments (e.g., mixer-loader-applicator), unit exposures from USEPA's OPHED (USEPA, 2016c) were selected in accordance with methods described in USEPA's *Review of Worker Exposure Assessment Methods* (USEPA, 2007k). Selection of unit exposures was completed in a similar manner as presented in the Statewide PEIR (CDFA, 2014a). Refer to Section 4.2.1.6.1 Mixer-Loader-Applicator of the Statewide PEIR (CDFA, 2014a) for additional details.

Occupational unit exposures selected are presented in Section 7.2.

5.3.2 Pesticide Off-target Drift

Off-target drift of pesticide residues was estimated in a similar manner as presented in the Statewide PEIR (CDFA, 2014a). Methods for assessing ground applications in AgDRIFT (USEPA, 2017d) were followed, and in accordance with USEPA's *Overview of Issues Related to the Standard Operating Procedures for Residential Exposure Assessment* (USEPA, 1999f), a "Flagger" unit exposure (UE) from USEPA's *Occupational Pesticide Handler Exposure Database* (OPHED) (USEPA, 2016c) was used to assess exposure to off-target drift to the Downwind-Bystander. Refer to Section 4.2.1.4.3 Pesticide Off-target Drift and Section 4.2.1.6.5 Downwind-Bystander of the Statewide PEIR (CDFA, 2014a) for additional details.

Flagger unit exposures and AgDRIFT estimated percent deposition are presented in Section 7.2.

5.3.3 Soil

5.3.3.1 Residential

Concentrations in soil beneath treated ornamental plants or fruit trees in residential settings were used to estimate exposure from dermal contact and ingestion of soil. The soil was assumed to receive 100% of the Merit 2F from direct application via soil drench scenarios and 20% of the applied Merit 2F from drift in foliar applications (Linders *et al.*, 2000). Imidacloprid and glycerin in the soil were assumed to be available for potential exposure directly through soil and through uptake into plant tissue.

Soil concentrations for acute duration exposure conditions in residential settings are represented by the peak residue concentrations in soils immediately following an application. For additional details on estimation methods, refer to the Acelepryn Residential Foliar and Turf Japanese Beetle Human Health Risk Assessment, Section 5.2.1 (CDFA, 2017a).

Soil concentrations for subchronic duration exposure in residential settings represent the maximum 30-day daily average concentration that could occur over one year.

Soil concentrations for chronic duration exposure in residential settings represent the daily concentration averaged over a 365-day period. For additional details on estimation methods, refer to the Acelepryn Residential Foliar and Turf Japanese Beetle Human Health Risk Assessment, Section 5.2.1 (CDFA, 2017a).

5.3.3.2 Nursery

Concentrations in the soil of potted plants were used to estimate worker exposure from dermal contact with soil in nursery settings. The soil was assumed to receive 20% of the applied Safari 20 SG, No Foam B, or Marathon II Greenhouse and Nursery Insecticide from drift in foliar applications (Linders *et al*., 2000). Both active and inert ingredients in the soil were assumed to be available for potential exposure directly through soil.

To assess acute, subchronic, and chronic exposure in nursery settings, the initial soil concentration following an application was utilized. Although it is assumed that workers will follow the Restricted Entry Interval (REI) in accordance with label language and California law, no accumulation or environmental degradation was accounted for. It is assumed workers in nursery settings will come into contact with treated soil following an application prior to transportation of the containerized plant.

Estimated soils concentrations are presented in Section 7.2

5.3.4 Surface Residues on Non-Edible Vegetation

5.3.4.1 Residential

Imidacloprid and glycerin EECs on foliar surfaces were used to estimate exposure from dermal contact with plant surfaces. The surface of non-edible vegetation in residential settings was assumed to intercept 80% of the applied active ingredients with 20% lost to drift in foliar application scenarios (Linders *et al.*, 2000). This degree of canopy interception (80%) was considered representative for plants likely to be treated as part of the Proposed Program.

In soil drench applications, deposition of pesticide on the surface of non-edible vegetation was considered *de minimis*.

Post-application imidacloprid and glycerin EECs on vegetation that are available for dermal transfer to a receptor's skin are referred to as dislodgeable foliar residue (DFR_t). The method for estimating the residential DFR_t is derived from a modification of the USEPA's Standard Operating Procedures for Residential Pesticide Exposure Assessment (SOP) (USEPA, 2012l) as follows:

$$DFR_t = AR * F_{AR} * (1 - F_D)^t * CF_1 * CF_2 * CIF$$

Where:

DFR_t = Dislodgeable foliar residue (t) days after application (µg/cm^2)
AR = Application rate (lb a.i./acre)
F_{AR} = Fraction of transferable a.i.
F_D = Fraction of residue that dissipates per day
t = Time after application (days)
CF_1 = Weight conversion factor (µg/lb)
CF_2 = Area unit conversion factor (acre/cm^2)
CIF = Canopy Interception Factor (%)

The F_{AR} was left unchanged from the default USEPA SOP value of 0.25, and the F_D was modified to reflect the rate at which imidacloprid or glycerin dissipates per day. The F_D was calculated by determining the percent of imidacloprid or glycerin remaining 1 day after application, using a foliar half-life of 4 days for imidacloprid and 0.6 days for glycerin and the equation for first-order rate kinetics (USEPA, 2012l). Using this method, the residue concentration after 1 day was estimated to be 84.09% for imidacloprid; therefore, the percent of imidacloprid residue that dissipates per day is 15.91%. The residue concentration after 1 day was estimated to be 31.50% for glycerin; therefore, the percent of glycerin residue that dissipates per day is 68.50%. The equation of first-order rate kinetics is given below:

$$C_t = C_0 e^{-kt}$$

Where:

C_t = Concentration on Day t following the application
C_0 = Concentration on Day 0 (immediately following application)
e = 2.718
k = 0.693/half life
t = time (days)

See Appendix C for the foliar half-lives used to calculate the surface residues of pesticide on non-edible foliage for a specific chemical.

A summary of the exposure factors used in estimating residential DFR_t is given in Table 2.

Table 2: Exposure Factors Used in Estimating Residential DFR_t

Chemical	F_{AR}	F_D	t (days)	CIF (unitless)	Foliar Half-Life (days)
Imidacloprid	0.25	0.1591	0-365	0.8	4
Glycerin		0.685			0.6

For estimating residue concentrations for acute exposures, dermal contact was assumed to occur immediately after application without any degradation, and the DFR_t value represents the peak concentration.

For subchronic exposures, dermal contact was assumed to occur every day over 30 days. The subchronic DFR_t value represents the maximum 30-day average concentration on foliage that could occur over a 365-day period.

For chronic exposures, dermal contact was assumed to occur every day for 365 days, so the estimated daily foliar concentration was averaged over a 365-day period. The chronic DFR_t value represents the 365-day average concentration on foliage assessed over the course of a year.

Residential DFR_t concentration results are presented in Section 7.2.

5.3.4.2 Nursery

The surface of non-edible vegetation in nursery settings was assumed to intercept 60% of the applied pesticide in foliar application scenarios (USEPA, 2006q). This percent of pesticide retained to foliage was considered representative for plants likely to be treated as part of the Proposed Program.

The equation for estimating the occupational DFR_t is the same as the residential DFR_t, which can be found in Section 5.3.4.1

DFR_t concentrations for acute, subchronic, and chronic duration exposure in nursery settings represent the initial concentration following a single application. Because it is assumed workers in nursery settings will come into contact with treated foliage immediately following application, accumulation from multiple applications and environmental degradation were not considered. Therefore, it is assumed no pesticide residue dissipates per day.

A summary of the exposure factors used in estimating occupational DFR_t is given in Table 3.

Table 3: Exposure Factors Used in Estimating Occupational DFR_t

Chemical	F	t (days)	F_D
Imidacloprid	0.6	0	0
Glycerin	0.6	0	0

Although it is assumed that workers will follow the REI in accordance with label language and California law, no accumulation or environmental degradation was accounted for in the estimated exposure. It is assumed workers in nursery settings will come into contact with treated soil following an application prior to transportation of the containerized plant.

5.3.5 Edible Vegetation Residue

Uptake by plants from soil in residential settings was estimated in a similar manner to that used in the ERA of the Statewide PEIR (CDFA, 2014a) with the exception that a revised Briggs' Equation was used based on the updated version in USEPA (2014a). Complete details regarding how the Briggs' equation is used appear in the Statewide PEIR (CDFA, 2014a). Consistent with guidance in USEPA (2014a), if the Octanol/Water Partition Coefficient (Log K_{ow}) was greater than 5.0, no uptake was assumed. When the Log K_{ow} is negative, the Transpiration Stream Concentration Factor (TSCF) is assumed to be 1.0 (Collins *et al*., 2006).

No exposure was evaluated for the post-purchase consumption of treated plants in nursery settings.

For estimating imidacloprid and glycerin concentrations in edible vegetation for acute, subchronic, and chronic exposures, uptake by plants from soil was conservatively assumed to occur without any degradation, and tissue concentrations were represented by the peak concentration. For assessing the concentration of imidacloprid and glycerin in the tissue of edible vegetation in soil drench applications, it was assumed 100% of pesticide was available for uptake in soil. For assessing the concentration of imidacloprid and glycerin in the tissue of edible vegetation due to drift following a foliar application, it was assumed 20% of pesticide was available for uptake in soil (Linders *et al.*, 2000).

First, the K_{ow}-specific Transpiration Stream Concentration Factor (TSCF) was calculated to estimate the relative potential for the translocation of a chemical within a plant, based on the equation:

$$\text{TSCF} = [-0.0648 \times (\text{Log } K_{ow})^2 + 0.241 \times \text{Log } K_{ow} + 0.5822]$$

Where:
TSCF = Transpiration Stream Concentration Factor
K_{ow} = Octanol/Water Partition Coefficient (unitless)

Using the TSCF and other inputs as described below, the Briggs' equation is utilized to yield the Terrestrial Vegetation Uptake Factor (VUF) in wet weight:

$$\text{Terrestrial VUF} = ([10^{(0.95 \times \text{Log } K_{ow} - 2.05)} + 0.82] \times \text{TSCF} \times \left[\frac{\rho}{\theta + \rho \times K_{oc} \times f_{oc}}\right])$$

Where:
VUF = Vegetation uptake factor
K_{ow} = Octanol/Water Partition Coefficient (unitless)
ρ = soil bulk density (g/cm^3)
θ = soil-water content by volume (cm^3/cm^3)
K_{oc} = soil organic carbon-water partitioning coefficient (cm^3/g-organic carbon or L/kg-organic carbon)
f_{oc} = fraction of organic carbon in the soil

The values of ρ, θ, and f_{oc} are from Pesticide Root Zone Model (PRZM) data for California residential soil profiles for Tierra soils. Please see the Pesticide in Water Active and Inert Ingredients and Adjuvants section of the ERA for more details. The total concentration of imidacloprid and glycerin in plant tissue was estimated by multiplying the Terrestrial VUF and the concentration of imidacloprid or glycerin available in the soil, as seen below.

$$EEC_{Briggs} = \text{VUF} * \text{Soil Concentration}$$

For foliar applications, it was assumed that 100% of applied pesticide was retained on edible vegetation surface. Soil drench scenarios assumed no Merit 2F is applied to foliage.

To estimate surface residues on edible foliage, the USEPA's Terrestrial Residue EXposure (T-REX) model (Version 1.5; USEPA, 2012i) was used. Using chemical-specific data, T-REX estimated the imidacloprid and glycerin concentrations on terrestrial vegetation. Receptors were assumed to consume vegetation from the fruits and seeds category. For more details, please see the Statewide PEIR (CDFA, 2014a) and HHRA Report.

Imidacloprid and glycerin concentrations in and on edible vegetation for acute duration exposure conditions are represented by the peak residue concentrations. For additional details on estimation methods, refer to the Statewide PEIR Section 2.3 (CDFA, 2014a).

To estimate the subchronic incidental ingestion of imidacloprid and glycerin residues in and on edible vegetation, the acute edible vegetation EEC was used to estimate the subchronic exposure. This method likely overestimates exposure to pesticide residues from consumption of edible vegetation because the peak concentration is assumed constant over thirty days (i.e., the peak concentration of imidacloprid and glycerin do not degrade). However, this methodology is health protective of the subchronic scenario and was estimated for the sake of completeness.

To estimate the chronic incidental ingestion of imidacloprid and glycerin residues in and on edible vegetation, the acute edible vegetation EEC was used to estimate the chronic exposure. This method likely overestimates exposure to pesticide residues from consumption of edible vegetation because the peak concentration is assumed constant over the year (i.e., the peak concentration of imidacloprid and glycerin do not degrade) and the seasonal nature of fruit makes repeated exposures from this route throughout the entire year unlikely. However, this methodology is health protective of the chronic scenario and was estimated for the sake of completeness.

In this risk assessment, it is assumed that consumption of edible vegetation will occur without any degradation or external measures like washing to reduce pesticide residue. However, under the Proposed Program, notices are posted that instruct residents to wash exposed edible vegetation prior to consumption. Therefore, the pesticide concentration on edible vegetation estimated in this HHRA is likely an overestimation.

The exposure factors used in estimating imidacloprid and glycerin concentrations in and on edible vegetation are summarized in Table 4.

Table 4: Exposure Factors Used in Estimating Edible Vegetation Residues

Chemical	Application Target	Log K_{ow}	ρ (g/cm3)	θ (cm^3/cm^3)	K_{oc} (cm3/g)	f_{oc}	Soil EEC (mg/kg)	Drift
Imidacloprid	Foliar	0.568	1.5	0.309	322	1.74	See Section 7.2	0.2
	Soil							1
Glycerin	Foliar	-1.76			4		See Section 7.2	0.2
	Soil							1

Edible vegetation residue concentration results are presented in Section 7.2.

5.3.6 Transferable Turf Residue

In residential foliar application scenarios, 20% of the pesticide applied to foliage was assumed to drift onto turf and groundcover (Linders *et al.*, 2000). Imidacloprid and glycerin EECs on turf surfaces were used to estimate exposure from dermal contact with turf and incidental hand-to-mouth ingestion of pesticide residues. Overspray in soil drench applications onto turf and groundcover was considered *de minimis*.

Post-application imidacloprid and glycerin on turf surfaces that are available for dermal transfer to a receptor’s skin and hand-to-mouth ingestion are referred to as transferable turf residues

(TTRs). The method for estimating the TTR_t was selected from USEPA's Standard Operating Procedures for Residential Pesticide Exposure Assessment (SOP) (USEPA, 2012l). The following equation was used to estimate the TTR_t.

$$TTR_t = AR * F_{AR} * (1 - F_D)^t * CF_1 * CF_2 * Dt\mathrm{T}$$

Where:

TTR_t = Transferable turf residue (t) days after application (µg/cm^2)
AR = Application rate (lb a.i./acre)
F_{AR} = Fraction of transferable a.i.
F_D = Fraction of residue that dissipates per day
t = Time after application (days)
CF_1 = Weight conversion factor (µg/lb)
CF_2 = Area unit conversion factor (acre/cm^2)
DtT = Drift to Turf (%)

The F_{AR} was left unchanged from the default USEPA SOP value of 0.01, and the F_D was modified to reflect the rate at which imidacloprid and glycerin dissipate per day. The F_D was calculated by determining the percent of imidacloprid and glycerin remaining 1 day after application, using the foliar half-life of 4 days for imidacloprid and 0.6 days for glycerin and the equation for first-order rate kinetics (USEPA, 2012l). Using this method, the residue concentration after 1 day of imidacloprid was calculated to be 84.09%; therefore, the percent of imidacloprid that dissipates per day is 15.91%. The residue concentration after 1 day of glycerin was calculated to be 31.50%; therefore, the percent of glycerin that dissipated per day is 68.50%. The equation of first-order rate kinetics is as follows:

$$C_t = C_O e^{-kt}$$

Where:

C_t = Concentration on Day t following the application
C_0 = Concentration on Day 0 (immediately following application)
e = 2.718
k = 0.693/half life
t = time (days)

A summary of the exposure factors used in estimating TTR_t is given in Table 5.

Table 5: Exposure Factors Used in Estimating TTR_t

Chemical	F_{AR}	F	t (days)	DtT	Foliar Half-Life (days)
Imidacloprid	0.01	0.1591	0-365	0.2	4
Glycerin		0.315			0.6

For estimating imidacloprid and glycerin concentrations for acute exposures, dermal contact with turf was assumed to occur immediately after an application. The acute TTR_t value represents the peak concentration on turf over the course of a year, taking into account the possibility of imidacloprid and glycerin accumulation when multiple applications occur.

For estimating imidacloprid and glycerin concentrations in subchronic exposures, dermal contact was assumed to occur every day for 30 days. The subchronic TTR_t value represents the maximum 30-day average on turf over the course of a year, taking into account the possibility of imidacloprid and glycerin accumulation when multiple applications occur.

For chronic exposures, dermal contact was assumed to occur every day for 365 days, so the estimated daily TTR_t was averaged over a 365-day period. The chronic TTR_t value represents the 365-day average concentration on turf assessed over the course of a year, taking into account the possibility of imidacloprid and glycerin accumulation when multiple applications are done under the Proposed Program.

Contact of pesticide residue with turf was not considered for nursery settings.

TTR_t concentration results are presented in Section 7.2.

5.3.7 Water Ingestion, Surfacewater, and Groundwater

Databases from authoritative and reliable sources such as the California Department of Pesticide Regulation (DPR) Surface Water Monitoring Database (SURF), United States Department of Agriculture Pesticide Data Program (PDP), and State Water Resources Control Board (SWRCB) California Environmental Data Exchange Network (CEDEN) were queried for data to evaluate the potential presence of pesticides from the Proposed Program to drinking water. These databases contain surface and groundwater monitoring data for a variety of chemicals, including some included in the Proposed Program.

Data were gathered for detections in both surface and groundwater. Unless otherwise specified, data from all years available in a given database were reviewed into this assessment.

5.3.7.1 Surfacewater

5.3.7.1.1 Evaluation of Monitoring Data

The presence of pesticides in surfacewater was evaluated using monitoring data from the SURF and CEDEN databases. Based on the surfacewater data available from the SURF and CEDEN databases, dinotefuran and imidacloprid have been detected in California surfacewaters (SWRCB, 2017a; DPR, 2017c). Concentrations of dinotefuran and imidacloprid across the databases ranged from below the detection limit to a maximum of 1.89 and 12.7 µg/L, respectively (SWRCB, 2017a; DPR, 2017c).

Based on reported presence of imidacloprid and dinotefuran detected in surfacewater and groundwater, and because some detection sites included drinking water or were identified as potential sources drinking water, the potential risk from consumption of contaminated drinking water was evaluated using modeling data. Monitoring data was not used to quantitate risk, as it is not informative of activities specifically by the proposed program, but instead includes all sources of chemical introduced into the environment. It is useful for qualitatively determining the potential for pesticides to reach surfacewater bodies, as discussed below.

For review of the POE-nonylphenol breakdown product, nonylphenol, in surfacewater, see Appendix G.

5.3.7.1.2 Evaluation Using Modeling Data

Consistent with the approach utilized by DPR (2017b), the concentration of pesticides in surfacewater was estimated using the Pesticides in Water Calculator (PWC) for the active and inert ingredients utilized in the Proposed Program. The PWC is a model designed by the USEPA to estimate the concentration of pesticide ingredients in surface waters resulting from drift, runoff, and/or erosion during and after pesticide applications (USEPA, 2017c). Model details, run parameters, and calculated EECs are discussed and presented in the Ecological Risk Assessment. In the analysis, individuals were conservatively assumed to consume exclusively from the contaminated source.

The PWC estimates multiple EECs, including the peak concentration and the 4-day, 21-day, 60-day, 90-day, and 365-day average. Each of these limnetic concentrations were used to assess acute, subchronic, and chronic exposure to surfacewater potentially used as drinking water. In addition to PWC estimated EECs, exposure factors and guidance from the USEPA's Risk Assessment Guidance for Superfund (RAGS) and Department of Toxic Substances Control (DTSC) Default Exposure Factors for Human Risk Assessment (DTSC, 2014a) were used to estimate exposure (USEPA, 1989e; USEPA, 2014d). The Index Lifestages (ILS) selected to characterize risk for all age groups were the 0-<6 year-old and Adult. These ILS are considered health protective for all age groups.

The following equation was used to estimate the Drinking Water Exposure (DWE):

$$DWE = \frac{IR_w * EEC * CF_1}{BW}$$

Where:

DWE = Drinking water exposure (mg/kg-day)
IR_w =Water intake rate (L/day)
EEC = Estimated environmental concentration (µg/L)
BW = Body weight (kg)
CF1 = Conversion factor (mg/µg)

A summary of the exposure factors used in estimating DWE are presented in Table 6: Exposure Factors Used to Estimate Drinking Water Exposure from Surfacewater .

Table 6: Exposure Factors Used to Estimate Drinking Water Exposure from Surfacewater

Index Lifestage	IR_w (L/day)	BW (kg)	EEC (ug/L)
0-<6 year-old	0.78	15	See Chemical Specific PWC Values (Appendix D)
Adult	2.5	80	

Estimates of exposure were then compared to chemical-specific oral NO(A)ELs with the acute oral NO(A)EL being compared to peak concentration and 4-day average, the subchronic oral NO(A)EL to the 21-day, and 60-day average, and the chronic oral NO(A)EL to the 90-day and 365-day average. To estimate non-cancer risk, margins of exposure (MOEs) were calculated using methodology presented in Section 6.1 and oral NO(A)ELs presented in Appendix B. The results of this analysis are presented in Appendix D. Note that cancer risk was not characterized in this risk assessment because none of the active or inert ingredients show evidence of carcinogenicity (USEPA, 2015a).

None of the estimated MOEs were below the target MOE of 100 (adults) or 300 (children) and all were more than three orders of magnitude higher than the target MOE, indicating that the contribution to risk from ingestion of surfacewater containing pesticides used by the Program is not anticipated to result in adverse impacts to human health.

5.3.7.2 Groundwater

Based on the groundwater data available from DPR Annual Well Sampling Reports and USDA PDP databases, of the pesticides evaluated in this HHRA, only imidacloprid has been detected in California groundwater (DPR, 2016d; USDA, 2017b). Based on the last 6 years (2011-2016) of groundwater well data from DPR Annual Well Sampling Reports, imidacloprid has been detected in groundwater wells in California. Imidacloprid, which is included on the Groundwater Protection List (GWPL), was detected in 5 wells in Fresno in 2016. Detected concentrations ranged from 0.051 to 0.665 μg/L. All wells were located in Groundwater Protection Areas (GWPAs), but because they are likely shallow wells accessing first encountered groundwater, these sources are typically not used as sources of drinking water. For all other years, imidacloprid was either not detected or detected below the reporting limit of 0.05 μg/L. The PDP database reports detections of trace amounts of imidacloprid in 2010, 2011, and 2012 in groundwater, with concentrations ranging from 2.5 to 124 ng/L (USDA, 2017b).

To make a conservative estimate of potential risk from ingestion of groundwater containing imidacloprid, risk was estimated using the same methods and exposure factors used in the surfacewater assessment and an EEC of 0.665 μg/L, the maximum detected concentration reported in the DPR Annual Well Sampling Reports, was used. The source of imidacloprid in groundwater as reported by DPR is unknown. The estimated MOEs are presented in Table 7 below.

Table 7: MOEs for Ingestion of Groundwater Contaminated with Imidacloprid

Chemical	Index Lifestage	MOE		
		Acute	Subchronic	Chronic
Imidacloprid	0-<6 year old	2.60E+05	2.11E+05	1.65E+05
	Adult	4.33E+05	3.51E+05	2.74E+05

None of the estimated MOEs were below the target MOE of 100 (adults) or 300 (children) and all were more than two orders of magnitude higher than the target MOE, indicating that the contribution to risk from ingestion of contaminated groundwater is not anticipated to result in adverse health effects. For review of the POE-nonylphenol breakdown product, nonylphenol, in groundwater, see Appendix G.

5.4 Estimating Human Receptor Exposure

The exposure assessment estimates the dose, or amount of pesticide active or inert ingredient or adjuvant that different receptors may be exposed to under different application scenarios that would be a part of the Proposed Program. The exposure to pesticide or adjuvant ingredients varies for different types of receptors depending on the activities of a particular receptor and proximity to the application site. The following six types of receptors were assessed in this HHRA:

- Mixer-Loader-Applicator (MLA): Pesticide handlers
- Downwind Bystander (DWB): Residents or workers near the application site during application
- Post-Application Resident (PAR): Residents in the yard after pesticide application
- During and Post-Application Residents (DPAR): Residents near the application site during application and in yard after application
- Post-Application Loader (PAL): Nursery employee that transports containerized plants after application
- Combined-Nursery Worker (CNW): Nursery pesticide handler that also transports containerized plants

The potential health impacts, if any, to receptors can be estimated by comparing estimated exposure doses with the measures of toxicity. Descriptions of the methodology used to characterize risk are described in Section 6.1.

5.4.1 Exposure Routes

Depending on the activities and location of a particular receptor, ten exposure routes could potentially occur under acute, subchronic, and chronic duration exposure scenarios. The exposure routes considered in this HHRA are the following:

- Inhalation: Aerosols and vapors

- Dermal Exposure to Airborne Residues: Deposition onto skin
- Ingestion of Edible Vegetation Residues: Eating home-grown edible vegetation (e.g., fruit)
- Dermal Exposure to Residues on Vegetation: Contact to skin due to working or playing in treated areas
- Hand-to-Mouth Ingestion of Vegetation Residues: Unintentional ingestion of residue from vegetation through hand-to-mouth transfer
- Dermal Exposure to Residues on Turf: Contact to skin due to activities in treated areas
- Hand-to-Mouth Ingestion of Turf Residues: Unintentional ingestion of residue from activities on turf through hand-to-mouth transfer
- Object-to-Mouth Ingestion of Turf Residues: Unintentional ingestion of residue from activities on turf through object-to-mouth transfer
- Pica and Incidental Ingestion of Soil Residues: Deliberate and unintentional soil consumption
- Dermal Exposure to Residues in Soil: Skin contact due to working or playing in treated areas

A description of each of the six receptors identified in Section 5.4.1 is provided below. These receptor groups represent the groups with reasonable potential for exposure during the Proposed Program.

5.4.1.1 Mixer-Loader-Applicator

The mixer-loader-applicator (MLA) represents the combination exposure of a worker who may be occupationally exposed to pesticide active and inert ingredients or adjuvants while mixing, loading, and applying pesticides. The MLA is assumed to be exposed through dermal and inhalation routes. Ingestion was not evaluated for this receptor because the MLA is properly trained to minimize any hand-to-mouth transfers.

5.4.1.1.1 Acute Exposure Assessment

Acute exposure for the MLA was evaluated in the same manner as in the Statewide PEIR. Refer to the Statewide PEIR Appendix B Section 2.3 for more details about exposure assessment methodology for the MLA. USEPA's Occupational Pesticide Handler Exposure Database (OPHED) was most recently updated in November 2016, and unit exposure values were selected from the updated version (USEPA, 2016c).

The following equation was used to estimate the ADD:

$$ADD = \frac{AR * ATPD * UE * DAF}{BW * CF_1}$$

Where:
ADD = Average daily dose (mg/kg-day)
AR =Application rate (lb/ac)
ATPD = Acres treated per day (ac/day)
UE = Unit exposure (µg/lb)
DAF = Dermal absorption factor*
*Only applied for dermal exposure when acute endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)
CF_1 = Conversion factor (µg/mg)

A summary of the exposure factors used in estimating acute exposure to residues through dermal and inhalation to the MLA are given in Table 8.

Table 8: Exposure Factors Used in Estimating Acute Exposures to Residues to the MLA

Receptor	DAF	Body Weight[a] (kg)
Adult MLA	See Appendix C: for Chemical-Specific DAFs	80

1. EFH (USEPA, 2011p)

Refer to Section 7.2 for the OPHED unit exposures used for estimating exposure to the MLA.

5.4.1.1.2 Subchronic Exposure Assessment

Subchronic exposure for the MLA was evaluated in a similar manner as the chronic in the Statewide PEIR, except the exposure frequency was limited to the number of applications that could occur over 30 days and a DAF was only applied in the dermal exposure assessment if the subchronic NO(A)EL was extrapolated from an oral or inhalation endpoint. Additionally, the exposure duration and averaging time reflected the intermediate period of 30 days instead of the chronic exposure duration. The USEPA's Occupational Pesticide Handler Exposure Database (OPHED) was most recently updated in November 2016, and unit exposure values were selected from the updated version (USEPA, 2016c).

The following equation was used to estimate the SADD:

$$SADD = \frac{AR * ATPD * UE * DAF * EF * ED}{BW * AT * CF_1 * CF_2}$$

Where:

SADD = Subchronic average daily dose (mg/kg-day)
AR =Application rate (lb/ac)
ATPD = Acres treated per day (ac/day)
UE = Unit exposure (µg/lb)
DAF = Dermal absorption factor*
*Only applied for dermal exposure when subchronic endpoint was derived from an oral or inhalation study
EF = Exposure frequency (days/year)
ED = Exposure duration (days)
BW = Body weight (kg)
AT = Averaging time (days)
CF_1 = Conversion factor (µg/mg)
CF_2 = Conversion factor (days/years)

A summary of the exposure factors used in estimating subchronic exposure to residues through dermal and inhalation to the MLA are given in Table 9.

Table 9: Exposure Factors Used in Estimating Subchronic Exposures to Residues to the MLA

Receptor	DAF	Exposure Duration (days)	Averaging Time (days)	Body Weight[a] (kg)
Adult MLA	See Appendix C: for Chemical-Specific DAFs	30	30	80

a. EFH (USEPA, 2011p)

Refer to Section 7.2 for the OPHED unit exposures used for estimating exposure to the MLA.

5.4.1.1.3 Chronic Non-Cancer Exposure Assessment

Chronic exposure for the MLA was evaluated in the same manner as in the Statewide PEIR, except unit exposure values were selected from an updated version of the USEPA's Occupational Pesticide Handler Exposure Database (OPHED) (USEPA, 2016c). Refer to the Statewide PEIR Appendix B Section 2.3 for exposure assessment methodology.

The following equation was used to estimate the AADD:

$$AADD = \frac{AR * ATPD * UE * DAF * ED * EF}{BW * AT * CF_1 * CF_2}$$

Where:
AADD = Annual average daily dose (mg/kg-day)
AR =Application rate (lb/ac)
ATPD = Acres treated per day (ac/day)
UE = Unit exposure (µg/lb)
DAF = Dermal absorption factor*
*Only applied for dermal exposure when chronic endpoint was derived from an oral or inhalation study
ED = Exposure duration (years)
EF = Exposure frequency (days/year)
BW = Body weight (kg)
AT = Averaging time (years)
CF_1 = Conversion factor (µg/mg)
CF_2 = Conversion factor (days/year)

A summary of the exposure factors used in estimating chronic exposure to residues through dermal and inhalation to the MLA are given in Table 10.

Table 10: Exposure Factors Used in Estimating Chronic Exposures to Residues to the MLA

Receptor	DAF	Exposure Duration (years)	Averaging Time (years)	Body Weight[a] (kg)
Adult MLA	See Appendix C: for Chemical-Specific DAFs	20	20	80

a. EFH (USEPA, 2011p)

Refer to Section 7.2 for the OPHED unit exposures used for estimating exposure to the MLA.

5.4.1.1.4 Cancer Exposure Assessment

Because no active or inert ingredient used in the Proposed Program show evidence of carcinogenicity (USEPA, 2015a), cancer risk was not evaluated in this HHRA.

5.4.1.2 Downwind-Bystander

The downwind bystander (DWB) represents any adult or child that is downwind from a residential or nursery application site and has the potential to be exposed to off-site drift. In accordance with USEPA's *Overview of Issues Related to the Standard Operating Procedures for*

Residential Exposure Assessment (USEPA, 1999f), the DWB was assumed to be 25 feet away from the application site.

The DWB was subcategorized into a <2 year-old child, a 2-<16 year-old child, and a 16< year-old (i.e., adult) (USEPA, 2005q). Off-target drift is unlikely for ground-directed applications (e.g., soil drench applications) because the spray nozzles are operated under low pressure, generally remain low to the ground, and/or the spray droplets are larger and less mobile than foliar applications. The DWB was assumed to be exposed to pesticide residue through dermal and inhalation off-target drift for foliar and aerial applications only.

5.4.1.2.1 Acute Exposure Assessment

Acute exposure for the DWB was evaluated in the same manner as in the Statewide PEIR, except as described here. Refer to the Statewide PEIR Appendix B Section 2.3 for exposure assessment methodology. USEPA's Occupational Pesticide Handler Exposure Database (OPHED) was most recently updated in November 2016, and unit exposure values were selected from the updated version (USEPA, 2016c). DWB exposure was estimated identically for the three age-groups, except the body weights selected were 11.4 kg for the <2 year-old child DWB (data for 1<2 year-olds), 13.8 kg for the 2-<16 year-old child DWB (data for 2<3 year-olds), and 80 kg for the adult DWB (USEPA, 2011p).

The following equation was used to estimate the ADD:

$$ADD = \frac{AR * OSD * ATPD * UE * DAF}{BW * CF_1}$$

Where:

ADD = Average daily dose (mg/kg-day)
AR =Application rate (lb/ac)
OSD = Off-site drift (%)
ATPD = Acres treated per day (ac/day)
UE = Unit exposure (µg/lb)
DAF = Dermal absorption factor*
*Only applied for dermal exposure when acute endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)
CF_1 = Conversion factor (µg/mg)

A summary of the exposure factors used in estimating acute exposure to residues through dermal and inhalation to the MLA are given in Table 11.

Table 11: Exposure Factors Used in Estimating Acute Exposures to Residues to the DWB

Receptor	Index Lifestage	Dermal Absorption Factor (DAF)	Body Weight[a] (kg)
<2 DWB	1-<2 years	See Appendix C: for Chemical-Specific DAFs	11.4
2-<16 DWB	2-<3 years		13.8
Adult DWB	Adult		80

a. EFH (USEPA, 2011p)

Refer to Section 7.2 for the OPHED "Flagger" unit exposures and off-site drift used for estimating exposure to the DWB.

5.4.1.2.2 Subchronic Exposure Assessment

Subchronic exposure for the DWB to active and inert ingredients was evaluated in the same manner as the chronic exposure in the Statewide PEIR, except the number of applications per year (exposure frequency) was limited to the number of applications that could occur over 30 days. USEPA's Occupational Pesticide Handler Exposure Database (OPHED) was most recently updated in November 2016 and unit exposure values were selected from the updated version (USEPA, 2016c).

The following equation was used to estimate the SADD:

$$SADD = \frac{AR * OSD * ATPD * UE * EF * ED * DAF}{BW * AT * CF_1 * CF_2}$$

Where:

SADD = Subchronic average daily dose (mg/kg-day)
AR =Application rate (lb/ac)
OSD = Off-site drift (%)
ATPD = Acres treated per day (ac/day)
UE = Unit exposure (µg/lb)
EF = Exposure frequency (days/year)
ED = Exposure duration (days)
DAF = Dermal absorption factor*
*Only applied for dermal exposure when subchronic endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)
AT = Averaging time (days)
CF_1 = Conversion factor (µg/mg)
CF_2 = Conversion factor (days/year)

A summary of the exposure factors used in estimating subchronic exposure to residues through dermal and inhalation to the DWB are given in Table 12.

Table 12: Exposure Factors Used in Estimating Subchronic Exposures to Residues to the DWB

Receptor	Index Lifestage	Exposure Duration (days)	Averaging Time (days)	Dermal Absorption Factor (DAF)	Body Weight[a] (kg)
<2 DWB	1-<2 years	30	30	See Appendix C: for Chemical-Specific DAFs	11.4
2-<16 DWB	2-<3 years				13.8
Adult DWB	Adult				80

a. EFH (USEPA, 2011p)

Refer to Section 7.2 for the OPHED "Flagger" unit exposures and off-site drift used for estimating exposure to the DWB.

5.4.1.2.3 Chronic Exposure Assessment

Chronic exposure for the DWB was evaluated in the same manner as in the Statewide PEIR with exception to changes described in this paragraph. Refer to the Statewide PEIR Appendix B Section 2.3 for exposure assessment methodology.

For applications in residential and urban settings, the maximum consecutive years the program was anticipated to occur at a single residence was 5 years. Therefore, the exposure duration for the adult and 2-<16 year-old DWB was assumed to be 5 years for applications in residential and urban settings. The exposure duration for the 0-<2 year-old DWB was assumed to be the entirety of that lifestage (i.e., 2 years).

For applications in nursery settings, an exposure duration of 20 years was selected for the adult DWB based on an updated version of the Department of Toxic Substances Control (DTSC) Default Exposure Factors for Human Risk Assessment (DTSC, 2014a). Consistent with the Statewide PEIR and Statewide Japanese Beetle Eradication Program Human Health Risk Assessments, respectively, the 2-<16 year-old DWB and 0-<2 year-old DWB were assumed to be exposed to for the entire duration of that lifestage (i.e., 14 years and 2 years, respectively).

Unit exposure values for the DWB were selected from an updated version of the USEPA's Occupational Pesticide Handler Exposure Database (OPHED) (USEPA, 2016c).

The following equation was used to estimate the AADD:

$$AADD = \frac{AR * OSD * ATPD * UE * EF * ED * DAF}{BW * AT * CF_1 * CF_2}$$

Where:

AADD = Average daily dose (mg/kg-day)
AR =Application rate (lb/ac)
OSD = Off-site Drift (%)
ATPD = Acres treated per day (ac/day)
UE = Unit exposure (µg/lb)
DAF = Dermal absorption factor*
*Only applied for dermal exposure when chronic endpoint was derived from an oral or inhalation NO(A)EL
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body weight (kg)
AT = Averaging Time (years)
CF_1 = Conversion factor (µg/mg)
CF_2 = Conversion factor (days/year)

A summary of the exposure factors used in estimating chronic exposure to residues through dermal and inhalation to the DWB are given in Table 13.

Table 13: Exposure Factors Used in Estimating Chronic Exposures to Residues to the DWB

Receptor	Index Lifestage	Application Setting	Exposure Duration (years)	Averaging Time (years)	Dermal Absorption Factor	Body Weight[a] (kg)
<2 DWB	1-<2 years	Residential	2	2	See Appendix C: for Chemical-Specific DAFs	11.4
		Nursery				
2-<16 DWB	2-<3 years	Residential	5	5		13.8
		Nursery	14	14		
Adult DWB	Adult	Residential	5	5		80
		Nursery	20	20		

a. EFH (USEPA, 2011p)

Refer to Section 7.2 for the OPHED "Flagger" unit exposures and off-site drift used for estimating exposure to the DWB.

5.4.1.2.4 Cancer Exposure Assessment

Cancer exposure was not characterized in this risk assessment because none of the active or inert ingredients show evidence of carcinogenicity (USEPA, 2015a).

5.4.1.3 Post-Application Resident

The post-application resident (PAR) represents a typical receptor living in an urban or residential environment who has the potential to be exposed after treatments have been conducted under the Proposed Program. The PAR was conservatively assumed to be active in the gardens and lawns on his/her property and to consume home-grown edible vegetation (e.g., fruits). An adult resident was assumed to be exposed to residues on foliage, turf, and soil through dermal contact and through ingestion of home-grown edible vegetation. Child residents, ages <2 years old and 2-<16 years old, were assumed to be exposed to residues on foliage, turf, and soil through dermal contact, incidental ingestion of residues on turf from hand-to-mouth and object-to-mouth activity, incidental ingestion of residues on foliage from hand-to-mouth activity, and ingestion of soil and home-grown edible vegetation. Post-application inhalation exposure to imidacloprid and glycerin was not considered because of their low vapor pressure (7.00E-12 mmHg for imidacloprid and 1.58E-04 mmHg for glycerin).

For the purposes of this risk assessment, the resident was analyzed over three lifestages: <2 year-old child, 2-<16 year-old child, and adults 16 years of age and older (USEPA, 2005q). To estimate potential exposure for these three age-groups, guidance and exposure factors from sources including, but not limited to, USEPA's Standard Operating Procedures for Residential Pesticide Exposure Assessment (SOP) (USEPA, 2012l), USEPA's Risk Assessment Guidance for Superfund (RAGS) (USEPA, 1989e, USEPA, 2004i, USEPA, 2014d), and USEPA's

Exposure Factor's Handbook (EFH) (USEPA, 2011p) were selected. If exposure factors from various age-ranges (e.g., 3-<6 year-old, 6-<11 year-old, etc.) within each lifestage (e.g., 2-<16 year-old child) were available, the exposure factor from the age-range that resulted in the highest exposure was selected for each lifestage. The SOP designates "index lifestages" for specific exposure assessments. An index lifestage (ILS) represents "the lifestage of highest concern due to unique behavioral characteristics that may lead to higher levels of exposure." The USEPA determined these index lifestages through both "quantitative (e.g., exposure assessments) and qualitative (e.g., exposure and activity data) considerations," and assessment of the ILS is expected to "protect for the exposures and risks for all potentially exposed lifestages" (USEPA, 2012l). For estimating potential exposure in this risk assessment, the SOP index lifestage was assessed using the SOP guidance when available.

Unless otherwise specified, exposure factors drawn from the Exposure Factors Handbook (EFH) were based on data from a 21-<80+ year-old (USEPA, 2011p). Similarly, exposure factors from the Standard Operating Procedures for Residential Pesticide Exposure Assessment (SOP) were based on data from a 16-<80 year old (USEPA, 2012l).

5.4.1.3.1 Post-Application Resident Acute Exposure Assessment

Dermal Exposure to Residues in Soil

The <2 year-old child PAR, 2-<16 year-old child PAR, and the adult PAR were assumed to be dermally exposed to imidacloprid and glycerin residues in garden soil or bare spots on lawns. Methods and exposure factors from the USEPA's RAGS (USEPA, 2004i, USEPA, 2014d), USEPA EFH (USEPA, 2011p), and USEPA's SOP (USEPA, 2012l) were used in this assessment. Exposure factors for a 1-<2 year-old and a 2-<3 year-old were selected to represent the <2 year-old child and 2-<16 year-old child PARs, respectively. For certain exposure factors, data were not available for the 2-<3 year-old lifestage index. In those instances, values from other lifestages were selected as surrogates.

To estimate the ADD, the peak imidacloprid and glycerin residue estimated to be in soil, as described in section 5.3.3, was multiplied by the resident's skin surface area that typically contacts soil, a soil-to-skin adherence factor, the number of times the resident is expected to come into contact with treated soil per hour, the number of hours per day the receptor was anticipated to spend in a treated area, a dermal absorption factor, and divided by the resident's body weight. A surface area of 6,032 cm^2/event was selected for an adult PAR, based on the mean surface area of an adult (USEPA, 2014d). A surface area of 2373 cm^2/event was selected for a 2-<16 year-old child PAR based on the weighted average of a 0-<6 year-old (USEPA, 2014d). A surface area of 610 cm^2/event was used for a <2 year-old child PAR, based on the 95th percentile for total body surface area of a 1-<2 year-old child (USEPA, 2011p). The soil adherence factor (AF) used for an adult was 0.07 mg/cm^2, based on the 50th percentile of a gardener in a high activity setting (USEPA, 2014d; USEPA, 2004i). A soil adherence factor of 0.2 mg/cm^2 was used for both child PARs, based on the 95th percentile of a 1-<6 year-old child (USEPA, 2014d; USEPA, 2004i). The adult PAR was assumed to spend 2.2 hours per day outside in treated areas and the two child PARs were assumed to spend 1.1 hours per day outside in treated areas, based on the arithmetic mean of adults and for 6-<11 year-old activity in gardens, respectively (USEPA, 2012l). The adult and both child PARs were assumed to contact soil 71 times per hour, based on the 90th percentile soil contact rate of both hands of a 1 to 5 year-old child (USEPA, 2011p). The mean body weights for a 1-<2 year-old, 2-<3 year-old, and adult were used for the <2 year-old PAR, 2-<16 year-old PAR, and adult PAR, respectively (USEPA, 2011p).

The following equation was used to estimate the ADD:

$$ADD = \frac{EEC * CF * SA * AF * ET * CR * DAF}{BW}$$

Where:
ADD = Average daily dose (mg/kg-day)
EEC = Estimated environmental concentration (mg/kg)
CF = Conversion factor (kg/mg)
SA = Surface area exposed per event (cm^2/event)
AF = Soil adherence factor (mg/cm^2)
ET = Exposure time (hours/day)
CR = Contact rate (events/hour)
DAF = Dermal absorption factor
*Only applied for dermal exposure when acute endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)

A summary of the exposure factors used in estimating acute dermal exposure to residues in soil is given in Table 14.

Table 14: Exposure Factors Used in Estimating Acute Dermal Exposure to the PAR in Soil

Receptor	EEC (mg/kg)	SA (cm^2/event)	AF[b,d] (mg/cm^2)	ET[c] (hours/day)	CR[a] (events/hour)	DAF	BW (kg)[a]
<2 PAR	Refer to Section 7.2	610[a]	0.2	1.1	71	See Appendix C: for chemical-specific DAFs	11.4
2-<16 PAR		2,373[b]					13.8
Adult PAR		6,032[b]	0.07	2.2			80

a. EFH (USEPA, 201lp)
b. USEPA, 2014d
c. SOP (USEPA, 2012l)
d. USEPA, 2004i

Pica and Incidental Ingestion of Soil

Both the <2 years old and 2-<16 years old child PARs were assumed to be exposed to imidacloprid and glycerin through ingestion of treated soils underneath garden plants or bare spots on lawns. The two child PARs were assumed to exhibit soil pica behavior, which is the recurrent ingestion of unusually high amounts of soil of between 1,000 – 5,000 mg/day (OEHHA, 2012d). USEPA's EFH (USEPA, 2011p) states, "soil-pica should not be limited to intentional soil ingestion, primarily because children can consume large amounts of soil from their typical behaviors and because differentiating intentional and unintentional behavior in young children is difficult.” Therefore, the soil ingestion rate is based on a total mg soil per day, and accounts for both intentional and incidental soil ingestion (OEHHA, 2012d). Due to the higher likelihood of children to consume soil, estimations of soil ingestion of the two child PARs were considered health protective of the adult PAR.

Methods and exposure factors from the USEPA’s RAGS (USEPA, 1989e), USEPA EFH (USEPA, 2011p), and ATSDR Soil-Pica Workshop (ATSDR, 2001a) were used in this assessment. The ILSs for the <2 year-old child PAR and 2-<16 year-old child PAR were the 1-<2 year-old and 2-<3 year-old, respectively.

To estimate the ADD, the peak imidacloprid and glycerin concentration estimated to be in soil was multiplied by a soil ingestion rate, the fraction of soil ingested that had been treated, and then divided by the child’s body weight. A soil ingestion rate of 5,000 mg soil/day was selected based on suggested value from the ATSDR Soil-Pica Workshop Summary Report (ATSDR, 2001a). The fraction of soil ingested from a treated site was assumed to be 100%.

The following equation was used to estimate the ADD:

$$ADD = \frac{EEC * CF * IR_s * FI}{BW}$$

Where:

ADD = Average daily dose (mg/kg-day)
EEC = Estimated environmental concentration (mg/kg)
CF = Conversion factor (kg/mg)
IR_s = Soil ingestion rate (mg/day)
FI = Fraction ingested from Contaminated Source (unitless)
BW = Body weight (kg)

A summary of the exposure factors used in estimating acute pica and incidental soil ingestion is given in Table 15.

Table 15: Exposure Factors Used in Estimating Acute Pica and Incidental Soil Ingestion

Receptor	Index Lifestage	EEC (mg/kg)	IR_s[a] (mg/day)	FI[b]	BW[c] (kg)
<2 PAR	1-<2 years	Refer to Section 7.2	5,000	1	11.4
2-<16 PAR	2-<3 years				13.8

a. ATSDR, 2001a
b. Professional judgment
c. EFH (USEPA, 2011p)

Dermal Exposure to Residues on Non-Edible Vegetation

The <2 year-old child PAR, 2-<16 year-old child PAR, and the adult PAR were assumed to be exposed to imidacloprid and glycerin through dermal contact with residues on ornamental plants and non-citrus fruit trees. Methods and exposure factors from the ‘Gardens’ section of the USEPA SOP (USEPA, 2012l) were selected for assessment of dermal exposure to non-edible vegetation. Because the exposure factors and methods from the ‘Gardens’ section of the SOP result in a greater estimated exposure than those of the ‘Trees’ section, use of the ‘Gardens’ SOP is considered health-protective of contact with treated trees. Exposure factors for a 6-<11 year-old were selected to represent the 2-<16 year-old because it is assumed younger children will not utilize these areas for playing nor engage in activities associated with these areas to the extent older children will (USEPA, 2012l). Although <2 year-old children are not expected to spend a substantial amount of time in garden/tree settings, the 1-<2 year-old child was selected to represent the <2 year-old child PAR for the sake of completeness.

The first step of the Gardens and Trees SOP equation was to estimate the DFR_t of the pesticide active or inert ingredient. The DFR_t represents the amount of material on the surface of a plant that is available for dermal transfer to a receptor’s skin after an application has occurred (USEPA, 2012l). For additional details of the methods for estimating the surface residue on foliage, refer to Section 5.3.4. The SOP makes use of transfer coefficients (TCs) to estimate the transfer of residue from leaf surface to skin. The TCs recommended by the SOP for use in garden settings were 8,400 cm^2/hr for an adult and 4,600 cm^2/hr for a child 6-<11 years old (USEPA, 2012l). No TC was available in the SOP for the 1-<2 year-old in garden/tree settings. However, the Lawns and Turf section of the SOP adjusts the adult TC by a reduction factor of 73% for the purposes of evaluating 1-<2 year-olds on lawns/turf. For this HHRA, the same reduction factor was applied to result in a TC of 2,268 cm^2/hr for the 1-<2 year-old PAR in residential/urban settings (USEPA, 2012l).

To estimate the PAR’s exposure, the DFR_t was multiplied by the surface-to-skin TC and the number of hours per day the resident was expected to be exposed (ET). The SOP assumed the adult was exposed for 2.2 hour per day and weighed 80 kg (USEPA, 2012l; USEPA, 2011p). The exposure time recommended by the SOP for the 6-< 11 year-old in garden settings was 1.1 hours/day and a body weight of 31.8 kg (USEPA, 2012l). Because no ET was available for 1-<2 year-olds in garden settings, the 6-<11 year-old value of 1.1 hours/day was selected. A body weight of 11.4 kg was used for the 1-<2 year-old child PAR (USEPA, 2012l).

The following equation was used to estimate the Vegetation Dermal Exposure:

$$VDE = DFR_t * CF * TC * ET$$

Where:
VDE = Vegetation Dermal Exposure (mg/day)
DFR_t = Dislodgeable Foliar Residue (μg/cm^2)
CF= Weight unit conversion factor (mg/μg)
TC = Transfer coefficient (cm^2/hour)
ET = Exposure time (hours/day)

To estimate the PAR's Average Daily Dose (ADD), the VDE was multiplied by the DAF and then divided by the resident's body weight. The following equation was used to estimate the ADD:

$$ADD = \frac{VDE * DAF}{BW}$$

Where:
ADD = Average daily dose (mg/kg-day)
VDE = Vegetation Dermal Exposure (mg/day)
DAF = Dermal Absorption Factor (unitless)
*Only applied for dermal exposure when acute endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)

A summary of the exposure factors used in estimating acute exposure to residues through dermal exposure to vegetation is given in Table 16.

Table 16: Exposure Factors Used in Estimating Acute Dermal Exposure to Vegetation

Receptor	Index Lifestage	TC[b] (cm^2/hour)	ET[a] (hours/day)	DAF	BW[a] (kg)
<2 PAR	1-<2 years	2,268	1.1	0.05 (Imidacloprid), 1 (Glycerin)	11.4
2-<16 PAR	6-<11 years	4,600	1.1		31.8
Adult PAR	Adult	8,400	2.2		80

a. EFH (USEPA, 2011p)
b. SOP (USEPA, 2012l)

Hand-to-Mouth Ingestion of Vegetation Residues

The <2 year-old child and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin by contacting residues on vegetation and then transferring that residue from his/her hand to mouth (HtM). The USEPA's SOP (USEPA, 2012l) for Lawns/Turf was the method used to evaluate hand-to-mouth ingestion of vegetation residues. Although an SOP for Gardens and Trees is available, it does not include a hand-to-mouth analysis; therefore, the Lawns/Turf SOP was chosen as a surrogate. In accordance with the USEPA SOP, the adult PAR was not assessed for hand-to-mouth incidental ingestion of residues because it is assumed adults would not place pesticide-contaminated hands in their mouth (USEPA 2012l). See the Statewide PEIR for more details.

In accordance with the SOP, the Vegetation Dermal Exposure (VDE) estimated in the Dermal Exposure to Residues on Non-Edible Vegetation section was multiplied by the fraction of residue on the child's hands (Fai_{Hands}) compared to total surface residue. The result was then divided by the typical surface area of a child's hands to estimate the potential amount of residue available on the PAR child's hands (USEPA 2012l).

$$HR = \frac{Fai_{Hands} * VDE}{2 * \mathrm{SA_H}}$$

Where:

HR = Residue available on hand (mg/cm^2)
Fai_{Hands}= Fraction of total residue on hands
VDE = Vegetation Dermal Exposure (mg)
SA_H = Hand surface area (cm^2)

To estimate the ADD, the SOP then factored in the fraction of hand surface area mouthed each event, the typical surface area of one hand, the number of hours per day the child may be exposed, the number of times the child contacts treated vegetation per hour, the fraction of residue removed from saliva, the frequency of hand-to-mouth contacts per hour, and the child PAR's body weight (USEPA, 2012l). The exposure factors for a 1-<2 years old and a 3-<6 years old were selected from the Lawns/Turf SOP to represent the <2 year-old child and 2-<16 year-old child PARs for analysis of hand-to-mouth ingestion of vegetation residues, respectively.

The following equation was used to estimate the ADD:

$$ADD = \frac{HR * F_M * SA_H * N_{Rep} * ET * \left(1 - (1 - SE)^{\frac{EV_{HtM}}{N_{Rep}}}\right)}{BW}$$

Where:

ADD = Average daily dose (mg/kg-day)
HR = Residue available on hand (mg/cm^2)
F_M = Fraction of hand surface area mouthed per event
SA_H = Hand surface area (cm^2)
ET = Exposure time (hours/day)
N_{Rep} = Number of replenishment intervals per hour (intervals/hour)
SE = Extraction by saliva
EV_{HtM} = Frequency of hand-to-mouth events per hour (events/hour)
BW = Body weight (kg)

A summary of the exposure factors used in estimating acute hand-to-mouth ingestion to vegetation residue is given in Table 17.

Table 17: Exposure Factors Used in Estimating Acute Hand-to-Mouth Ingestion to Vegetation Residues

<table>
<tr><th>Receptor</th><th>ILS</th><th>Fai_{hands}[a]</th><th>SA_H[a,b] (cm^2)</th><th>F_M[a]</th><th>ET[a] (hours/day)</th><th>N_{Rep}[a] (intervals/ hour)</th><th>SE</th><th>EV_{HtM}[a] (events/hour)</th><th>BW[b] (kg)</th></tr>
<tr><td>0 -<2 PAR</td><td>1-<2 years</td><td rowspan="2">0.06</td><td>150</td><td rowspan="2">0.127</td><td rowspan="2">1.5</td><td rowspan="2">4</td><td rowspan="2">0.48</td><td>13.9</td><td>11.4</td></tr>
<tr><td>2 -<16 PAR</td><td>3-<6 years</td><td>225</td><td>8.5</td><td>18.6</td></tr>
</table>

a. SOP (USEPA, 2012l)
b. EFH (USEPA, 2011p)

Ingestion of Edible Vegetation Residues

The <2 year-old child, 2-<16 year-old child, and the adult PAR were assumed to be exposed to imidacloprid and glycerin residues through consumption of edible vegetation (i.e., home-grown fruit). Methods for estimating pesticide residue concentrations in plants are described in Section 5.3.5. When evaluating foliar application, it was assumed that direct treatment of vegetation resulted in 100% of the applied material being available on the surface of fruit-bearing plants. It was assumed 20% of the application rate drifted to soil below fruit-bearing plants and was available for uptake through the roots. For soil drench applications, 100% of the applied material was assumed to be available in the soil below fruit-bearing plants for translocation into edible vegetation.

Methods and exposure factors from the USEPA's RAGS (USEPA, 1989e) and USEPA EFH (USEPA, 2011p) were used in this assessment. Exposure factors for a 40-<69 year-old were selected to represent the adult PAR (USEPA, 2011p). Exposure factors for a 1-<2 years old and a 3-<5 years old were selected to represent the ILSs for the <2 year-old child and 2-<16 year-old child PARs, respectively. To estimate the ADD, the maximum EEC of imidacloprid and glycerin in edible vegetation, listed in Section 7.2, was multiplied by the amount of vegetation a resident was expected to consume per day relative to his/her body weight. For the <2 year-old child PAR assessment, a vegetation ingestion rate of 8.7 g/kg-day, based on mean intake of home-produced fruits for a 1-2 years old, was selected from USEPA's EFH (USEPA, 2011p). For the 2-<16 year-old child PAR assessment, a vegetation ingestion rate of 4.1 g/kg-day, based on mean intake of home-produced fruits for a 3-5 years old, was selected from USEPA's EFH (USEPA, 2011p). For the adult PAR assessment, a vegetation ingestion rate of 2.7 g/kg-day, based on mean intake of home-produced fruits for a 40-69 year-old, was selected from USEPA's EFH (USEPA, 2011p).

The following equation was used to estimate the ADD:

$$ADD = EEC * CF * IR_v$$

Where:

ADD = Average daily dose (mg/kg-day)
EEC = Estimated environmental concentration (mg/kg)
CF = Conversion factor (kg/g)
IR_v = Vegetation ingestion rate (g/kg-day)

A summary of the exposure factors used in estimating acute exposure to residues through ingestion of edible vegetation is given in Table 18.

Table 18: Exposure Factors Used in Estimating Acute Exposures to Residues through Ingestion of Edible Vegetation

Receptor	Index Lifestage	EEC (mg/kg)	IR_v[a] (g/kg-day)
<2 PAR	1-<2 years	Refer to Section 5.3.5	8.7
2-<16 PAR	3-<5 years		4.1
Adult PAR	40-<69 years		2.7

a. EFH (USEPA, 2011p)

Dermal Exposure to Residues on Turf

The <2 year-old child, 2-<16 year-old child, and adult PAR's dermal exposure to imidacloprid and glycerin residues on turf were assessed using USEPA's SOP guidance for "Lawns/Turf - High Contact Lawn Activities". In accordance with the SOP, the 1-<2 year-old PAR served as the ILS for the <2 year-old. The 2-<3 year-old child represented the 2-<16 year-old PAR. The first step of the Lawns/Turf SOP equation was to estimate the Transferable Turf Residue (TTR_t) of imidacloprid and glycerin. Refer to Section 5.3.5 for the TTR_t equation and additional details.

The SOP recommended TC were used to estimate the transfer of residue from turf-surface to skin. The recommended TCs were 49,000 cm^2/hour for a 1-<2 years old, 56,000 cm^2/hour for a 2-<3 years old, and 180,000 cm^2/hour for an adult (USEPA, 2012l). For the definition of TCs, refer to Appendix B Section 2.3 of the Statewide PEIR. It was assumed the adult, 1-<2 year-old child, and 3-<6 year-old child PARs spent 1.5 hours in turf settings. The default exposure factors used in the SOP for a child 1-<2 years old, a child 2-<3 years old, and an adult were left unchanged for the assessment of the <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR, respectively.

To estimate the Turf Dermal Exposure (TDE), the TTR_t was multiplied by the TC, and the number of hours per day the resident was expected to be exposed (ET).

The following equation was used to estimate the TDE:

$$TDE = TTR_t * CF * TC * ET$$

Where:

TDE = Turf Dermal Exposure (mg/d)
TTR_t = Transferable turf residue (t) days after application (μg/cm^2)
CF= Weight unit conversion factor (mg/μg)
TC = Transfer coefficient (cm^2/hour)
ET = Exposure time (hours/day)

To estimate the PAR's Average Daily Dose (ADD), the TDE was multiplied by the DAF and then divided by the resident's body weight.

$$ADD = \frac{TDE * DAF}{BW}$$

Where:
ADD = Average daily dose (mg/kg-day)
TDE = Turf Dermal Exposure (mg/d)
DAF = Dermal absorption factor
*Only applied for dermal exposure when acute endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)

A summary of the exposure factors used in estimating acute dermal exposure to turf is given in Table 19.

Table 19: Exposure Factors Used in Estimating Acute Dermal Exposure to Turf

Receptor	Index Lifestage	TC[a] (cm^2/hour)	ET[a] (hours/d)	DAF	BW[b] (kg)
<2 PAR	1-<2 years	49,000	1.5	See Appendix C: for chemical-specific DAFs	11.4
2-<16 PAR	2-<3 years	56,000			13.8
Adult PAR	Adult	180,000			80

a. SOP (USEPA, 2012l)
b. EFH (USEPA, 2011p)

Hand-to-Mouth Ingestion of Turf Residues

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to come into contact with imidacloprid and glycerin by contacting residues on turf and then transferring that residue from his/her hand to mouth. Due to the higher likelihood of children placing their hands in their mouths, estimations of incidental ingestion for the two child PARs were considered health protective of the adult PAR. The USEPA's SOP (USEPA, 2012l) guidance for Lawns/Turf was used as a source of exposure factors and methods. Exposure factors for the ILS of 1-<2 year-old and a 3-<6 year-old were selected to represent the <2 year-old child PAR and the 2-<16 year-old child PAR, respectively.

In accordance with the SOP, the TDE, which was estimated in the Dermal Exposure to Residues on Turf Section, was multiplied by the fraction of total residue on the child's hands. The result was then divided by the surface area of the child's hands to estimate the potential amount of residue available on the PAR child's hands (HR). The following equation was used to estimate the HR:

$$HR = \frac{Fai_{hands} * TDE}{SA_H * 2}$$

Where:

HR = Residue available on hand (mg/cm^2)
Fai_{hands} = Fraction of total residue on hands
TDE = Turf dermal exposure (mg)
SA_H = Hand surface area (cm^2)

To estimate the ADD, the SOP accounts for the residue available on the receptor's hands, the fraction of hand surface area mouthed each event, the typical surface area of one hand, the number of hours per day the child may be exposed, the number of times the child contacts treated turf per hour, the fraction of residue removed from saliva, the frequency of hand-to-mouth contacts per hour, and the child PAR's body weight (USEPA, 2012l). The following equation was used to estimate the ADD:

$$ADD = \frac{HR * F_M * SA_H * ET * N_{Rep} * (1 - (1 - SE)^{EV_{HtM}/N_{Rep}})}{BW}$$

Where:

ADD = Average daily dose (mg/kg-day)
HR = Residue available on hand (mg/cm^2)
F_M = Fraction of hand surface area mouthed per event (unitless/event)
SA_H = Hand surface area (cm^2)
ET = Exposure time (hours/day)
N_{Rep} = Number of replenishment intervals per hour (intervals/hour)
SE = Extraction by saliva
EV_{HtM} = Frequency of hand-to-mouth (events/hour)
BW = Body weight (kg)

A summary of the exposure factors used in estimating acute hand-to-mouth ingestion of turf residues is given in Table 20.

Table 20: Exposure Factors Used in Estimating Acute Hand-to-Mouth Ingestion of Turf Residues

Receptor	Index Lifestage	Fai_{hands}[a]	SA_H (cm^2)	F_M[a]	ET[a] (hours /day)	N_{Rep}[a] (intervals/ hr)	SE[a]	EV_{HtM} (events/ hour)[a]	BW (kg)[b]
<2 PAR	1-<2 years	0.06	150[b]	0.127	1.5	4	0.48	13.9	11.4
2-<16 PAR	3-<6 years		225[a]					8.5	18.6

a. SOP (USEPA, 2012l)
b. EFH (USEPA, 2011p)

Object-to-Mouth Ingestion of Turf Residues

Both the <2 year-old and 2-<16 year-old child PARs were assumed to come into contact with imidacloprid and glycerin through turf-to-object contact that subsequently transferred to his/her mouth from the object. Due to the higher likelihood of children placing objects in their mouth, estimations of incidental ingestion of the two child PARs were considered health protective of the adult PAR. The USEPA's SOP (USEPA, 2012l) guidance for Lawns/Turf was used as a source of exposure factors and methods. Exposure factors for a 1-<2 year-old and a 2-<3 year-old were selected to represent the <2 year-old child and 2-<16 year-old child PARs, respectively.

To estimate the potential amount of residue available on an object (OR_t), a variation of the equation found in the USEPA SOP was used. Consistent with a personal communication with Jeff Dawson of the USEPA on July 20th, 2016, the application rate was multiplied by the fraction of total residue on the object and the dissipation rate (Dawson, J., USEPA Office of Pesticide Program 2016, Pers comm, E-mail RE: Inquiry into the SOP for Assessing Residential Pesticide Exposure (2012) methodology). For acute exposure, the OR_t was the peak value possible over multiple applications considering environmental degradation. It was assumed the dissipation of pesticide residue on an object was comparable to the degradation on foliage. As such, the foliar half-lives of 4 days and 0.6 days were used to estimate the concentration of imidacloprid and glycerin on the object over time, respectively. See Section 5.3.4 for more details on the use of first-order rate kinetics to estimate environmental degradation. A 20% Drift to Object (DtO) was applied in foliar applications to account for residues blocked by foliage.

The following equation was used to estimate the OR_t:

$$OR_t = AR * F_O * (1 - FD)^t * CF_1 * CF_2 * DtO$$

Where:

OR_t = Residue available on object ($\mu g/cm^2$)
AR = Application rate (lb a.i./acre)
F_O = Fraction of total residue on object
F_D = Fraction of residue that dissipates per day
t = Time after application (days)
CF_1 = Weight unit conversion factor (µg/lb)
CF_2 = Area unit conversion factor ($acre/cm^2$)
DtO = Drift to Object

To estimate the ADD due to object-to-mouth (OtM) exposure, the SOP accounts for the residue available on the object, the object surface area mouthed for each event, the number of hours per day the child is assumed to be exposed (i.e., exposure time), the number of times the object contacts treated turf per hour, the fraction of residue removed by saliva, the frequency of object-to-mouth contacts per hour, and the child PAR's body weight (USEPA, 2012l).

The following equation was used to estimate the ADD:

$$ADD = \frac{OR_t * CF_3 * SAM_O * ET * N_{Rep} * (1 - (1 - SE)^{(EV_{OtM}/N_{Rep})})}{BW}$$

Where:

ADD = Average daily dose (mg/kg-day)
OR_t = Residue available on object ($\mu g/cm^2$)
CF_3 = Weight unit conversion factor (mg/ug)
SAM_O = Object surface area mouthed per event (cm^2/event)
ET = Exposure time (hours/day)
N_{Rep} = Number of replenishment intervals per hour (intervals/hour)
SE = Extraction by saliva
EV_{OtM} = Frequency of OtM events per hour (events/hour)
BW = Body weight (kg)

A summary of the exposure factors used in estimating acute object-to-mouth ingestion of turf residues is given in Table 21.

Table 21: Exposure Factors Used in Estimating Acute Object-to-Mouth Ingestion of Turf Residue

Receptor	Index Lifestage	t (days)	EV_{OtM}[a] (events/hr)	BW[b] (kg)	F_O[a]	DtO	SAM_O[a] (cm^2/event)	ET[a] (hrs/day)	N_{Rep}[a] (intervals/hr)	SE[a]
<2 PAR	1-<2 years	0-365	8.8	11.4	0.01	0.2	10	1.5	4	0.48
2-<16 PAR	2-<3 years		8.1	13.8						

a. SOP (USEPA, 2012l)
b. EFH (USEPA, 2011p)

5.4.1.3.1 Post-Application Resident Subchronic Exposure Assessment

The subchronic duration is defined as repeated daily exposure over multiple days up to 10 percent of a life span in humans or 30 to 90 days in laboratory animal species (USEPA, 1996g). For this assessment, the subchronic exposure was assumed to be 30 days, based on the USEPA 2011 Integrated Risk Information System (IRIS) Glossary definition of ‘subchronic exposure’ (USEPA, 2011w).

To assess the subchronic exposure to the PAR, an average daily dose (ADD_{SC}) was estimated using a similar method and equation as the acute exposure, except a subchronic EEC was used instead of the peak EEC. See Section 5.3 for more details about the methods used to calculate subchronic EECs.

To estimate the Subchronic Average Daily Dose (SADD), the ADD_{SC} was multiplied by the number of days the resident had the potential to be exposed per year, the time frame the resident was expected to be exposed, and a chemical-specific dermal absorption factor (DAF) when evaluating dermal exposure and the chronic endpoint was derived from an oral or inhalation NO(A)EL. This value was then divided by the total duration of time assessed. The exposure frequency, exposure duration, and averaging time reflected the assumed 30-day exposure.

The general equation for calculating the SADD was as follows:

$$SADD = \frac{ADD_{SC} * EF * ED * DAF}{CF * AT}$$

Where:

SADD = Subchronic average daily dose (mg/kg-day)
ADD_{SC} = Average daily dose (mg/kg-day)
EF = Exposure frequency (days/year)
ED = Exposure duration (days)
DAF = Dermal absorption factor (unitless)
*Only applied for dermal exposure when subchronic endpoint was derived from an oral or inhalation NO(A)EL
CF = Conversion factor (days/year)
AT = Averaging time (days)

A summary of the exposure factors used in estimating the SADD is given in Table 22.

Table 22: Exposure Factors Used in Estimating the SADD

Receptor	EF (days/year)	ED (days)	AT (days)
<2 year-old PAR	30	30	30
2-<16 year-old PAR			
Adult PAR			

Dermal Exposure to Residues in Soil

The <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR were assumed to be exposed to imidacloprid and glycerin residues from dermal contact with treated soil daily for 30 days. An adjusted ADD (ADD_{SC}) was estimated by the same process as the acute ADD, except a subchronic soil EEC was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 30 days. See Section 5.3 for more details about how subchronic EECs were estimated.

To calculate the SADD, the ADD_{SC} was multiplied by the number of days the resident had the potential to be exposed per year (EF), the duration the resident was expected to be exposed (ED), and a chemical-specific DAF when appropriate, then divided by the total duration of time assessed (AT).

Pica and Incidental Soil Ingestion

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin residues from ingestion of treated soil daily for 30 days. An adjusted ADD (ADD_{SC}) was estimated through the same process as the acute ADD, except a subchronic soil EEC was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 30 days. See Section 5.3 for more details about how subchronic EECs were estimated.

To calculate the SADD, the ADD_{SC} was multiplied by the number of days the resident had the potential to be exposed per year (EF), the duration the resident was expected to be exposed (ED), then divided by the total duration of time assessed (AT).

Dermal Exposure to Residues on Vegetation

The <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR were assumed to be exposed to imidacloprid and glycerin residues on non-edible vegetation daily for 30 day. An adjusted ADD (ADD_{SC}) was estimated through the same process as the acute ADD, except a subchronic DFR_t was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 30 days. See Section 5.3 for more details about how subchronic EECs were estimated.

To calculate the SADD, the ADD_{SC} was multiplied by the number of days the resident had the potential to be exposed per year (EF), the duration the resident was expected to be exposed (ED), and a chemical-specific DAF when appropriate, then divided by the total duration of time assessed (AT).

Hand-to-Mouth Ingestion of Vegetation Residues

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin residues from hand-to-mouth activity daily for 30 days. An adjusted ADD (ADD_{SC}) was estimated through the same process as the acute ADD, except a subchronic DFR_t was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 30 days. See Section 5.3 for more details about how subchronic EECs were estimated.

To calculate the SADD, the ADD_{SC} was multiplied by the number of days the resident had the potential to be exposed per year (EF), the duration the resident was expected to be exposed (ED), then divided by the total duration of time assessed (AT).

Ingestion of Edible Vegetation

The <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR were assumed to be exposed to imidacloprid and glycerin residues in edible vegetation daily for 30 days. No environmental degradation was assumed for the pesticide residues in and on plants for the purposes of estimating risk associated with consumption of treated fruit. Therefore, to calculate the SADD, the acute ADD was multiplied by the number of days the resident had the potential to be exposed per year (EF), the duration the resident was expected to be exposed (ED), then divided by the total duration of time assessed (AT). It should be noted that by assuming no environmental degradation, the concentration of pesticide residue in and on fruit likely overestimates exposure. Refer to Section 5.3 for additional details regarding the estimation of edible vegetation EECs.

Dermal Exposure to Residues on Turf

The <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR were assumed to be exposed to imidacloprid and glycerin residues from dermal contact with turf for 30 days. An adjusted ADD (ADD_{SC}) was estimated through the same process as the acute ADD, except a subchronic TTR_t was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 30 days. See Section 5.3 for more details about how subchronic EECs were estimated.

To calculate the SADD, the ADD_{SC} was multiplied by the number of days the resident had the potential to be exposed per year (EF), the duration the resident was expected to be exposed (ED), a chemical-specific dermal absorption factor (DAF) when appropriate, and then divided by the total duration of time assessed (AT).

Hand-to-Mouth Ingestion of Turf Residues

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin residues from hand-to-mouth activity daily for 30 days. An adjusted ADD (ADD_{SC}) was estimated through the same process as the acute ADD, except a subchronic TTR_t was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 30 days. Refer to Section 5.3 for more details about how subchronic EECs were estimated.

To calculate the SADD, the ADD_{SC} was multiplied by the number of days the resident had the potential to be exposed per year (EF), the duration the resident was expected to be exposed (ED), then divided by the total duration of time assessed (AT).

Object-to-Mouth Ingestion of Turf Residues

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin residues from object-to-mouth contact daily for 30 days. An adjusted ADD (ADD_{SC}) was estimated through the same process as the acute ADD, except a subchronic OR_t was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 30 days. Refer to the acute object-to-mouth exposure section (Section 5.4.1.1.1) for details about how OR_t s were estimated. To calculate the SADD, the ADD_{SC} was multiplied by the number of days the resident had the potential to be exposed per year (EF), the duration the resident was expected to be exposed (ED), then divided by the total duration of time assessed (AT).

5.4.1.3.2 Post-Application Resident Chronic Exposure Assessment

To assess the chronic exposure to the PAR, an average daily dose (ADD_C) was estimated using a similar method and equation as the acute exposure, except a chronic EEC was used instead of the peak EEC. See Section 5.3 for more details about how chronic EECs were estimated.

To estimate the Annual Average Daily Dose (AADD), the ADD_C was multiplied by the number of days the resident had the potential to be exposed per year, the time frame the resident was expected to be exposed, and a chemical-specific dermal absorption factor (DAF) when the chronic endpoint was derived from an oral or inhalation NO(A)EL. This value was then divided by the total duration of time assessed. The duration of Proposed Program treatments at a single residence was assumed to be 5 years. Because the <2 year-old child PAR lifestage is limited to two years, a two year exposure duration was assumed for this subgroup.

The following equation was used to calculate the AADD:

$$AADD = \frac{ADD_c * EF * ED * DAF}{AT * CF}$$

Where:

AADD = Annual average daily dose (mg/kg-day)
ADD_c = Average daily dose (mg/kg-day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
DAF = Dermal Absorption Factor (unitless)
*Only applied for dermal exposure when chronic endpoint was derived from an oral or inhalation NO(A)EL
AT = Averaging time (years)
CF = Conversion factor (days/year)

A summary of the exposure factors used in estimating the AADD is given in Table 23.

Table 23: Exposure Factors Used in Estimating the AADD

Receptor	EF (days/year)	ED (years)	AT (years)
<2 year-old PAR	365	2	2
2-<16 year-old PAR		5	5
Adult PAR		5	5

Dermal Exposure to Residues in Soil

The <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR were assumed to be exposed to imidacloprid and glycerin residues in soil daily for the entire year. An adjusted ADD (ADD_C) was estimated through the same process as the acute ADD, except a chronic soil EEC was used, considering first-order rate environmental degradation and the possibility of accumulation from multiple applications over 365 days. See Section 5.3 for more details about how chronic EECs were estimated.

To calculate the AADD, the ADD_C was multiplied by the number of days the resident had the potential to be exposed per year (EF), the number of years the resident was expected to be exposed (ED), a chemical-specific DAF when appropriate, then divided by the total duration of time assessed (AT).

Pica and Incidental Soil Ingestion

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin residues from ingestion of treated soil every day of the year. An adjusted ADD (ADD_C) was estimated through the same process as the acute ADD, except a chronic soil EEC was used, considering first-order rate environmental degradation and the possibility of accumulation from multiple applications over 365 days. See Section 5.3 for more details about how chronic EECs were estimated.

To calculate the AADD, the ADD_C was multiplied by the number of days the resident had the potential to be exposed per year (EF), the number of years the resident was expected to be exposed (ED), then divided by the total duration of time assessed (AT).

Dermal Exposure to Residues on Vegetation

The <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR were assumed to be exposed to imidacloprid and glycerin residues from dermal contact with vegetation daily for the entire year. An adjusted ADD (ADD_C) was estimated using the same process as the acute ADD, except a chronic DFR_t was used, consider first-order environmental degradation and the possibility of accumulation from multiple applications over 365 days. See Section 5.3 for more details about how chronic EECs were estimated.

To calculate the AADD, the ADD_C was multiplied by the number of days the resident had the potential to be exposed per year (EF), the number of years the resident was expected to be exposed (ED) and a chemical-specific DAF when appropriate, then divided by the total duration of time assessed (AT).

Hand-to-Mouth Ingestion of Vegetation Residues

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin residues from hand-to-mouth activity every day of the year. An adjusted ADD (ADD_C) was estimated using the same process as the acute ADD, except a chronic Vegetation Dermal Exposure was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 365 days. See the Dermal Exposure to Residues on Non-Edible Vegetation section for more details about how chronic dermal exposure to vegetation was estimated.

To calculate the AADD for hand-to-mouth ingestion of vegetation residues, the ADD_C was multiplied by the number of days the resident had the potential to be exposed per year and the number of years the resident was expected to be exposed, and subsequently divided by the total duration of time assessed.

Ingestion of Edible Vegetation

The <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR were assumed to be exposed to imidacloprid and glycerin residues in edible vegetation daily for the entire year. Because fruits have seasonal limits of availability, consumption of residues on treated fruit over an entire year is not anticipated. However, to complete this extrapolation, the acute ADD was multiplied by the number of potential exposure days and the number of years the resident was expected to be exposed, and then divided by the total duration of time assessed. The AADD was then compared to the chronic NO(A)EL. This method of estimating chronic exposure to residues on edible vegetation is expected to be an overestimation of exposure as it does not assume any environmental degradation. Refer to Section 5.3 for additional details regarding estimating edible vegetation residue concentrations.

Dermal Exposure to Residues on Turf

The <2 year-old child PAR, 2-<16 year-old child PAR, and adult PAR were assumed to be exposed to imidacloprid and glycerin residues from dermal contact with turf every day of the year. An adjusted ADD (ADD_C) was estimated using the same process as the acute ADD, except a chronic TTR_t was used, considering first-order environmental degradation and the possibility of accumulation from multiple applications over 365 days. See Section 5.3 for more details on how chronic EECs were estimated.

To calculate the AADD, the ADD_C was multiplied by the number of days the resident had the potential to be exposed per year (EF), the number of years the resident was expected to be exposed (ED), and a chemical-specific DAF when appropriate, then divided by the total duration of time assessed (AT).

Hand-to-Mouth Ingestion of Turf Residues

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin residues from hand-to-mouth activity every day of the year. An adjusted ADD (ADD_C) was estimated through the same process as the acute ADD, except a chronic TTR_t was used, considering first-order rate environmental degradation and the possibility of accumulation from multiple applications over 365 days. See Section 5.3 for more details about how chronic EECs were estimated.

To calculate the AADD, the ADD_C was multiplied by the number of days the resident had the potential to be exposed per year (EF), the number of years the resident was expected to be exposed (ED), then divided by the total duration of time assessed (AT).

Object-to-Mouth Ingestion of Turf Residues

The <2 year-old child PAR and 2-<16 year-old child PAR were assumed to be exposed to imidacloprid and glycerin residues from object-to-mouth activity daily for the entire year. An adjusted ADD (ADD_C) was estimated through the same process as the acute ADD, except a chronic OR_t was used, considering first-order rate environmental degradation and the possibility of accumulation from multiple applications over 365 days. Refer to the acute object-to-mouth exposure (Section 5.4.1.1.1) for details about how OR_t s were estimated.

To calculate the AADD, the ADD_C was multiplied by the number of days the resident had the potential to be exposed per year (EF), the number of years the resident was expected to be exposed (ED), then divided by the total duration of time assessed (AT).

5.4.1.3.3 Post-Application Resident Cancer Exposure Assessment

Cancer exposure was not characterized in this risk assessment because no pesticides or adjuvants used in the Proposed Program show evidence of carcinogenicity (USEPA, 2015a).

5.4.1.4 During and Post-Application Resident

The during and post-application resident (DPAR) represents a combination exposure of a resident who is downwind at the time his/her property is being treated, and who has the potential to be exposed to imidacloprid and glycerin residues on the treated vegetation, turf, and soil after the application. A <2 year-old child, a 2-<16 year-old child, and a 16< year-old adult were analyzed in the DPAR exposure assessment.

To estimate the DPAR's exposure, the DWB's and the PAR's risk values were summed. For additional details about the DWB and PAR individual exposures, refer to Section 5.4.1.2 and 5.4.1.3, respectively. Further details of methods and equations to combine MOEs can be found in Section 6.1, the Statewide PEIR.

5.4.1.5 Post-Application Loader

The post-application loader (PAL) represents a worker at a nursery who may be occupationally exposed to pesticide active and inert ingredient or adjuvant residues while loading plants that have been treated under the Proposed Program onto trucks or for transport. Loading was assumed to occur after the re-entry interval (REI) had past. The REI is a specified time period that must occur prior to entry into an application site area. However, no environmental degradation or accumulation from multiple applications was considered. The PAL was assumed to have the potential to be exposed through dermal contact with vegetation after foliar treatments and soil while handling pots.

5.4.1.5.1 Post-Application Loader Acute Exposure Assessment

Dermal Exposure to Vegetation

The PAL was assumed to come into contact with treated foliage while picking up or brushing against leaves of potted plants. The method for estimating the PAL's dermal ADD for vegetation was based on USEPA's *Standard Operating Procedures for Residential Pesticide Exposure Assessments* (SOP) (USEPA, 2012l). The first step of the SOP methodology was to estimate the DFR_t of the specific pesticide active or inert ingredient. See Section 5.3 for more details about the methods used to calculate the DFR_t in nursery settings. To estimate the amount of dermal transfer of residue from leaf surface to the skin, a transfer coefficient (TC) of 100 cm^2/hour for "orchard maintenance" was selected from the USEPA Science Advisory Council for Exposure (ExpoSAC) Policy (USEPA, 2013g). The DFR_t and TC were multiplied by an exposure time of 1 hour, a chemical-specific DAF, then divided by the average body weight of an adult (80 kg) (USEPA, 2011p). The ADD was calculated using the following equation:

$$ADD = \frac{DFR_t * TC * ET * CF_1 * DAF}{BW}$$

Where:

ADD = Average daily dose (mg/kg-day)
DFRt = Dislodgeable Foliar Residue (μg/cm^2)
TC = Transfer coefficient (cm^2/hr)
ET = Exposure time (hrs/day)
CF_1 = Conversion factor (mg/μg)
DAF = Dermal Absorption Factor
*Only applied for dermal exposure when acute endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)

A summary of the exposure factors used in estimating the acute ADD is given in Table 24.

Table 24: Exposure Factors Used in Estimating Acute Dermal Exposure to Vegetation

Receptor	TC[a] (cm^2/hr)	ET (hrs/day)	DFR_t (ug/cm^2)	DAF	BW (kg)
Adult PAL	100	1	See Section 7.2 for specific DFRt calculations	See Appendix C:for chemical-specific DAFs	80

a. USEPA, 2013g
b. EFH (USEPA, 2011p)

Dermal Exposure to Soil

The PAL was assumed to come into contact with soil while picking up potted plants. The method for estimating the PAL's dermal ADD for soil was based on USEPA's Risk Assessment Guidance for Superfunds (RAGS) (USEPA, 1989e). The acute dermal exposure to soil was calculated using the acute concentration of chemical estimated to be in soil, the estimated surface area of the PAL's hand that comes into contact with treated soil, a soil-to-skin adherence factor, and the number of times the loader was expected to come into contact with treated soil. For more details about the methods used to calculate soil EECs, refer to Section 5.3. For the purposes of this risk assessment, a fifth of the 95th percentile adult male hand surface area of 0.131 m^2 (USEPA, 2011p) was used to represent the portion of the loader's hand (i.e., the thumb) that contacts the inside of a pot. A Department of Toxic Substances Control (DTSC) soil adherence factor (AF) of 0.2 mg/cm^2 was chosen (DTSC, 2014a), and the PAL was conservatively assumed to contact soil once every second for a 1 hour loading shift (i.e., 3,600 times per hour). The exposure was normalized by the loader's body weight, assumed to be 80 kg (USEPA, 2011p), to estimate the ADD. The ADD was calculated using the following equation:

$$ADD = \frac{EEC * CF_1 * SA_H * AF * EV * DAF}{BW}$$

Where:

ADD = Average daily dose (mg/kg-day)
EEC = Estimated environmental concentration (mg/kg)
CF = Conversion factor (kg/mg)
SA_H = Hand surface area exposed per event (cm^2/event)
AF = Soil adherence factor (mg/cm^2)
EV = Event frequency (events/day)
DAF = Dermal absorption Factor
*Only applied for dermal exposure when acute endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)

A summary of the exposure factors used in estimating acute dermal exposure to soil are given in Table 25.

Table 25: Exposure Factors Used in Estimating PAL Dermal Soil Exposure to Pesticide Residues

Receptor	EEC (mg/kg)	SA_H[a] (cm^2/event)	AF[b] (mg/cm^2)	EV (events/day)	EF (days/year)	ED (year)	DAF	BW[a] (kg)	AT (days)
Adult PAL	Refer to Section 7.2	262	0.2	3,600	1	1	See Appendix C: for chemical-specific DAFs	80	1

a. DTSC, 2014a
b. EFH (USEPA, 2011p)

5.4.1.5.2 Subchronic Exposure Assessment

Dermal Exposure to Vegetation

Subchronic exposure for the PAL was evaluated in a similar manner as the chronic in the Statewide PEIR, except the frequency of exposure was limited to the number of applications that could occur over 30 days. A chemical-specific DAF was only applied if the subchronic NO(A)EL was extrapolated from an oral or inhalation endpoint. Additionally, the exposure duration and averaging time reflected the intermediate period of 30 days instead of the chronic exposure duration.

The following equation was used to estimate the SADD:

$$SADD = \frac{DFR_t * CF_1 * TC * ET * EF * ED * DAF}{BW * AT * CF_2}$$

Where:

SADD = Subchronic average daily dose (mg/kg-day)
DFRt = Dislodgeable Foliar Residue (µg/cm^2)
CF_1 = Conversion factor (mg/µg)
TC = Transfer coefficient (cm^2/hr)
ET = Exposure time (hr/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (days)
DAF = Dermal Absorption Factor
*Only applied for dermal exposure when subchronic endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)
AT = Averaging time (days)
CF_2 = Conversion factor (days/year)

A summary of the exposure factors used in estimating the subchronic dermal exposure to vegetation is given in Table 26.

Table 26: Exposure Factors Used in Estimating Subchronic Dermal Exposure to Vegetation

Receptor	TC[a] (cm^2/hr)	ET (hrs/day)	ED (days)	AT (days)	DAF	Body Weight[b] (kg)
Adult PAL	100	1	30	30	See Appendix C: for chemical-specific DAFs	80

a. DTSC, 2014a
b. EFH (USEPA, 2011p)

Dermal Exposure to Soil

Subchronic exposure for the PAL was evaluated in a similar manner as the chronic in the Statewide PEIR, except the number of applications was limited to the number of applications that could occur over 30 days and a DAF was only applied if the subchronic NO(A)EL was extrapolated from an oral or inhalation endpoint. Additionally, the exposure duration and averaging time reflected the intermediate period of 30 days instead of the chronic exposure duration.

The following equation was used to estimate the SADD:

$$SADD = \frac{EEC * CF_1 * SA_H * AF * EV * EF * ED * DAF}{CF_2 * BW * AT}$$

Where:
SADD = Subchronic average daily dose (mg/kg-day)
EEC = Estimated Environmental Concentration in Soil (mg/kg)
CF_1 = Conversion factor (kg/mg)
SA_H = Surface area of hand (cm^2/event)
AF = Adherence factor (mg/cm^2)
EV = Event frequency (events/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (days)
DAF = Dermal absorption factor*
*Only applied for dermal exposure when subchronic endpoint was derived from an oral or inhalation study
CF_2 = Conversion factor (days/year)
BW = Body weight (kg)
AT = Averaging time (days)

A summary of the exposure factors used in estimating subchronic exposure to the PAL through treated soil are given in Table 27.

Table 27: Exposure Factors Used in Estimating Subchronic Dermal Soil Exposure to Pesticide Residues

Receptor	EEC (mg/kg)	SA_H[a] (cm^2/event)	AF[b] (mg/cm^2)	EV (events/day)	ED (days)	DAF	BW (kg)[a]	AT (days)
Adult PAL	Refer to Section 5.3	262	0.2	3600	30	See Appendix C: for chemical-specific DAFs	80	30

a. EFH (USEPA, 2011p)
b. DTSC, 2014a

5.4.1.5.3 Chronic Exposure Assessment

Dermal Exposure to Vegetation

Chronic exposure for the PAL was evaluated in the same manner as the chronic in the Statewide PEIR. Refer to the Statewide PEIR for additional details of chronic exposure methodology.

The following equation was used to estimate the AADD:

$$AADD = \frac{DFR_t * CF_1 * TC * ET * EF * ED * DAF}{BW * AT * CF_2}$$

Where:

AADD = Annual average daily dose (mg/kg-day)
DFR_t = Dislodgeable foliar residue (µg/cm^2)
CF_1 = Conversion factor (mg/µg)
TC = Transfer coefficient (cm^2/hr)
ET = Exposure time (hrs/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
DAF = Dermal Absorption Factor
*Only applied for dermal exposure when chronic endpoint was derived from an oral or inhalation NO(A)EL
BW = Body weight (kg)
AT = Averaging time (years)
CF_2 = Conversion Factor (days/year)

A summary of the exposure factors used in estimating the AADD is given in Table 28.

Table 28: Exposure Factors Used in Estimating Chronic Dermal Exposure to Vegetation

Receptor	TC[a] (cm$_2$/hr)	ET (hrs/day)	ED (years)	DAF	AT (years)	Body Weight[b] (kg)
Adult PAL	**100**	**1**	**20**	See Appendix C: for chemical-specific DAFs	**20**	**80**

a. DTSC, 2014a
b. EFH (USEPA, 2011p)

Dermal Exposure to Soil

Chronic dermal exposure to soil for the PAL was evaluated in the same manner as the chronic in the Statewide PEIR. Refer to the Statewide PEIR for more details about the methods used to estimate dermal soil exposure.

The following equation was used to estimate the AADD:

$$AADD = \frac{EEC * CF_1 * SA_H * AF * EV * EF * ED * DAF}{BW * AT * CF_2}$$

Where:
AADD = Annual average daily dose (mg/kg-day)
EEC = Estimated Environmental Concentration in Soil (mg/kg)
CF_1 = Conversion factor (kg/mg)
SA_H = Surface area of hand (cm^2/event)
AF = Adherence factor (mg/cm^2)
EV = Event frequency (events/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
DAF = Dermal absorption factor*
*Only applied for dermal exposure when chronic endpoint was derived from an oral or inhalation study
BW = Body weight (kg)
AT = Averaging time (years)
CF_2 = Conversion Factor (days/year)

The exposure factors used in estimating chronic exposure to the PAL through treated soil are given in Table 29.

Table 29: Exposure Factors Used in Estimating PAL Dermal Soil Exposure to Pesticide Residues

Receptor	EEC (mg/kg)	SA_H[a] (cm^2/event)	AF[b] (mg/cm^2)	EV (events/day)	ED (year)	DAF	BW (kg)[a]	AT (years)
Adult PAL	Refer to Section 7.2	262	0.2	3600	20	See Appendix C: for chemical-specific DAFs	80	20

a. EFH (USEPA, 2011p)
b. DTSC, 2014a

5.4.1.5.4 Post-Application Loader Cancer Exposure Assessment

Cancer exposure was not characterized in this risk assessment because none of the active of inert ingredients show evidence of carcinogenicity (USEPA, 2015a).

5.4.1.5.5 Combined-Nursery-Worker

The combined-nursery-worker (CNW) represents a worker employed at a nursery that may be occupationally exposed to Proposed Program chemicals while preparing pesticide solutions and applying them, as well as loading the treated plants into a truck for transport. In other words, under this receptor analysis, the mixer-loader-applicator and post-application-loader were considered to be the same individual. To estimate the CNW's exposure, the MLA and the PAL exposure values were combined using the aggregate MOE approach. See Section 6.1 for methods used to estimate aggregate exposure. For additional details about MLA and PAL exposure, refer to the 5.4.1.1 and 5.4.1.5, respectively.

6 Risk Characterization

The risk characterization compared estimates of pesticide active or inert ingredient and adjuvant receptor exposure (i.e., ADD, AADD) to receptor-specific toxicity values (i.e., NO(A)ELs) to characterize the potential risk for each receptor (OEHHA, 2001a).

6.1 Non-Cancer Effects

The method used to quantify non-cancer risk for pesticide active or inert ingredient or adjuvant is the MOE. The MOE represents how close the receptor's daily intake is to the NO(A)EL (i.e., how close a pesticide active or inert ingredient or adjuvant exposure is to being a concern). The target MOE accounts for uncertainty in inter-species extrapolation and intra-species variation through the use of two 10x uncertainty factors for a total of 100 target MOE. Thus, calculated MOEs for the receptor's exposures greater than 100 are typically not considered to be of concern for adult receptors (USEPA, 2007k). However, an additional uncertainty factor of 3 is applied to the target MOE for child receptors, who may have more sensitivity to adverse effects (OEHHA, 2016a; OEHHA, 2001c; OEHHA, 2008a). It should be noted that MOEs estimated in this analysis are not probabilistic statements of risk, but instead represent a threshold model.

The generic formula for estimating a MOE is:

MOE = Toxicity (mg/kg-day) / ADD (mg/kg-day)*

Where:

MOE = Margin of Exposure (unitless)

ADD = Average Daily Dose

* For subchronic or chronic assessments, the ADD is replaced by the SADD or AADD, respectively

In situations where multiple pathways are present, multiple exposures occur. A MOE was estimated for each active or inert ingredient individually for each individual exposure route and the MOEs were summed regardless of mode of action or target organs and systems to conservatively estimate the hazard that may be associated with the combined exposure. This methodology is consistent with the approaches described in the *USEPA Risk Assessment Guide to Superfunds (RAGS*) and *USEPA General Principles for Performing Aggregate Exposure and Risk Assessment* which provides guidance on assessing aggregate chemical risk and aggregate exposure pathway risk (USEPA, 1989e; 2001e). Consistent with the evaluation of individual MOEs in this HHRA, summed MOEs greater than 100 (adults) and 300 (children) are not considered to be of concern (USEPA, 2007k; OEHHA, 2016a).

The generic formula for summing MOEs is:

$$MOE_{total} = 1/((1/MOE_1)+(1/MOE_2)+\ldots+(1/MOE_n))$$

Where:

MOE = Margin of Exposure (unitless)

6.2 Cancer Effects

Cancer risk is not estimated in this HHRA because there is no evidence suggesting any of the pesticide active or inert ingredients analyzed are carcinogenic (USEPA, 2015a).

6.3 Numeric Data Presentation

Some numeric data presented in the risk characterization section were very large numbers. To present these numbers in an easily readable format, scientific notation is used. For example, the value of 1,290,000 is expressed as 1.29E+06. Note that the "E" represents "exponent" or the number 10 raised to a power. The positive ("+") sign following the "E" indicates the number of places the decimal point was moved to the left from the original number.

7 Risk Assessment Results

The following sections present the HHRA results for the Proposed Programs. Application scenarios are first summarized, followed by a presentation of the CSM, estimated environmental concentrations, risk results (i.e., calculated MOEs), an uncertainty analysis, and conclusions.

Merit 2F, Safari 20 SG, and Marathon II Greenhouse and Nursery Insecticide applications were categorized into separate application scenarios and given a distinct application scenario identification number (Application Scenario ID). Each Application Scenario ID represents a unique combination of application method, application rate, number of applications per year, retreatment interval, application area, and environmental setting.

The EECs of pesticide active and inert ingredients and adjuvants resulting from these application scenarios are available in Section 7.2. Note that the acute EECs account for the possibility of multiple applications and account for the degradation and dissipation properties of pesticide active and inert ingredients and adjuvants. Degradation and dissipation properties accounted for include, but are not limited to, soil microbial metabolism, photodegradation, and degradation on the leaf surface.

Risk results, expressed as MOEs, are presented in Section 7.3.

7.1 Application Scenarios

Merit 2F, Safari 20 SG, and Marathon II Greenhouse and Nursery Insecticide application scenarios were based on descriptions provided by CDFA staff using the PMDS. Where a range of conditions were possible, such as the area of an application site, CDFA staff were requested to provide conditions that were ‘reasonably foreseeable’ and tending toward worst case.

The eight application scenarios for the Proposed Program are summarized in Table 30. These eight scenarios are comprised of six scenarios that take place in nursery production areas or loading dock nursery settings (PDCP-64, PDCP-65, PDCP-66, PDCP-66 Aerial, PDCP-77, PDCP-78) and two scenarios that take place in residential settings (PDCP-70, PDCP-71).

Table 30: Application Scenarios for Pierce's Disease Control Program

Application Scenario	Product	Application Type	Application Method*	Setting	Adjuvant	Application Rate (AR)	AR – Active Ingredient (lb a.i./Ac)	Application Area	ATPD	Apps/ year	Retreatment Interval (RTI)
PDCP-64	Safari SG 20	Foliar	Mechanically pressurized sprayer, hydraulic sprayer, backpack sprayer	Small, Medium, and Most Large Production Nursery Loading Dock	No Foam B	8 oz per 100 gal water (Safari 20 SG 20), 16 fl. oz per 100 gal water (No Foam B)	0.22	3750 ft^2	3750 ft^2/day	150	2 days
PDCP-65	Safari SG 20	Foliar	Mechanically pressurized sprayer, hydraulic sprayer, boom sprayer, backpack sprayer	Small, Medium, and Most Large Production Nursery	No Foam B	8 oz per 100 gal water (Safari 20 SG 20), 16 fl. oz per 100 gal water (No Foam B)	0.22	0.75 ac	0.75 ac/day	2	90 days
PDCP-66	Safari SG 20	Foliar	Mechanically pressurized sprayer, hydraulic sprayer	Large Production Nursery	None	8 oz per 100 gal water	0.22	130 ac	50 ac/ day	1	1 year
PDCP-66 Aerial	Safari SG 20	Foliar	Aerial Application	Large Production Nursery	None	8 oz per 100 gal water	0.22	130 ac	130 ac/ day	1	1 year

Table 30: Application Scenarios for Pierce's Disease Control Program (Cont.)

Application Scenario	Product	Application Type	Application Method*	Setting	Adjuvant	Application Rate (AR)	AR – Active Ingredient (lb a.i./Ac)	Application Area	ATPD	Apps/ year	Retreatment Interval (RTI)
PDCP-70	Merit 2F	Foliar	Mechanically pressurized sprayer, backpack sprayer	Residential	None	1.5 fl oz per 100 gal water	0.023	15 ac	15 ac/day	1	1 year
PDCP-71	Merit 2F	Soil Drench	Mechanically pressurized sprayer	Residential	None	0.2 fl oz/in of trunk diameter or ft of shrub height	0.4	15 ac	15 ac/day	1	1 year
PDCP-77	Marathon II Greenhouse and Nursery Insecticide	Foliar	Mechanically pressurized sprayer, hydraulic sprayer, backpack sprayer	Small, Medium, and Most Large Production Nursery	No Foam B	1.7 fl oz. per 100 gal water (Marathon II Greenhouse and Nursery Insecticide), 16 fl. oz per 100 gal water (No Foam B)	0.027	3750 ft^2	3750 ft^2/day	150	2 days
PDCP-78	Marathon II Greenhouse and Nursery Insecticide	Foliar	Mechanically pressurized sprayer, hydraulic sprayer, backpack sprayer	Small, Medium, and Most Large Production Nursery	No Foam B	1.7 fl oz. per 100 gal water (Marathon II Greenhouse and Nursery Insecticide), 16 fl. oz per 100 gal water (No Foam B)	0.027	0.75 ac	0.75 ac/day	2	180 days

*When multiple application equipment are permitted for use under an application scenario, the ground equipment with the greatest unit exposure (UE) was selected as a health protective representative for exposure assessment. For PDCP-64, PDCP-65, PDCP-70, PDCP-77, and PDCP-78, the backpack sprayer yielded the greatest UE for both dermal and inhalation exposure. For PDCP-66 and PDCP-71, the mechanically pressurized sprayer yielded the greatest UE for both dermal and inhalation exposure.

7.2 Estimated Environmental Concentrations and Unit Exposure Values

Table 31 through Table 38 present the estimated environmental concentrations and unit exposure values used to estimate risk for the Proposed Program.

Table 31: MLA OPHED Unit Exposures

Application Scenario	Mixer-Loader-Applicator (MLA)		Mixer-Loader (ML)		Applicator (A)	
	Dermal (µg a.i./lb)	Inhalation (µg a.i./lb)	Dermal (µg a.i./lb)	Inhalation (µg a.i./lb)	Dermal (µg a.i./lb)	Inhalation (µg a.i./lb)
PDCP-64	3.05E+04	6.91E+01	See MLA	See MLA	See MLA	See MLA
PDCP-65	3.05E+04	6.91E+01	See MLA	See MLA	See MLA	See MLA
PDCP-66	2.05E+03	8.68E+00	See MLA	See MLA	See MLA	See MLA
PDCP-66 Aerial	See ML, A	See ML, A	6.9E+00	1.7E+00	2.08E+00	4.9E-03
PDCP-70	3.05E+04	6.91E+01	See MLA	See MLA	See MLA	See MLA
PDCP-71	2.05E+03	8.68E+00	See MLA	See MLA	See MLA	See MLA
PDCP-77	3.05E+04	6.91E+01	See MLA	See MLA	See MLA	See MLA
PDCP-78	3.05E+04	6.91E+01	See MLA	See MLA	See MLA	See MLA

Table 32: DWB OPHED Unit Exposures

Application Scenario	Dermal (µg a.i./lb)	Inhalation (µg a.i./lb)	Off-Site Drift (%)
PDCP-64	1.10E+01	3.50E-01	0.83%
PDCP-65	1.10E+01	3.50E-01	0.83%
PDCP-66	1.10E+01	3.50E-01	0.83%
PDCP-66 Aerial	1.10E+01	3.50E-01	14.66%
PDCP-70	1.10E+01	3.50E-01	0.83%
PDCP-77	1.10E+01	3.50E-01	0.83%
PDCP-78	1.10E+01	3.50E-01	0.83%

Table 33: PDCP-64 PAL Soil and Foliar Pesticide Concentrations

Chemical	EEC	Acute	Subchronic	Chronic
Dinotefuran	DFR_t (µg/cm^2)	1.48E+00	1.48E+00	1.48E+00
	Soil (mg a.i./kg soil)	2.19E-02	2.19E-02	2.19E-02
Dodecylbenzene sulfonate	DFR_t (µg/cm^2)	9.15E-01	9.15E-01	9.15E-01
	Soil (mg a.i./kg soil)	1.35E-02	1.35E-02	1.35E-02
Ethanolamine	DFR_t (µg/cm^2)	8.75E-01	8.75E-01	8.75E-01
	Soil (mg a.i./kg soil)	1.30E-02	1.30E-02	1.30E-02
Isopropyl alcohol	DFR_t (µg/cm^2)	3.36E-01	3.36E-01	3.36E-01
	Soil (mg a.i./kg soil)	4.98E-03	4.98E-03	4.98E-03
POE Nonylphenol	DFR_t (µg/cm^2)	2.07E+00	2.07E+00	2.07E+00
	Soil (mg a.i./kg soil)	3.06E-02	3.06E-02	3.06E-02
Sodium dodecylbenzene sulfonate	DFRt (µg/cm^2)	3.66E-01	3.66E-01	3.66E-01
	Soil (mg a.i./kg soil)	5.42E-03	5.42E-03	5.42E-03
Sodium xylene sulfonate	DFRt (µg/cm^2)	1.61E-01	1.61E-01	1.61E-01
	Soil (mg a.i./kg soil)	2.39E-03	2.39E-03	2.39E-03

Table 34: PDCP-65 PAL Soil and Foliar Pesticide Concentrations

Chemical	EEC	Acute	Subchronic	Chronic
Dinotefuran	DFR_t (µg/cm^2)	1.48E+00	1.48E+00	1.48E+00
	Soil (mg a.i./kg soil)	2.19E-02	2.19E-02	2.19E-02
Dodecylbenzene sulfonate	DFR_t (µg/cm^2)	9.15E-01	9.15E-01	9.15E-01
	Soil (mg a.i./kg soil)	1.35E-02	1.35E-02	1.35E-02
Ethanolamine	DFR_t (µg/cm^2)	8.75E-01	8.75E-01	8.75E-01
	Soil (mg a.i./kg soil)	1.30E-02	1.30E-02	1.30E-02
Isopropyl alcohol	DFR_t (µg/cm^2)	3.36E-01	3.36E-01	3.36E-01
	Soil (mg a.i./kg soil)	4.98E-03	4.98E-03	4.98E-03
POE Nonylphenol	DFR_t (µg/cm^2)	2.07E+00	2.07E+00	2.07E+00
	Soil (mg a.i./kg soil)	3.06E-02	3.06E-02	3.06E-02
Sodium dodecylbenzene sulfonate	DFR_t (µg/cm^2)	3.66E-01	3.66E-01	3.66E-01
	Soil (mg a.i./kg soil)	5.42E-03	5.42E-03	5.42E-03
Sodium xylene sulfonate	DFR_t (µg/cm^2)	1.61E-01	1.61E-01	1.61E-01
	Soil (mg a.i./kg soil)	2.39E-03	2.39E-03	2.39E-03

Table 35: PDCP-66 PAL Soil and Foliar Pesticide Concentrations

Chemical	EEC	Acute	Subchronic	Chronic
Dinotefuran	DFR_t (µg/cm^2)	1.48E+00	1.48E+00	1.48E+00
	Soil (mg a.i./kg soil)	2.19E-02	2.19E-02	2.19E-02
Sodium dodecylbenzene sulfonate	DFR_t (µg/cm^2)	3.66E-01	3.66E-01	3.66E-01
	Soil (mg a.i./kg soil)	5.42E-03	5.42E-03	5.42E-03

Table 36: PDCP-66 Aerial PAL Soil and Foliar Pesticide Concentrations

Chemical	EEC	Acute	Subchronic	Chronic
Dinotefuran	DFR_t (µg/cm^2)	1.48E+00	1.48E+00	1.48E+00
	Soil (mg a.i./kg soil)	2.19E-02	2.19E-02	2.19E-02
Sodium dodecylbenzene sulfonate	DFR_t (µg/cm^2)	3.66E-01	3.66E-01	3.66E-01
	Soil (mg a.i./kg soil)	5.42E-03	5.42E-03	5.42E-03

Table 37: PDCP-77 PAL Soil and Foliar Pesticide Concentrations

Chemical	EEC	Acute	Subchronic	Chronic
Imidacloprid	DFR_t (µg/cm^2)	1.82E-01	1.82E-01	1.82E-01
	Soil (mg a.i./kg soil)	2.69E-03	2.69E-03	2.69E-03
Glycerin	DFR_t (µg/cm^2)	8.07E-02	8.07E-02	8.07E-02
	Soil (mg a.i./kg soil)	1.20E-03	1.20E-03	1.20E-03
Dodecylbenzene sulfonate	DFR_t (µg/cm^2)	4.17E-01	4.17E-01	4.17E-01
	Soil (mg a.i./kg soil)	6.18E-03	6.18E-03	6.18E-03
Ethanolamine	DFR_t (µg/cm^2)	4.04E-01	4.04E-01	4.04E-01
	Soil (mg a.i./kg soil)	5.98E-03	5.98E-03	5.98E-03
Isopropyl alcohol	DFR_t (µg/cm^2)	1.55E-01	1.55E-01	1.55E-01
	Soil (mg a.i./kg soil)	2.29E-03	2.29E-03	2.29E-03
POE Nonylphenol	DFR_t (µg/cm^2)	9.49E-01	9.49E-01	9.49E-01
	Soil (mg a.i./kg soil)	1.40E-02	1.40E-02	1.40E-02
Sodium xylene sulfonate	DFR_t (µg/cm^2)	7.40E-02	7.40E-02	7.40E-02
	Soil (mg a.i./kg soil)	1.10E-03	1.10E-03	1.10E-03

Table 38: PDCP-78 PAL Soil and Foliar Pesticide Concentrations

Chemical	EEC	Acute	Subchronic	Chronic
Imidacloprid	DFR_t (µg/cm^2)	1.82E-01	1.82E-01	1.82E-01
	Soil (mg a.i./kg soil)	2.69E-03	2.69E-03	2.69E-03
Glycerin	DFR_t (µg/cm^2)	8.07E-02	8.07E-02	8.07E-02
	Soil (mg a.i./kg soil)	1.20E-03	1.20E-03	1.20E-03
Dodecylbenzene sulfonate	DFR_t (µg/cm^2)	4.17E-01	4.17E-01	4.17E-01
	Soil (mg a.i./kg soil)	6.18E-03	6.18E-03	6.18E-03
Ethanolamine	DFR_t (µg/cm^2)	4.04E-01	4.04E-01	4.04E-01
	Soil (mg a.i./kg soil)	5.98E-03	5.98E-03	5.98E-03
Isopropyl alcohol	DFR_t (µg/cm^2)	1.55E-01	1.55E-01	1.55E-01
	Soil (mg a.i./kg soil)	2.29E-03	2.29E-03	2.29E-03
POE Nonylphenol	DFR_t (µg/cm^2)	9.49E-01	9.49E-01	9.49E-01
	Soil (mg a.i./kg soil)	1.40E-02	1.40E-02	1.40E-02
Sodium xylene sulfonate	DFR_t (µg/cm^2)	7.40E-02	7.40E-02	7.40E-02
	Soil (mg a.i./kg soil)	1.10E-03	1.10E-03	1.10E-03

Table 39: PDCP-70 PAR Soil, Foliar, Turf, and Edible Vegetation Pesticide Concentrations

Chemical	EEC	Acute	Subchronic	Chronic
Glycerin	Soil (mg a.i./kg soil)	1.10E-03	1.51E-04	1.24E-05
	DFR_t (µg/cm^2)	2.46E-02	1.23E-03	1.01E-04
	TTR_t (µg/cm^2)	2.46E-04	1.23E-05	1.01E-06
	Edible Veg (mg/kg veg)	1.69E-01	1.69E-01	1.69E-01
Imidacloprid	Soil (mg a.i./kg soil)	2.29E-03	2.02E-03	6.79E-04
	DFR_t (µg/cm^2)	5.15E-02	1.12E-02	9.23E-04
	TTR_t (µg/cm^2)	5.15E-04	1.12E-04	9.23E-06
	Edible Veg (mg/kg veg)	3.45E-01	3.45E-01	3.45E-01

Table 40: PDCP-71 PAR Soil and Edible Vegetation Pesticide Concentrations

Chemical	EEC	Acute	Subchronic	Chronic
Glycerin	Soil (mg a.i./kg soil)	9.46E-02	1.30E-02	1.07E-03
	Edible Veg (mg/kg veg)	3.06E-01	3.06E-01	3.06E-01
Imidacloprid	Soil (mg a.i./kg soil)	1.99E-01	1.76E-01	5.90E-02
	Edible Veg (mg/kg veg)	2.04E-02	2.04E-02	2.04E-02

7.3 Risk Results

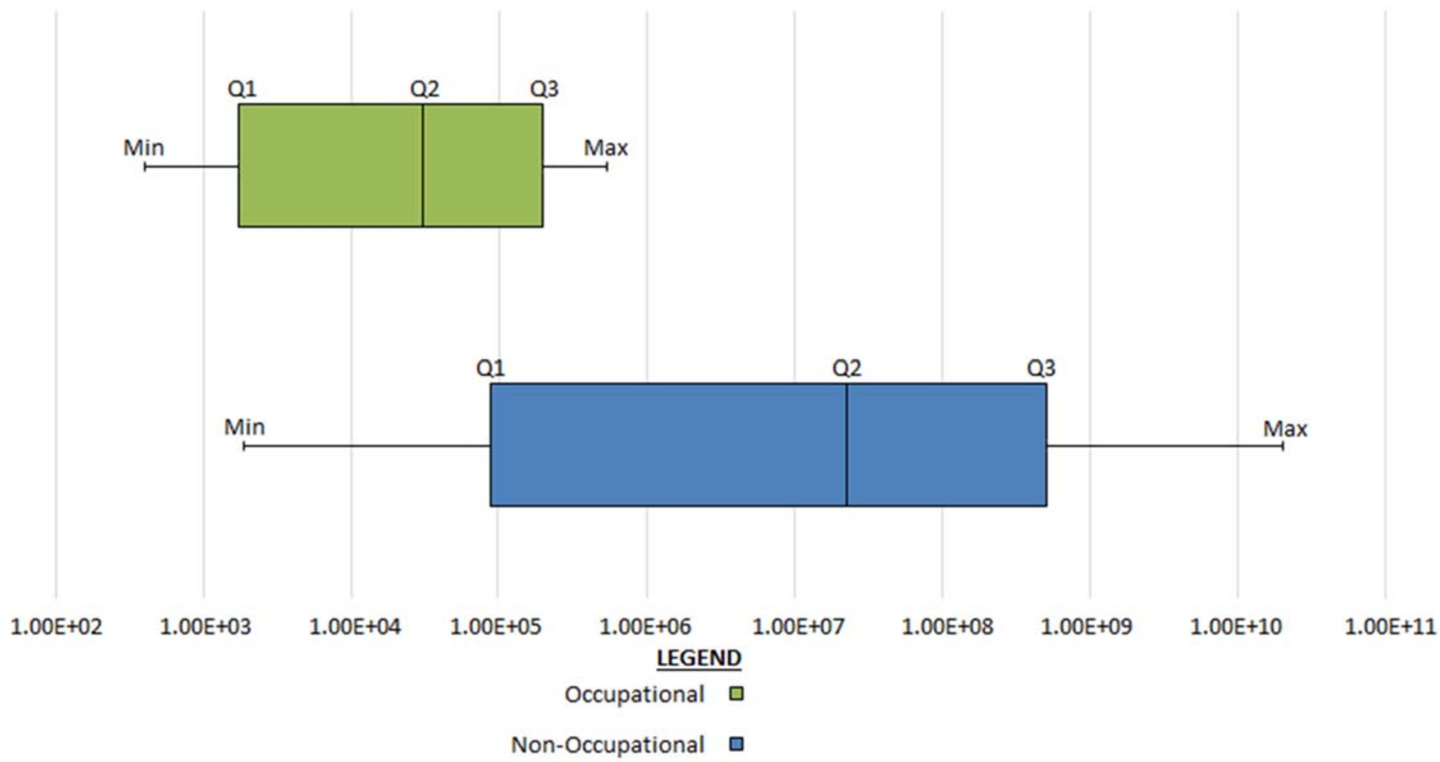
Presented in Figure 4 is a graphical summary of the aggregate MOEs (i.e., sum MOE for all chemicals and pathways within a scenario) for the Proposed Changes. The distribution of aggregate MOE data is presented as box-and-whisker plots, separated by occupational and non-occupational receptor groups. Occupational receptors include the mixer-loader-applicator and combined nursery worker and were all assumed to be adults. For non-occupational receptors, the <2 year-old, 2-<16 year-old, and adult downwind bystander and post-application resident MOE data were aggregated by age group for applicable scenarios (e.g., Residential). For the scenarios evaluated in this HHRA, aggregate MOE values ranged from approximately 400 to over 2.00E+10. Note that the target MOE values used for this HHRA were 100 and 300 for adult and child receptors, respectively. Exposures with an MOE greater than the target MOE indicate that adverse impact to human health is not anticipated.

A box-and-whisker plot is a method for graphically displaying sets of data through the use of quartiles, or ranked sets of data in which three separate points (Q1, Q2, Q3) divide the data into four groups. Box-and-whisker plots have lines (whiskers) that horizontally extend from the boxes to the lowest and highest observed aggregate MOEs for occupational and non-occupational receptors. The interquartile range (i.e., box) includes the MOEs that are within fifty-percent of the median, with Q1 representing the twenty-five percent of MOEs lower than the median (Q2) and, similarly, Q3 representing the twenty-five percent of the MOEs above the median. The terminal point on each whisker represents the minimum and maximum MOE value.

The magnitude of an MOE is indicative of the general safety of exposure, with larger MOEs indicating lesser relative potential risk. As a whole, risk values (MOEs) for occupational receptors tended to be lower than those for non-occupational workers. Comparatively large MOEs should not, however, be interpreted as encouraging a receptor to unnecessarily come into contact with environmental media containing pesticide residues. Risk results for the individual scenarios and receptors are presented in Appendix E. A “N/A” (Not Applicable) in the MOE tables indicates that receptor and exposure pathway were not quantitated because the route of exposure was not applicable, the chemical was not of concern, or no data were available.

No aggregate MOE values surpassed the target MOE, indicating no adverse impacts to human health were anticipated for any receptor in this HHRA.

Figure 4: Distribution of Occupational and Non-Occupational Aggregate MOEs for All Scenarios



7.4 Uncertainty Analysis

In characterizing risks from exposure to pesticide active and inert ingredients and adjuvants, it is important to address the variability and uncertainty associated with the exposure/risk estimates. The risk characterization should provide information on: (1) potential measurement errors based on the precision and accuracy of the available data, (2) variability of the input data used in the exposure/risk estimates, and (3) uncertainty that results from data gaps or the assumptions used. The risk characterization also assesses the relative importance of these components on the estimates of exposure/dose and risk.

Uncertainty may be introduced into the exposure/risk calculations at various stages of the risk assessment process. Uncertainty may occur as a result of: (1) site-specific variations of chemical-specific fate and transport that could impact chemical partitioning, retention, and degradation, (2) the selection of exposure scenarios and exposure factors, (3) and the uncertainties associated with pesticide active and inert ingredient or adjuvant toxicity data that have been extrapolated from high doses in animals to low doses in humans, and that do not account for the interactions of exposures to multiple chemical substances over a lifetime. Variability can occur as a result of variations in individual day-to-day or event-to-event exposure factors or variations among the exposed population.

7.4.1 Exposure Assessment

To address the exposure assessment uncertainties, the following assumptions were made. In some cases, as noted below, conservative assumptions likely resulted in an overestimation of actual risk.

7.4.1.1 Inert Ingredient Information Quality

The HHRA evaluated information on inert ingredients to the extent that information was available. The quality and detail of information available on inert ingredients in pesticide products was highly variable. Disclosure of inert ingredients is limited and rarely fully disclosed. In instances where inert ingredients were not disclosed and no information was available to estimate risk, the extent of risk, if any, remains unknown.

7.4.1.2 Model Limitations

When empirical data were not available, models are often utilized to derive environmental media concentrations and exposure values in the HHRA. To overcome the innate limitations of environmental modeling, various assumptions were made based on professional judgment. When assumptions were necessary, conservative assumptions (i.e., ones that resulted in the highest exposure estimate) were made. For a description of the models discussed in this section, please refer to Section 5.

Limitations of each model are presented below.

7.4.1.2.1 USEPA Occupational Pesticide Handler Exposure Data (OPHED)

OPHED required the user to select from the given combinations of application techniques, settings, and Personal Protective Equipment (PPE). When a requested application scenario did not match any of the OPHED choices, the most suitable surrogate was chosen based on professional judgment. Most studies used to derive the OPHED unit exposures were unavailable.

7.4.1.2.2 Brigg's Equation

The Brigg's equation was used to estimate active and inert ingredient and adjuvant concentration in vegetation. It allows for the calculation of expected tissue concentrations due to active and inert ingredient and adjuvant uptake from soil residues for plants. If the Log K_{ow} was estimated at greater than 5, the model assumed there was no chemical uptake from the soil, limiting the analysis to external foliar residues only, if applicable. When the Log K_{ow} was estimated as negative, the TSCF is assumed to be 1.0 (Collins *et al*., 2006).

The Brigg's Equation utilizes the chemical K_{ow} and a simple soil model to estimate active and inert ingredient and adjuvant concentrations taken up in vegetation. When multiple K_{ow}s have been reported, a mean value was calculated.

Additionally, the assumptions associated with the soil properties are based on a residential soil profile that may not reflect actual application site conditions.

7.4.1.2.3 AgDRIFT

For this HHRA, most of the default values in the AgDRIFT model were left unchanged from the Statewide PEIR. AgDRIFT makes assumptions for a variety of parameters associated with application methods and meteorological data that may not match site specific conditions and may lead to over- or under-estimation of actual off-site drift.

7.4.1.2.4 USEPA Standard Operating Procedures for Residential Exposure Assessments (SOP)

USEPA's Residential SOPs are more reliable for estimating acute exposure than continuous exposure. The user is limited to the application settings, exposure pathways, and activity patterns provided in the SOP so a surrogate had to be chosen if the requested application and exposure options were not available. Using conservative surrogates, such as USEPA's Exposure Factors Handbook (EFH), provided more confidence that the resulting exposure tended toward an over-estimate compared to actual exposure.

7.4.1.2.5 USEPA Risk Assessment Guidance for Superfunds (RAGS)

RAGS methodology is most commonly used to estimate continuous exposure, but in some cases (e.g., ingestion of vegetation, dermal exposure to soil), it was used for acute exposure assessments due to lack of appropriate alternative methodology. Alternative methodologies that were considered, but not used because they were deemed less conservative or less appropriate for the specific analysis included, but were not limited to, USEPA *Standard Operating Procedures for Residential Exposure Assessments* (SOP) (USEPA, 2012l) and USEPA's *Occupational Pesticide Handler Exposure Data* (OPHED) (USEPA, 2013b).

7.4.1.2.6 Water Ingestion

Surfacewater

Qualitative considerations for chemicals included in the Proposed Program included surfacewater monitoring data from reliable and authoritative databases. Data is limited based on what is available in the databases and considers all potential source inputs of chemicals. This data was intended to provide insight into general presence of chemicals in the environment and includes all source inputs which include but is not limited to Proposed Program activities. The estimated environmental concentrations used for estimating risk to ingestion of surfacewater relied, in part, on modeling data from PWC. There are inherent limitations associated with environmental modeling, including those utilized here. For more information on the limitations of PWC, see the Ecological Risk Assessment.

For surfacewater assessment, individuals were conservatively assumed to consume exclusively from the impacted source, which likely overestimates consumption from one given water source.

Groundwater

The estimated environmental concentrations for ingestion of groundwater relied, in part, on monitoring data from reliable databases. These data are reflective of all potential source inputs, which includes, but is not limited to Proposed Program activities. Thus, the information provided is not a direct evaluation of program activity but instead used to provide context for evaluating the potential impacts of the project as well as the potential for cumulative impacts.

Individuals were conservatively assumed to consume exclusively from the impacted source, which likely overestimates consumption from one given water source.

7.4.2 Toxicity Assessment

To address the toxicity assessment uncertainties, the following assumptions were made. In some cases, as noted below, conservative assumptions likely resulted in an over-estimate of actual risk.

7.4.2.1 Toxicological Endpoints

The toxicity assessment evaluated non-cancerous adverse effects that were derived from animal data observed in controlled experiments. Uncertainty associated with the NO(A)EL extrapolated for human exposure are addressed through use of the uncertainty factors which determine the target MOE. The uncertainty factors for inter-species extrapolation and intra-species variation were accounted for through the use of two 10x uncertainty factors for a total target MOE of 100 (USEPA, 2007k). An additional uncertainty factor of 3 is applied to the target MOE for child receptors, who may be more sensitivity to adverse effects (OEHHA, 2001c; OEHHA, 2008a). Therefore, the higher target MOE of 300 for children was used to be consistent with OEHHA's recent analysis (OEHHA, 2016a).

There exists uncertainty in using a "freestanding NO(A)EL" (i.e., a point of departure that has no adverse effect associated with it, but instead is the maximum dose tested without adverse effects). Use of freestanding NO(A)ELs is generally considered health protective as no adverse health effects are observed even at the typically high doses used in toxicity tests. There also exists uncertainty in the extrapolation of an oral endpoint to dermal and inhalation exposure pathways. Differences in metabolism and susceptibility at different sites influence the dose of a chemical that interacts at a receptor level, as well as whether the adverse effects are local or systemic.

7.4.2.2 Endocrine Disruptors

Endocrine disruptors are chemicals or mixtures of chemicals that may interfere with the body's endocrine system and produce developmental, teratogenic, reproductive, neurological and immune effects in both humans and wildlife (NIEHS, 2010a). Although endocrine disruptors are generally considered to have the potential to cause adverse effects, uncertainty exists regarding the relationship between endocrine disruptor exposure and adverse health outcomes. In many cases, only screening level data are available, which may address the potential for a chemical to interact with the endocrine system in a way that could produce an adverse effect (USEPA, 2011v). In general, these and other forms of endocrine disruptor data are not sufficient for conducting a risk assessment. Due to this uncertainty, endocrine disruption effects are not specifically evaluated in this risk assessment.

7.4.2.3 Synergism

Synergism is the effect caused when exposure to two or more chemicals concurrently or consecutively results in health effects that are greater than the sum of the effects of the individual chemicals (Health Canada, 2016c). Uncertainty exists as to whether any of the chemicals analyzed in this HHRA produce synergistic effects. Although methodologies were available for assessing synergism, no usable endpoints were available in the literature to evaluate synergistic relationships between and within active and inert ingredients analyzed in this HHRA. Therefore, synergistic effects could not be evaluated in this risk assessment.

7.5 Conclusions

This HHRA was conducted to assess the potential health risk to humans from implementation of Proposed Program. The HHRA was conducted using procedures and methodologies commonly accepted and used by government agencies such as USEPA, DPR, OEHHA and CDPH as well as the wider risk assessment profession. The HHRA relied upon the four stage process for risk assessments: hazard identification, toxicity dose response assessment, exposure assessment, and risk characterization. In the hazard identification phase, CDFA and its risk assessment team consulted with DPR, CDPH and OEHHA to determine the appropriate scenarios to assess, which models should be used to evaluate exposure, default input parameters, and appropriate toxic effect representations. The toxicity dose-response assessment phase selected health-protective values for acute, subchronic, and chronic non-cancer health effects. Cancer slope factors (CSF) do not exist because the available data indicate that the pesticide active and inert ingredients and adjuvant assessed are not carcinogenic. Therefore, cancer risk was not assessed. Non-cancer health effects were based on NO(A)ELs obtained from toxicity studies. In the exposure assessment phase, the ADD, SADD, and AADD for potentially exposed populations were estimated using various models accounting for concentration of pesticide active and inert ingredients and adjuvants in various environmental media and subsequent exposure by human receptors. The risk characterization phase provided a quantitative assessment of the potential for adverse effects to receptors.

For each of the application scenarios analyzed for the Proposed Program, the calculated MOE was greater than the target MOE value of 300. This indicates that exposure to pesticide active and inert ingredients and adjuvants during the Proposed Program is unlikely to result in adverse impacts to human health.

This HHRA, along with the Statewide PEIR, will be used to assist CDFA in assessing potential impacts to human health. This HHRA did not identify any new significant human health impacts or any substantial increase in the severity of the significant effects identified in the PEIR accruing to the use of these scenarios in addition to previously analyzed treatment scenarios. No alterations to PDCP-64, PDCP-65, PDCP-66, PDCP-66 Aerial, PDCP-70, PDCP-71, PDCP-72, PDCP-77, and PDCP-78 that were not already indicated for other scenarios in the PEIR are recommended.

References

NOTE: References match those previously listed in the Statewide PEIR (CDFA, 2014a). Therefore, lettering order following publication years may not always be in sequence in this report. Links to webpages were active as of the listed access date. Access to those web resources and information presented therein are subject to change.

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Appendix A: Program Material Data Sheets (PMDS)

(PMDS includes product label and MSDS or SDS)

Appendix 3A

California Department of Food & Agriculture Program Material Data Sheet (PMDS) Version 2.0

INSTRUCTIONS:

1.) Please fill in this PMDS with specific application scenario details.
2.) In the "Application Description" section on Page 2, please describe the application in thorough detail.
3.) Please refer to the Example PMDS (attached) to ensure the template has been filled in properly.
4.) Please attach product label and Safety Data Sheet.
5.) Include units as needed.
6.) For PMDS revisions, do so in track changes and "save as" with the following file naming convention:
PMDS Program Name Pesticide Scenario App Method Author Initials Date
Ex.: PMDS JB Acelepryn Turf Spray Drench LP 4.2.16

PMDS Status Summary

Prepared by
(CDFA): **S. Veling** Date: 7/22/16

X Reviewed, X Revised, ☐ Approved by:
(Blankinship):**J. Sullivan** Date: 9/30/2016

☐Reviewed, ☐ Revised, ☐ Approved by:
(CDFA): Date:

☐ Reviewed, X Revised, ☐ Approved by:
(Blankinship): **J. Sullivan** Date: **10/26/16**

☐Reviewed, ☐ Revised, X Approved by:
(CDFA): C. Hanes Date: 10/28/16

☐Reviewed, ☐ Revised, X Approved by:
(Blankinship):J. Sullivan Date: 11/2/16

Scenario Name: PDCP-64

Product Name	Specialty Label (e.g., Section 18, 24c) (Yes/No)	Active Ingredient(s)	Additional Product	Additional Active Ingredient
Safari 20 SG	No	Dinotefuran	None	NA

General Scenario Setting (e.g., Large Production Nursery, Residential, etc.)	Specific Scenario Setting Description (e.g., containerized plants on loading dock)	Geographic Scenario Setting Description (Statewide or specific region)
Small, Medium and Most Large Production Nursery	Containerized nursery stock on loading dock	Statewide

Trapping Scenario (if yes, Describe below)	Anticipated Consecutive Years of Application	Target Pest(s)	Target Host(s) (e.g., citrus tree, ornamental, turf, etc.)
N/A	Minimum of 4 years	Various	Nursery stock

Non-target Areas Affected (e.g., potential overspray to turf)	Application Technique (e.g., broadcast, drench, spot spray, etc.)	Application Equipment (e.g., mechanically pressurized handgun, boom sprayer, backpack, etc.)
Loading dock surface (concrete, soil)	Foliar spray	Mechanically pressurized sprayer, hydraulic sprayer, backpack sprayer

Application(s) per year	Application Interval (If variable, explain on page 2)	Product Application Rate	Final Tank Mix Applied (Volume per Area)
150	2 days	8 oz. per 100 gal. of water	100 gallons/20,000 sq. ft.

Application Area	Area Treated/Applicator/Day	Initial Application (Provide Month)	Final Application (Provide Month)
3750 sq. ft.	3750 sq. ft.	January	December

Months When Applications Could Occur (Place an "x" in all appropriate boxes)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x	x	x	x	x	x	x	x	x	x	x	x

Adjuvant(s) or Additive(s) Product:	Adjuvant Application Rate	Adjuvant Application Rate Units
No Foam B	16 fl. oz.	fl. oz. per 100 gallon tank mix

Application Descriptions and Assumptions (Please describe the application in as much detail as possible using a bullet point list).

- Each plant receives a single application on loading dock immediately prior to shipment
- Re-entry signs are posted around treated plants.
- Plants are not loaded onto shipping trucks until the REI period has elapsed.
- Loading consist of either palleted plants or individuals pots manually lifted.
- Nursery food crops that are potential hosts can be included but would need to be treated at a lower rate.
- Treated host plants on loading docks are isolated from other nursery stock or other nontarget plants.
- Applications not be made when target plants within the application area are in bloom when bees are present.
- Applying 8 oz (by weight) of Safari 20 SG/100 gallons/20,000 sq. ft. converts to 0.22 lb. a.i./ac.
- No Foam B is applied at a rate of 16 fl. Oz./100 gallons.
- Minimize exposure of this Safari 20 SG to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of Safari 20 SG to beehives or to off-site pollinator attractive habitat.

Appendix 3A

California Department of Food & Agriculture
Program Material Data Sheet (PMDS) Version 2.0

PMDS Status Summary
Prepared by (CDFA): **S. Veling** Date: 7/22/16 X Reviewed, X Revised, ☐ Approved by: (Blankinship):**J. Sullivan** Date: 9/30/2016
☐Reviewed, ☐ Revised, ☐ Approved by: (CDFA): Date: ☐ Reviewed, X Revised, ☐ Approved by: (Blankinship): **J. Sullivan** Date: **10/26/16**
☐Reviewed, ☐ Revised, X Approved by: (CDFA): C. Hanes Date: 10/28/16 ☐Reviewed, ☐ Revised, X Approved by: (Blankinship): J. Sullivan Date: 11/2/16

INSTRUCTIONS:

1.) Please fill in this PMDS with specific application scenario details.
2.) In the "Application Description" section on Page 2, please describe the application in thorough detail.
3.) Please refer to the Example PMDS (attached) to ensure the template has been filled in properly.
4.) Please attach product label and Safety Data Sheet.
5.) Include units as needed.
6.) For PMDS revisions, do so in track changes and "save as" with the following file naming convention:
PMDS Program Name Pesticide Scenario App Method Author Initials Date
Ex.: PMDS JB Acelepryn Turf Spray Drench LP 4.2.16

Scenario Name: PDCP-65

Product Name	Specialty Label (e.g., Section 18, 24c) (Yes/No)	Active Ingredient(s)	Additional Product	Additional Active Ingredient
Safari 20 SG	No	Dinotefuran	None	NA

General Scenario Setting (e.g., Large Production Nursery, Residential, etc.)	Specific Scenario Setting Description (e.g., containerized plants on loading dock)	Geographic Scenario Setting Description (Statewide or specific region)
Small, Medium and Most Large Production Nursery	Containerized nursery stock	Statewide

Trapping Scenario (if yes, Describe below)	Anticipated Consecutive Years of Application	Target Pest(s)	Target Host(s) (e.g., citrus tree, ornamental, turf, etc.)
N/A	Minimum of 4 years	Various	Nursery stock

Non-target Areas Affected (e.g., potential overspray to turf)	Application Technique (e.g., broadcast, drench, spot spray, etc.)	Application Equipment (e.g., mechanically pressurized handgun, boom sprayer, backpack, etc.)
Drift to nontarget containerized plants and overspray to soil or gravel	Foliar spray	Mechanically pressurized sprayer, hydraulic sprayer, boom sprayer, backpack sprayer

Application(s) per year	Application Interval (If variable, explain on page 2)	Product Application Rate	Final Tank Mix Applied (Volume per Area)
2	90 days	8 oz. per 100 gal. of water	100 gallons/20,000 sq. ft.

Application Area	Area Treated/Applicator/Day	Initial Application (Provide Month)	Final Application (Provide Month)
0.75 acres	0.75 acres	January	December

Months When Applications Could Occur (Place an "x" in all appropriate boxes)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x	x	x	x	x	x	x	x	x	x	x	x

Adjuvant(s) or Additive(s) Product:	Adjuvant Application Rate	Adjuvant Application Rate Units
No Foam B	16 fl. oz. per 100 gallons	100 gal tank mix/20,000 sq. ft.

Application Descriptions and Assumptions (Please describe the application in as much detail as possible using a bullet point list).

- Hold treatments are made when the nursery has a viable GWSS find in a shipment at destination. This would be a nursery with either an infested premise or a free-from premise compliance agreement. The second situation is a nursery in an infested county with trap finds that are over the maximum threshold for finds in the nursery. If either situation happens the nursery must treat all plants within 100 feet of the finds, or the block of plants where the GWSS-infested plant originated.
- Plants can be treated no more than 2x per year.
- Re-entry signs are posted around treated plants.
- Applications not be made when target or nontarget plants within the application area are in bloom.
- Applying 8 oz (by weight) of Safari 20 SG/100 gallons/20,000 sq. ft. converts to 0.22 lb. a.i./ac.
- No Foam B is applied at a rate of 16 fl. oz./100 gallons.
- Minimize exposure of this Safari 20 SG to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of Safari 20 SG to beehives or to off-site pollinator attractive habitat.

Appendix 3A

California Department of Food & Agriculture
Program Material Data Sheet (PMDS) Version 2.0

PMDS Status Summary

Prepared by
(CDFA): **S. Veling** Date: 7/22/16

X Reviewed, X Revised, ☐ Approved by:
(Blankinship):**J. Sullivan** Date: 9/30/2016

☐Reviewed, ☐ Revised, ☐ Approved by:
(CDFA): Date:

☐ Reviewed, X Revised, ☐ Approved by:
(Blankinship): **J. Sullivan** Date: **11/1/16**

☐Reviewed, ☐ Revised, X Approved by:
(CDFA): C. Hanes Date: 11/1/16

☐Reviewed, ☐ Revised, X Approved by:
(Blankinship):J. Sullivan Date: 11/2/16

INSTRUCTIONS:

1.) Please fill in this PMDS with specific application scenario details.
2.) In the "Application Description" section on Page 2, please describe the application in thorough detail.
3.) Please refer to the Example PMDS (attached) to ensure the template has been filled in properly.
4.) Please attach product label and Safety Data Sheet.
5.) Include units as needed.
6.) For PMDS revisions, do so in track changes and "save as" with the following file naming- convention:
PMDS Program Name Pesticide Scenario App Method Author Initials Date
Ex.: PMDS JB Acelepryn Turf Spray Drench LP 4.2.16

Scenario Name: PDCP-66

Product Name	Specialty Label (e.g., Section 18, 24c) (Yes/No)	Active Ingredient(s)	Additional Product	Additional Active Ingredient
Safari 20 SG	No	Dinotefuran	None	NA

General Scenario Setting (e.g., Large Production Nursery, Residential, etc.)	Specific Scenario Setting Description (e.g., containerized plants on loading dock)	Geographic Scenario Setting Description (Statewide or specific region)
Large Production Nursery	Containerized nursery stock	Statewide

Trapping Scenario (if yes, Describe below)	Anticipated Consecutive Years of Application	Target Pest(s)	Target Host(s) (e.g., citrus tree, ornamental, turf, etc.)
N/A	Minimum of 4 years	Various	Nursery stock

Non-target Areas Affected (e.g., potential overspray to turf)	Application Technique (e.g., broadcast, drench, spot spray, etc.)	Application Equipment (e.g., mechanically pressurized handgun, boom sprayer, backpack, etc.)
Soil, drift to nontarget nursery plants	Foliar spray	Mechanically pressurized sprayer, hydraulic sprayer

Application(s) per year	Application Interval (If variable, explain on page 2)	Product Application Rate	Final Tank Mix Applied (Volume per Area)
1	Per year	8 oz. per 100 gal. of water	100 gallons/20,000 sq. ft.

Application Area	Area Treated/Applicator/Day	Initial Application (Provide Month)	Final Application (Provide Month)
130 acres	50 acres	January	December

Months When Applications Could Occur (Place an "x" in all appropriate boxes)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x	x	x	x	x	x	x	x	x	x	x	x

Adjuvant(s) or Additive(s) Product:	Adjuvant Application Rate	Adjuvant Application Rate Units
No Foam B	16 fl. oz./100 gallons	fl. oz. per 100 gallons

Program Material Data Sheet (PMDS) Version 2.0

Application Descriptions and Assumptions (Please describe the application in as much detail as possible using a bullet point list).

- Board treatments occur where nurseries, if they meet specific requirements, can receive a pesticide treatment that is reimbursed by the CDFA PD/GWSS Board. Quite often these treatments involve the aerial application of a pesticide having systemic properties. The average size of these nurseries over the past few years has been about 130 acres. Treatments using Safari 20 SG are done at most once a year, with 12 nurseries qualifying. The products used for these treatments are those listed on the nursery PMDS as being applied using "aerial" or "soil treatment" methods.
- Plants can be treated no more than once per year.
- Re-entry signs are posted around treated plants. Applications not be made when target or nontarget plants within the application area are in bloom.
- Applying 8 oz (by weight) of Safari 20 SG/100 gallons/20,000 sq. ft. converts to 0.22 lb. a.i./ac.
- No Foam B is applied at a rate of 16 oz/100 gallons.
- Minimize exposure of this Safari 20 SG to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of Safari 20 SG to beehives or to off-site pollinator attractive habitat.

Appendix 3A

California Department of Food & Agriculture
Program Material Data Sheet (PMDS) Version 2.0

PMDS Status Summary

Prepared by
(CDFA): **S. Veling** Date: 7/22/16

X Reviewed, ☐X Revised, ☐ Approved by:
(Blankinship):**J. Sullivan** Date: 10/3/16

☐Reviewed, ☐ Revised, ☐ Approved by:
(CDFA): Date:

☐ Reviewed, X Revised, ☐ Approved by:
(Blankinship): **J. Sullivan** Date: **10/18/16**

☐Reviewed, ☐ Revised, X Approved by:
(CDFA): C. Hanes Date: 10/28/16

☐Reviewed, ☐ Revised, X Approved by:
(Blankinship): J. Sullivan Date: 11/2/16

INSTRUCTIONS:

1.) Please fill in this PMDS with specific application scenario details.
2.) In the "Application Description" section on Page 2, please describe the application in thorough detail.
3.) Please refer to the Example PMDS (attached) to ensure the template has been filled in properly.
4.) Please attach product label and Safety Data Sheet.
5.) Include units as needed.
6.) For PMDS revisions, do so in track changes and "save as" with the following file naming convention:
PMDS Program Name Pesticide Scenario App Method Author Initials Date
Ex.: PMDS JB Acelepryn Turf Spray Drench LP 4.2.16

Scenario Name: PDCP-70

Product Name	Specialty Label (e.g., Section 18, 24c) (Yes/No)	Active Ingredient(s)	Additional Product	Additional Active Ingredient
Merit 2F	No	Imidacloprid	None	NA

General Scenario Setting (e.g., Large Production Nursery, Residential, etc.)	Specific Scenario Setting Description (e.g., containerized plants on loading dock)	Geographic Scenario Setting Description (Statewide or specific region)
Residential	Landscape host material	Statewide

Trapping Scenario (if yes, Describe below)	Anticipated Consecutive Years of Application	Target Pest(s)	Target Host(s) (e.g., citrus tree, ornamental, turf, etc.)
N/A	Minimum of 4 Years	Various	Ornamentals

Non-target Areas Affected (e.g., potential overspray to turf)	Application Technique (e.g., broadcast, drench, spot spray, etc.)	Application Equipment (e.g., mechanically pressurized handgun, boom sprayer, etc.)
Potential overspray to turf, bare soil, nontarget plants	Foliar	Mechanically pressurized sprayer, backpack sprayer

Application(s) per year	Application Interval (If variable, explain on page 2)	Product Application Rate	Final Tank Mix Applied (Volume per Area)
Once per year per location	Once per year per location	1.5 fl oz (45mL) per 100 gal of water	100 gallons/acre

Application Area	Area Treated/Applicator/Day	Initial Application (Provide Month)	Final Application (Provide Month)
15 acres	15 acres	January	December

Months When Applications Could Occur (Place an "x" in all appropriate boxes)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x	x	x	x	x	x	x	x	x	x	x	x

Adjuvant(s) or Additive(s) Product:	Adjuvant Application Rate	Adjuvant Application Rate Units
None	NA	NA

Program Material Data Sheet (PMDS) Version 2.0

Application Descriptions and Assumptions (Please describe the application in as much detail as possible using a bullet point list).

- Applications made in a 150 m radius around a find.
- Applications made to ornamental.
- No applications made to citrus or vegetables, but other fruit trees could be treated.
- No direct applications made to turf.
- Lawn furniture, lawn toys, are removed or covered.
- Water containers and features are tarped or covered.
- Application rate of 1.5 fl. oz. Merit/100 gal tank mix, and 100 gal tank mix/Ac is 0.023 lb imidacloprid/Ac.
- Overspray to impervious surfaces avoided.
- Pre-treatment notification of 7 days provided to all properties.
- Residents are provided notices regarding re-entry period of "once the spray has dried."
- Notices also indicate citrus fruits and grapes can be eaten directly after treatment as long as they are washed. Preharvest intervals for other fruits that might be treated are also provided.
- Minimize exposure of Merit 2F to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of Merit 2F to beehives or to off-site pollinator attractive habitat.

Appendix 3A

California Department of Food & Agriculture Program Material Data Sheet (PMDS) Version 2.0

PMDS Status Summary

Prepared by
(CDFA): **S. Veling** Date: 7/22/16

X Reviewed, X Revised, ☐ Approved by:
(Blankinship): **J. Sullivan** Date: 10/3/16

☐Reviewed, ☐ Revised, ☐ Approved by:
(CDFA): Date:

☐ Reviewed, X Revised, ☐ Approved by:
(Blankinship): **J. Sullivan** Date: **10/18/16**

☐Reviewed, ☐ Revised, X Approved by:
(CDFA): C. Hanes Date: 10/28/16

☐Reviewed, ☐ Revised, X Approved by:
(Blankinship): J. Sullivan Date: 11/2/16

INSTRUCTIONS:

1.) Please fill in this PMDS with specific application scenario details.
2.) In the "Application Description" section on Page 2, please describe the application in thorough detail.
3.) Please refer to the Example PMDS (attached) to ensure the template has been filled in properly.
4.) Please attach product label and Safety Data Sheet.
5.) Include units as needed.
6.) For PMDS revisions, do so in track changes and "save as" with the following file naming convention:
PMDS Program Name Pesticide Scenario App Method Author Initials Date
Ex.: PMDS JB Acelepryn Turf Spray Drench LP 4.2.16

Scenario Name: PDCP-71

Product Name	Specialty Label (e.g., Section 18, 24c) (Yes/No)	Active Ingredient(s)	Additional Product	Additional Active Ingredient
Merit 2F	Yes	Imidacloprid	None	NA

General Scenario Setting (e.g., Large Production Nursery, Residential, etc.)	Specific Scenario Setting Description (e.g., containerized plants on loading dock)	Geographic Scenario Setting Description (Statewide or specific region)
Residential	Landscape host material	Statewide

Trapping Scenario (if yes, Describe below)	~~Anticipated Consecutive Years of~~ Application	Target Pest(s)	Target Host(s) (e.g., citrus tree, ornamental, turf, etc.)
N/A	Minimum of 4 years	Various	Ornamentals including groundcovers and citrus and other fruit trees

Non-target Areas Affected (e.g., potential overspray to turf)	Application Technique (e.g., broadcast, drench, spot spray, etc.)	Application Equipment (e.g., mechanically pressurized handgun, boom sprayer, etc.)
turf and soil	Drench	Mechanically pressurized sprayer

Application(s) per year	Application Interval (If variable, explain on page 2)	Product Application Rate	Final Tank Mix Applied (Volume per Area)
Once per year per location	Once per year per location	0.2 fl oz. per inch of trunk dia. or per foot of shrub height	NA, no more than 128 inches of tree trunk or feet of shrub height per acre

Application Area	Area Treated/Applicator/Day	Initial Application (Provide Month)	Final Application (Provide Month)
15 acres	15 acres	January	December

Months When Applications Could Occur (Place an "x" in all appropriate boxes)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x	x	x	x	x	x	x	x	x	x	x	x

Adjuvant(s) or Additive(s) Product:	Adjuvant Application Rate	Adjuvant Application Rate Units
None	NA	NA

Program Material Data Sheet (PMDS) Version 2.0

Application Descriptions and Assumptions (Please describe the application in as much detail as possible using a bullet point list).

- Section 24c for citrus leafminer provides for a 2ee recommendation for use.
- Applications made in a 150 m radius around a find.
- Applications made to ornamentals, citrus and other fruit trees.
- No applications made vegetables.
- No direct applications made to turf.
- Overspray to impervious surfaces avoided.
- Pre-treatment notification of 7 days provided to all properties.
- Residents are provided notices regarding re-entry period of "once the spray has dried."
- Notices also indicate citrus fruits and grapes can be eaten directly after treatment as long as they are washed. Preharvest intervals for other fruits that might be treated are also provided.
- Maximum allowed amount of active ingredient is 0.4 lb a.i./acre or 1.6 pints of product. This application rate provides for treatment of 128 inches of tree trunk diameter or feet of shrub height per acre.
- Minimize exposure of Merit 2F to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.

Appendix 3A

California Department of Food & Agriculture Program Material Data Sheet (PMDS) Version 2.0

INSTRUCTIONS:

1.) Please fill in this PMDS with specific application scenario details.
2.) In the "Application Description" section on Page 2, please describe the application in thorough detail.
3.) Please refer to the Example PMDS (attached) to ensure the template has been filled in properly.
4.) Please attach product label and Safety Data Sheet.
5.) Include units as needed.
6.) For PMDS revisions, do so in track changes and "save as" with the following file naming convention:
PMDS Program Name Pesticide Scenario App Method Author Initials Date
Ex.: PMDS JB Acelepryn Turf Spray Drench LP 4.2.16

PMDS Status Summary

Prepared by
(CDFA): **S. Veling** Date: 7/22/16

X Reviewed, X Revised, ☐ Approved by:
(Blankinship): **J. Sullivan** Date: 10/3/16

☐Reviewed, ☐ Revised, ☐ Approved by:
(CDFA): Date:

☐ Reviewed, X Revised, ☐ Approved by:
(Blankinship): **J. Sullivan** Date: **10/18/16**

☐Reviewed, ☐ Revised, x Approved by:
(CDFA): C. Hanes Date: 10/28/16

☐Reviewed, ☐ Revised, X Approved by:
(Blankinship): J. Sullivan Date: 11/1/16

Scenario Name: PDCP-72

Product Name	Specialty Label (e.g., Section 18, 24c) (Yes/No)	Active Ingredient(s)	Additional Product	Additional Active Ingredient
Merit 2F	Yes	Imidacloprid	None	NA

General Scenario Setting (e.g., Large Production Nursery, Residential, etc.)	Specific Scenario Setting Description (e.g., containerized plants on loading dock)	Geographic Scenario Setting Description (Statewide or specific region)
Residential	Landscape host material	Statewide

Trapping Scenario (if yes, Describe below)	Anticipated Consecutive Years of Application	Target Pest(s)	Target Host(s) (e.g., citrus tree, ornamental, turf, etc.)
N/A	Minimum of 4 Years	Various	Ornamentals including groundcovers and citrus and other fruit trees

Non-target Areas Affected (e.g., potential overspray to turf)	Application Technique (e.g., broadcast, drench, spot spray, etc.)	Application Equipment (e.g., mechanically pressurized handgun, boom sprayer, etc.)
Soil and turf	Injection	Soil Injector

Application(s) per year	Application Interval (If variable, explain on page 2)	Product Application Rate	Final Tank Mix Applied (Volume/Area)
Once per year per location	Once per year per location	0.2 fl oz. per inch of trunk dia. or per foot of shrub height	NA, no more than 128 inches of tree trunk or feet of shrub height per acre

Application Area	Area Treated/Applicator/Day	Initial Application (Provide Month)	Final Application (Provide Month)
15 acres	15 acres	January	December

Months When Applications Could Occur (Place an "x" in all appropriate boxes)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x	x	x	x	x	x	x	x	x	x	x	x

Adjuvant(s) or Additive(s) Product:	Adjuvant Application Rate	Adjuvant Application Rate Units
None	NA	NA

Program Material Data Sheet (PMDS) Version 2.0

Application Descriptions and Assumptions (Please describe the application in as much detail as possible using a bullet point list).

- Section 24c for citrus leafminer provides for a 2ee recommendation for use.
- Applications made in a 150 m radius around a find.
- Applications made to ornamentals, citrus and other fruit trees.
- No applications made vegetables.
- No direct applications made to turf.
- Pre-treatment notification of 7 days provided to all properties.
- Residents are provided notices regarding re-entry period of "once the spray has dried."
- Notices also indicate citrus fruits and grapes can be eaten directly after treatment as long as they are washed. Preharvest intervals for other fruits that might be treated are also provided.
- Maximum allowed amount of active ingredient is 0.4 lb a.i./acre or 1.6 pints of product. This application rate provides for treatment of 128 inches of tree trunk diameter or feet of shrub height per acre.
- Minimize exposure of Merit 2F to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.

Appendix 3A

California Department of Food & Agriculture Program Material Data Sheet (PMDS) Version 2.0

PMDS Status Summary	
Prepared by (CDFA): **C. Hanes**	Date: 10/14/16
X Reviewed, X Revised, ☐ Approved by: (Blankinship): **J. Sullivan**	Date: 10/14/16
☐Reviewed, X Revised, ☐ Approved by: (CDFA): **C. Hanes**	Date: 10/31/16
☐ Reviewed, X Revised, ☐ Approved by: (Blankinship): **J. Sullivan**	Date: **11/1/16**
☐Reviewed, ☐ Revised, X Approved by: (CDFA): C. Hanes	Date: 11/2/16
☐Reviewed, ☐ Revised, X Approved by: (Blankinship): J. Sullivan	Date: 11/2/16

INSTRUCTIONS:

1.) Please fill in this PMDS with specific application scenario details.
2.) In the "Application Description" section on Page 2, please describe the application in thorough detail.
3.) Please refer to the Example PMDS (attached) to ensure the template has been filled in properly.
4.) Please attach product label and Safety Data Sheet.
5.) Include units as needed.
6.) For PMDS revisions, do so in track changes and "save as" with the following file naming convention:
PMDS Program Name Pesticide Scenario App Method Author Initials Date
Ex.: PMDS JB Acelepryn Turf Spray Drench LP 4.2.16

Scenario Name: PDCP-77

Product Name	Specialty Label (e.g., Section 18, 24c) (Yes/No)	Active Ingredient(s)	Additional Product	Additional Active Ingredient
Marathon II Greenhouse and Nursery Insecticide	No	Imidacloprid	None	None

General Scenario Setting (e.g., Large Production Nursery, Residential, etc.)	Specific Scenario Setting Description (e.g., containerized plants on loading dock)	Geographic Scenario Setting Description (Statewide or specific region)
Small, Medium, and Most Large Production Nursery	Containerized nursery stock on loading dock	Statewide

Trapping Scenario (if yes, Describe below)	Anticipated Consecutive Years of Application	Target Pest(s)	Target Host(s) (e.g., citrus tree, ornamental, turf, etc.)
N/A	Minimum of 4 years	Various	Nursery stock

Non-target Areas Affected (e.g., potential overspray to turf)	Application Technique (e.g., broadcast, drench, spot spray, etc.)	Application Equipment (e.g., mechanically pressurized handgun, boom sprayer, etc.)
Loading dock surface (concrete, soil)	Foliar spray	Mechanically pressurized sprayer, backpack sprayer, or hydraulic sprayer

Application(s) per year	Application Interval (If variable, explain on page 2)	Product Application Rate	Final Tank Mix Applied
150	2 days	1.7 fl oz. per 100 gal. of water	100 gallons/acre

Application Area	Area Treated/Applicator/Day	Initial Application (Provide Month)	Final Application (Provide Month)
3750 square feet	3750 square feet	January	December

Months When Applications Could Occur (Place an "x" in all appropriate boxes)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x	x	x	x	x	x	x	x	x	x	x	x

Adjuvant(s) or Additive(s) Product:	Adjuvant Application Rate	Adjuvant Application Rate Units
No Foam B	16 fl oz/100 gal tank mix	100 gallons/acre

Appendix 3A

Program Material Data Sheet (PMDS) Version 2.0

Application Descriptions and Assumptions (Please describe the application in as much detail as possible using a bullet point list).

- Each plant receives a single application on loading dock immediately prior to shipment
- Re-entry signs are posted around treated plants.
- Plants are not loaded onto shipping trucks until the REI period has elapsed.
- Loading consist of either palleted plants or individuals pots manually lifted.
- Nursery food crops that are potential hosts can be include
- ed.
- Consistent with assumptions made in the Statewide PEIR analysis for other imidacloprid-containing products applied in nurseries, assume 100 gallons of tank mix are sprayed per acre.
- Applying 1.7 fl. oz./100 gallons/acre results in application rate of 0.027 lb a.i./acre.
- Application rate for No Foam B is 16 fl. oz./100 gallons of tank mix.
- Treated host plants on loading docks are isolated from other nursery stock or other nontarget plants.
- Applications will not be made when target plants within the application area are in bloom.
- Do not apply Marathon II Greenhouse and Nursery Insecticide or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

Appendix 3A

California Department of Food & Agriculture Program Material Data Sheet (PMDS) Version 2.0

INSTRUCTIONS:

1.) Please fill in this PMDS with specific application scenario details.
2.) In the "Application Description" section on Page 2, please describe the application in thorough detail.
3.) Please refer to the Example PMDS (attached) to ensure the template has been filled in properly.
4.) Please attach product label and Safety Data Sheet.
5.) Include units as needed.
6.) For PMDS revisions, do so in track changes and "save as" with the following file naming convention:
PMDS Program Name Pesticide Scenario App Method Author Initials Date
Ex.: PMDS JB Aceleptyn Turf Spray Drench LP 4.2.16

PMDS Status Summary

Prepared by
(CDFA): **C. Hanes** Date: 10/14/16

X Reviewed, X Revised, ☐ Approved by:
(Blankinship):**J. Sullivan** Date: 10/20/16

☐Reviewed, x Revised, ☐ Approved by:
(CDFA): **C. Hanes** Date: 10/31/16

☐ Reviewed, X Revised, ☐ Approved by:
(Blankinship): **J. Sullivan** Date: **11/1/16**

☐Reviewed, ☐ Revised, X Approved by:
(CDFA): C. Hanes Date: 11/2/16

☐Reviewed, ☐ Revised, X Approved by:
(Blankinship): J. Sullivan Date: 11/2/16

Scenario Name: PDCP-78

Product Name	Specialty Label (e.g., Section 18, 24c) (Yes/No)	Active Ingredient(s)	Additional Product	Additional Active Ingredient
Marathon II Greenhouse and Nursery Insecticide	No	Imidacloprid	None	None

General Scenario Setting (e.g., Large Production Nursery, Residential, etc.)	Specific Scenario Setting Description (e.g., containerized plants on loading dock)	Geographic Scenario Setting Description (Statewide or specific region)
Small, Medium, and Most Large Production Nursery	Containerized nursery stock	Statewide

Trapping Scenario (if yes, Describe below)	Anticipated Consecutive Years of Application	Target Pest(s)	Target Host(s) (e.g., citrus tree, ornamental, turf, etc.)
N/A	Minimum of 4 years	Various	Nursery stock

Non-target Areas Affected (e.g., potential overspray to turf)	Application Technique (e.g., broadcast, drench, spot spray, etc.)	Application Equipment (e.g., mechanically pressurized handgun, boom sprayer, etc.)
Soil and non-target plants	Foliar spray	Mechanically pressurized sprayer, backpack sprayer, or hydraulic sprayer

Application(s) per year	Application Interval (If variable, explain on page 2)	Product Application Rate	Final Tank Mix Applied
2	180 days	1.7 fl oz. per 100 gal. of water	100 gallons/acre

Application Area	Area Treated/Applicator/Day	Initial Application (Provide Month)	Final Application (Provide Month)
0.75 Acre	0.75 Acre	January	December

Months When Applications Could Occur (Place an "x" in all appropriate boxes)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x	x	x	x	x	x	x	x	x	x	x	x

Adjuvant(s) or Additive(s) Product:	Adjuvant Application Rate	Adjuvant Application Rate Units
No Foam B	16 fl oz/100 gal tank mix	100 gallons/acre

Program Material Data Sheet (PMDS) Version 2.0

Application Descriptions and Assumptions (Please describe the application in as much detail as possible using a bullet point list).

- Hold treatments are made when the nursery has a viable GWSS find in a shipment at destination. This would be a nursery with either an infested premise or a free-from premise compliance agreement. The second situation is a nursery in an infested county with trap finds that are over the maximum threshold for finds in the nursery. If either situation happens the nursery must treat all plants within 100 feet of the finds, or the block of plants where the GWSS-infested plant originated.
- The same plants can be treated more than one time per year.
- Re-entry signs are posted around treated plants.
- Consistent with assumptions made in the Statewide PEIR analysis for other imidacloprid-containing products applied in nurseries, assume 100 gallons of tank mix are sprayed per acre.
- Applying 1.7 fl. oz./100 gallons/acre results in application rate of 0.027 lb a.i./acre.
- Application rate for No Foam B is 16 fl. oz./100 gallons of tank mix.
- Treated host plants on loading docks are isolated from other nursery stock or other nontarget plants.
- Applications will not be made when target plants within the application area are in bloom.
- Do not apply Marathon II Greenhouse and Nursery Insecticide or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

Labels and Safety Data Sheets (SDS) for Application Scenarios:

PDCP-64, PDCP-65, PDCP-66, PDCP-66 Aerial, PDCP-70, PDCP-71, PDCP-72, PDCP-77, and PDCP-78

GROUP	4A	INSECTICIDE

PROFESSIONAL VALENT PRODUCTS

Safari®

20 SG INSECTICIDE

FOR FOLIAR AND SYSTEMIC INSECT CONTROL IN ORNAMENTAL PLANTS AND VEGETABLE TRANSPLANTS IN ENCLOSED STRUCTURES.

FOR GREENHOUSE, NURSERY, INTERIOR PLANTSCAPE, OUTDOOR LANDSCAPE AND FORESTRY USE ONLY.

Active Ingredient:
Dinotefuran, [N-methyl-N'-nitro-N"-((tetrahydro-3-furanyl)methyl)guanidine] 20%
Other Ingredients 80%
Total 100%

EPA Reg. No. 86203-11-59639 EPA Est. 67545-AZ-01

KEEP OUT OF REACH OF CHILDREN
CAUTION
SEE BELOW FOR ADDITIONAL PRECAUTIONARY STATEMENTS.

FIRST AID

If on skin or clothing:	Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for further treatment advice.
If swallowed:	Call poison control center or doctor immediately for treatment advice. Do not induce vomiting unless told to do so by the poison control center or doctor. Have person sip a glass of water if able to swallow. Do not give anything by mouth to an unconscious person.

(continued)

FIRST AID (continued)

If in eyes:	Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for further treatment advice.
If inhaled:	Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call poison control center or doctor for further treatment advice.

HOT LINE NUMBER

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact **800-892-0099** for emergency medical treatment information.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Harmful if swallowed or absorbed through skin. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Causes moderate eye irritation. Remove and wash contaminated clothing before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE):

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants
- Shoes plus socks

USER SAFETY REQUIREMENTS

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions exist for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS

Users should:
- Wash hands with soap and water before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to 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. Do not apply when weather conditions favor drift from treated areas. Drift and runoff from treated areas may be hazardous to aquatic organisms in water adjacent to treated areas. Do not dispose equipment washwaters or rinsate into a natural drain or water body.

This product is toxic to honey bees. The persistence of residues and potential residual toxicity of dinotefuran in nectar and pollen suggests the possibility of chronic toxic risk to honey bee larvae and the eventual instability of the hive.

- This product is toxic to bees exposed to residues for more than 38 hours following treatment.
- Do not apply this product to blooming, pollen-shedding or nectar-producing parts of plants if bees may forage on the plants during this time period, unless the application is made in response to a public health emergency declared by appropriate state or federal authorities.

Dinotefuran and its degradate, MNG, have the properties and characteristics associated with chemicals detected in groundwater. The high water solubility of dinotefuran, and its degradate, MNG, coupled with its very high mobility, and resistance to biodegradation indicates that this compound has a strong potential to leach to the subsurface under certain conditions as a result of label use. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

PHYSICAL OR CHEMICAL HAZARDS

Do not use, pour, spill or store near heat or open flame.

SPRAY DRIFT ADVISORY

Do not apply under conditions involving possible drift to food, forage or other plantings that might be damaged or the crop thereof rendered for sale, use or consumption.

PROTECTION OF POLLINATORS

APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

(continued)

PROTECTION OF POLLINATORS (continued)

Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.

Bees and other insect pollinators will forage on plants when they flower, shed pollen or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications.
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at: http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx. Pesticide incidents (for example, bee kills) should immediately be reported to the State/Tribal lead agency. For contact information for your State, go to: www.aapco.org. Pesticide incidents should also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

READ ENTIRE LABEL. USE STRICTLY IN ACCORDANCE WITH PRECAUTIONARY STATEMENTS AND DIRECTIONS, AND WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

FOR COMMERCIALLY GROWN ORNAMENTALS NOT UNDER CONTRACT FOR POLLINATION SERVICES BUT ARE ATTRACTIVE TO POLLINATORS

- **Do not apply this product while bees are foraging.**
- **This product is toxic to bees exposed to residue for more than 38 hours following treatment.**
- **Do not apply this product to blooming, pollen-shedding or nectar-producing parts of plants if bees may forage on the plants during this time period, unless the application is made in response to a public health emergency declared by appropriate state or federal authorities.**

NON-AGRICULTURAL USES

Do not apply Safari® 20 SG Insecticide while bees are foraging. Do not apply *Safari* 20 SG Insecticide to plants that are flowering. Only apply after all flower petals have fallen off.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, greenhouses and handlers of agricultural insecticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

EXCEPTION: If product is drenched or soil-injected, workers may enter the area at any time if there will be no contact with anything that has been treated.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil or water is:
- Coveralls
- Shoes plus socks
- Chemical-resistant gloves (made of any waterproof material)

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Do not allow others to enter treated areas until sprays have dried.

APPLICATION INFORMATION

- Applications of *Safari* 20 SG Insecticide in residential areas may be made by commercially licensed applicators.

Application to Ornamental Plants (including Forestry):
- *Safari* 20 SG Insecticide can be applied as a foliar spray, a broadcast spray, a soil drench, soil injection and via chemigation for insect control in ornamental plants in greenhouses, nurseries, outdoor landscapes and interior plantscapes.
- *Safari* 20 SG Insecticide is a systemic product and will be taken up by the root system and translocated upward throughout the plant. When applied as a foliar spray, the product offers translaminar and locally systemic control of foliar pests.
- When applied to the soil, *Safari* 20 SG Insecticide will be translocated more quickly in herbaceous plants than in woody shrubs and trees. Speed of insect control will range from as little as one day for small herbaceous plants in containers, to several weeks in large trees growing in the landscape.
- Do not apply more than a total of 2.7 lbs of product (0.54 lb active ingredient) per acre per year for all application types.
- **Do not apply this product, by any application method, to linden, basswood or other *Tilia* species.**

Application to Vegetable Transplants:
- *Safari* 20 SG Insecticide can be applied as a foliar spray or a broadcast spray for insect control in vegetable transplants.
- Do not apply more than 1.34 lbs (0.268 lbs ai) per acre of nursery per year.

MIXING INSTRUCTIONS:

Safari 20 SG Insecticide Alone: Add half of the required amount of water to the mix tank. With the agitator running, add the desired amount of *Safari* 20 SG Insecticide to the tank. Continue agitation while adding the remainder of the water. Begin application of the solution after *Safari* 20 SG Insecticide has completely dispersed into the mix water. Maintain agitation until all of the mixture has been applied.

Safari 20 SG Insecticide + Tank Mixtures: Add half of the required amount of water to the mix tank. Start the agitator running before adding any tank mix partners. In general, add tank mix partners in this order: products packaged in water-soluble packaging, wettable powders, wettable granules (dry flowables), liquid flowables, liquids, emulsifiable concentrates, and surfactants/adjuvants. Always allow each tank mix partner to become fully dispersed before adding the next product. Provide sufficient agitation while adding the remainder of the water. Maintain agitation until all the mixture has been applied.

NOTE: When using *Safari* 20 SG Insecticide in tank mixtures, add all products in water-soluble packaging to the tank before any other tank mix partner, including *Safari* 20 SG Insecticide. Allow the water-soluble packaging to completely dissolve and the product(s) to completely disperse before adding any other tank mix partner to the tank.

If using *Safari* 20 SG Insecticide in a tank mixture, observe all directions for use, crop/sites, use rates, dilution ratios, precautions, and limitations which appear on the tank mix product label. Do not exceed label dosage rate, and follow the most restrictive label precautions and limitations. Do not mix this product with any product that prohibits such mixing. Tank mixtures or other applications of products referenced on this label are permitted only in those states in which the referenced products are labeled.

Compatibility

IMPORTANT: The safety of all potential tank mixes has not been tested on all crops. Before applying any tank mixture not specifically listed on this label, confirm the safety to the target crop.

Safari 20 SG Insecticide is compatible with most commonly used pesticides, crop oils, adjuvants, and nutritional sprays. However, since it is not possible to test all possible mixtures, pre-test to assure the physical compatibility and lack of phytotoxic effect of any proposed mixtures with *Safari* 20 SG Insecticide. To determine the physical compatibility of *Safari* 20 SG Insecticide with other products, use a jar test, as described below:

Using a quart jar, add the proportionate amounts of the products to 1 quart of water. Add wettable powders and water dispersible granular products first, then liquid flowables, and emulsifiable concentrates last. After thoroughly mixing, let stand for at least 5 minutes. If the combination remains mixed or can be remixed readily, it is physically compatible. Once compatibility has been proven, use the same procedure for additional required ingredients to the spray tank.

RESISTANCE MANAGEMENT

Safari 20 SG Insecticide contains a Group 4A insecticide. Insect biotypes with acquired resistance to Group 4A may eventually dominate the insect population if Group 4A insecticides are used repeatedly in the same crop or in successive years as the primary method of control for a targeted species. This may result in partial or total loss of control of those species by *Safari* 20 SG Insecticide or other Group 4A insecticides.

To delay the development of insecticide resistance in greenhouse, nursery and interiorscape use sites, strongly consider the following guidelines:

- Do not apply *Safari* 20 SG Insecticide or other Group 4A insecticides to consecutive generations of the same insect pest species.
- Do not drench soil media with *Safari* 20 SG Insecticide or other Group 4A insecticides more than one time per crop cycle or three months, whichever is shorter.
- Do not make more than two foliar or broadcast sprays of *Safari* 20 SG Insecticide or other Group 4A insecticides to a single crop during a two-month period.
- Do not make more than one soil drench and one foliar or broadcast spray with *Safari* 20 SG Insecticide or other Group 4A insecticides during a two-month period.
- Base insecticide use on a comprehensive IPM program.
- Monitor treated insect populations for loss of field efficacy.
- Contact your local extension specialist, certified crop advisors, and/or manufacturers for insecticide resistance management and/or IPM guidelines for the specific site and resistant pest problems.
- For further information or to report suspected resistance, you may contact Valent U.S.A. Corporation, at toll free number: 1-800-898-2536.

APPLICATION PROCEDURES AND SPRAY EQUIPMENT

Ground Application: Select spray nozzles that will provide accurate and uniform spray deposition. Use spray nozzles that provide medium-sized droplets and reduce drift. To help insure accuracy, calibrate sprayer before each use. For information on spray equipment and calibration, consult nozzle manufacturers and/or State Extension Service specialists.

Apply *Safari* 20 SG Insecticide using sufficient water volume to provide thorough and uniform coverage. In situations where a dense canopy exists and/or pest pressure is high, use greater water volumes. The use of a spray adjuvant may improve spray coverage. Do not apply under conditions where uniform coverage cannot be obtained or where excessive spray drift may occur.

Applications to ornamental plants, forestry and vegetable transplants: *Safari* 20 SG Insecticide can be applied using many different types of application equipment. Apply in sufficient water to ensure good coverage of ornamental plants. Tank mixing with a surfactant will produce better coverage when making applications to plants with hard to wet foliage such as holly or pine. If concentrate or mist type spray equipment is used, apply the same amount of product on the sprayed area as would be used in a dilute solution. To assure optimum effectiveness, the product must be placed where the growing portion of the target plant can absorb the active ingredient. Applications can be made to foliage or as a soil drench.

RESTRICTIONS

- With the exception of non-livestock animals, do not graze treated areas or use clippings from treated areas for feed or forage.
- Prevent runoff or puddling of irrigation water following application.
- Keep children and pets off treated areas until spray has dried.
- Do not apply to areas that are water logged or saturated, or frozen, which will not allow penetration into the root zone of the plant.

APPLICATION THROUGH IRRIGATION SYSTEMS (CHEMIGATION):

Safari 20 SG Insecticide may be applied by injection into an irrigation system, either alone or in combination with other pesticides or chemicals that are registered for application through irrigation systems. Dilution ratios are normally 1:100 to 1:200, depending on the system. Apply this product only through microirrigation (individual spaghetti tube), drip irrigation, overhead irrigation, or motorized calibrated irrigation equipment (Ornamentals). Do not apply through any other type of irrigation system. Lack of effectiveness can result from non-uniform distribution of treated water. If you have questions about calibration, contact State Extension Service specialists, equipment manufacturers, or other experts. A person knowledgeable of the chemigation system and responsible for its operation, or under the supervision of the responsible person, shall shut the system down and make adjustments when necessary.

Using Water from Public Water Systems:
DO NOT APPLY *Safari* 20 SG INSECTICIDE THROUGH ANY IRRIGATION SYSTEM PHYSICALLY CONNECTED TO A PUBLIC WATER SYSTEM.

Public water system means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days per year. *Safari* 20 SG Insecticide may be applied through irrigation systems which may be supplied by a public water system only if the water from the public water system is discharged into a reservoir tank prior to pesticide introduction. There shall be a complete physical break (air gap) between the outlet end of the fill pipe and to top or overflow rim of the reservoir tank of at least twice the inside diameter of the fill pipe. Before beginning chemigation, always make sure that the air gap exists and that there is no blockage of the overflow of the reservoir tank.

Any irrigation system using water supplied from a public water system must also meet the following requirements:

Operating Instructions for Irrigation Systems:

1. The system must be calibrated to uniformly apply the rates specified. If you have questions about calibration, contact State Extension Service specialists, equipment manufacturers, or other experts.
2. The system must contain a functional check valve, vacuum relief valve, and low-pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from backflow.
3. The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.
4. The pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
5. The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.
6. The irrigation line or water pump must include a functional pressure switch that will stop the water pump motor when the water pressure decreases to the point where pesticide distribution is adversely affected.
7. Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.
8. Do not apply when wind speed favors drift beyond the area intended.

Calibration and Application Instructions:

Apply *Safari* 20 SG Insecticide under the schedule specified in the specific use instructions, not according to the irrigation schedule unless the events coincide. In general, set the equipment to apply the minimum amount of water per acre. Run the system at 86-90% of the manufacturer's maximum rated travel speed.

The following calibration and application techniques are provided for user reference, but do not constitute a warranty of fitness for application through sprinkler irrigation equipment. Check with State and local regulatory agencies for potential use restrictions before applying any agricultural chemical through sprinkler irrigation equipment.

MINIMIZING SPRAY DRIFT

As with all crop protection products, it is important to minimize off-target movement. Do not allow spray to drift onto adjacent land, crops, or aquatic areas. To minimize spray drift:

1. Make applications when wind velocity favors on-target product deposition (approximately 3 to 10 mph). Do not apply when wind velocity exceeds 10 mph. Do not apply when wind gusts approach 10 mph.
2. Risk of exposure to sensitive aquatic areas can be reduced by not applying when wind direction is toward the aquatic area.
3. Do not cultivate or plant crops within 25 feet of the aquatic area as to allow growth of a vegetative filter strip.
4. Do not make applications during temperature inversions. Inversions are characterized by stable air and increasing temperatures with increased height above the ground. Mist or fog may indicate the presence of an inversion in humid areas. The applicator may detect the presence of an inversion by producing smoke and observing a smoke layer near the ground surface.
5. Use the largest droplet size consistent with good pest control. Small droplets are more prone to spray drift and can be minimized by appropriate nozzle selection, by orienting nozzles away from the air stream as much as possible, and by not using excessive spray boom pressure.
6. Apply as close to target plants as practical to obtain a good spray pattern for adequate coverage. Do not apply more than 10 ft above the crop canopy.
7. For aerial applications, mount spray boom on the aircraft so as to minimize drift caused by wing tip vortices. Use minimum practical boom length and do not use boom that exceeds 75% of wing span or rotor diameter.

Air Assisted (Air Blast) Tree and Vine Sprayers (Ornamentals Only):

Air assisted tree and vine sprayers carry droplets into the canopy of trees and vines via a radially or laterally directed air stream. In addition to the general drift management principles already described, the following specific practices will further reduce the potential for drift:

1. Adjust deflectors and aiming devices so that spray is only directed into the canopy.
2. Block off upward pointed nozzles when there is no overhanging canopy.
3. Use only enough air volume to penetrate the canopy and provide good coverage. Use a minimum of 50 gallons finished spray per acre.
4. Do not allow spray to go beyond the edge of the cultivated area. Spray the outside row only from outside the planting.

Appendix 3A

VEGETABLE TRANSPLANTS (IN ENCLOSED STRUCTURES) FOLIAR OR BROADCAST SPRAY APPLICATION
For foliar insect control on vegetable transplants grown in enclosed structures.

Crops	Pests	Product Rate (By Weight)	Remarks
Cucurbits (Transplants only) Cantaloupe Cucumber Melons Squash Fruiting Vegetables Eggplant Peppers Tomato Head and Stem Brassica Broccoli Brussels Sprouts Cabbage Cauliflower Kohlrabi	Aphids Leafminers Mealybugs Thrips (suppression) Whiteflies including: Silverleaf/ Sweetpotato (B and Q Biotypes)	3.5-7.0 oz per 100 gal 7 - 14 oz per Acre 0.16-0.32 oz per 1,000 sq ft (0.09 to 0.18 lbs ai per Acre)	Do not make more than one application per crop. Apply only to cucurbits and brassica being grown as transplants and before transplants are sold. 100 gals of spray mix will treat 20,000 sq ft of area when using a typical high volume sprayer. If using a low volume sprayer, adjust concentration to apply the same amount of product per unit area.
Leafy Vegetables (Transplants only) (Excluding *Brassica* spp.)	Aphids Leafminers Mealybugs Thrips (suppression) Whiteflies including: Silverleaf/ Sweetpotato (B and Q Biotypes)	3.5-5.5 oz per 100 gal 7-11 oz per Acre 0.16-0.25 oz per 1,000 sq ft (0.09 to 0.134 lbs ai per Acre)	Do not make more than one application per crop. Apply only to leafy vegetables being grown as transplants and before transplants are sold. 100 gals of spray mix will treat 20,000 sq ft of area when using a typical high volume sprayer. If using a low volume sprayer, adjust concentration to apply the same amount of product per unit area.
One (1) level teaspoon contains 2.4 grams and 1 cup (8 fl oz) contains 4.0 oz by weight of *Safari* 20 SG Insecticide. Begin applications when first pest activity is noticed or when insects reach threshold levels per University/ Extension recommendations. Time application before a damaging population becomes established. **Restriction:** Do not apply more than 1.34 lbs (0.268 lbs ai) per acre of nursery per year. To delay the development of resistance: Do not apply *Safari* 20 SG Insecticide or other Group 4A insecticides to consecutive generations of the same insect species without switching to a different mode of action. Do not make more than two sprays of *Safari* 20 SG Insecticide or other Group 4A insecticides to a single crop. Refer to "Resistance Management" section of label for further guidelines.			

ORNAMENTAL PLANTS AND FORESTS – FOLIAR OR BROADCAST SPRAY APPLICATION – OUTDOOR

For foliar insect control on ornamental plants in nurseries, outdoor landscapes (commercial, industrial, recreational and residential), tree plantations, reforestation nurseries and forests.

Crops	Pests	Product Rate	Remarks
Ornamental plants including: Shrubs Bedding Plants Flowering Plants Foliage Plants Ground Covers Evergreens Ornamental Trees Non-Bearing Fruit Trees Non-Bearing Nut Trees Non-Bearing Vines Christmas Trees Trees in Plantations including: Conifers Deciduous trees Reforestation Nurseries Forests and Wooded Areas: National, Private and State	Adelgids including: Hemlock Woolly, Balsam Woolly Aphids (suppression) including: Balsam, Crepe Myrtle, Green Peach Melon Japanese Beetles (adults) Lacebugs including: Azalea, Cotoneaster, Hawthorne Rhododendron Leaf Beetles, Viburnum Leafhoppers, including: Glassy-Winged Sharpshooter, Potato Leafminers including: Serpentine Mealybugs including: Citrus, Long-Tailed, Madeira, Obscure, Phormium, Pink Hibiscus Psyllids including: Asian Citrus Root Weevils (adults) including: Black Vine, Diaprepes Sawflies (larvae) Scale (Armored and Soft) including: Cryptomeria, Cycad Aulacaspis, Elongate Hemlock, Euonymus, Florida Red, Florida Wax, Tea Thrips including: Chilli, Gynaikothrips uzeli, Western Flower (suppression) Whiteflies including: Fig (Ficus), Giant, Greenhouse, Silverleaf / Sweetpotato (B and Q Biotypes)	**Foliar Spray** 1/4 to 1/2 lb per 100 gallons (4 to 8 oz per 100 gallons) (0.05 to 0.1 lbs ai per 100 gallons) 8-16 oz per Acre (0.1 to 0.2 lbs ai/A) 0.2-0.4 oz per 1,000 sq ft For treatment of small areas: 1/2-1.0 tsp per gallon	Make first application just before pest populations reach an economic threshold. If necessary, make a second application after 14-21 days. Tank mixing with a surfactant may improve control of pests such as whitefly, mealybug and scale. Confirm plant safety of tank mix in small area before using on a commercial scale. 100 gals of spray mix will treat 20,000 sq ft of area when using a typical high volume sprayer. If using a low volume sprayer, adjust concentration to apply the same amount of product per unit area.

One (1) level teaspoon contains 2.4 grams and 1 cup (8 fl oz) contains 4.0 oz by weight of *Safari* 20 SG Insecticide.

Make first application just before pest populations reach an economic threshold. If necessary, make a second application after 14-21 days.

Restrictions:

Not for use on house plants grown inside private residences.

Do not apply more than 2.7 lbs (0.54 lbs ai) per acre of nursery, landscape or forest per year.

To delay the development of resistance: Do not apply *Safari* 20 SG Insecticide or other Group 4A insecticides to consecutive generations of the same insect species without switching to a different mode of action. Do not make more than two sprays of *Safari* 20 SG Insecticide or other Group 4A insecticides to a single crop. Refer to "Resistance Management" section of label for further guidelines.

ORNAMENTAL PLANTS – FOLIAR OR BROADCAST SPRAY APPLICATION – INDOOR
For foliar insect control on ornamental plants in greenhouses, interior plantscapes, lath and shadehouses.

Crops	Pests	Product Rate	Remarks
Ornamental plants including: Shrubs Bedding Plants Flowering Plants Foliage Plants Ground Covers Evergreens Ornamental Trees Non-Bearing Fruit Trees Non-Bearing Nut Trees Non-Bearing Vines	Adelgids including: Hemlock Woolly, Balsam Woolly Aphids (suppression) including: Balsam, Crepe Myrtle, Green Peach Melon Japanese Beetles (adults) Lacebugs including: Azalea, Cotoneaster, Hawthorne Rhododendron Leaf Beetles, Viburnum Leafhoppers, including: Glassy-Winged Sharpshooter, Potato Leafminers including: Serpentine Mealybugs including: Citrus, Long-Tailed, Madeira, Obscure, Phormium, Pink Hibiscus Psyllids including: Asian Citrus Root Weevils (adults) including: Black Vine, Diaprepes Sawflies (larvae) Scale (Armored and Soft) including: Cryptomeria, Cycad Aulacaspis, Elongate Hemlock, Euonymus, Florida Red, Florida Wax, Tea Thrips including: Chilli, *Gynaikothrips uzeli*, Western Flower (suppression) Whiteflies including: Fig (Ficus), Giant, Greenhouse, Silverleaf / Sweetpotato (B and Q Biotypes)	**Foliar Spray** 1/4 to 1/2 lb per 100 gallons (4 to 8 oz per 100 gallons) (0.05 to 0.1 lbs ai per 100 gallons) 8-16 oz per Acre (0.1 to 0.2 lbs ai/A) 0.2-0.4 oz per 1,000 sq ft For treatment of small areas: 1/2-1.0 tsp per gallon	Make first application just before pest populations reach an economic threshold. If necessary, make a second application after 14-21 days. Tank mixing with a surfactant may improve control of pests such as whitefly, mealybug and scale. Confirm plant safety of tank mix in small area before using on a commercial scale. 100 gals of spray mix will treat 20,000 sq ft of area when using a typical high volume sprayer. If using a low volume sprayer, adjust concentration to apply the same amount of product per unit area.

One (1) level teaspoon contains 2.4 grams and 1 cup (8 fl oz) contains 4.0 oz by weight of *Safari* 20 SG Insecticide.

Make first application just before pest populations reach an economic threshold. If necessary, make a second application after 14-21 days.

Restrictions:
Not for use on house plants grown inside private residences.

Do not apply more than 2.7 lbs (0.54 lbs ai) per acre of nursery or landscape per year.

To delay the development of resistance: Do not apply *Safari* 20 SG Insecticide or other Group 4A insecticides to consecutive generations of the same insect species without switching to a different mode of action. Do not make more than two sprays of *Safari* 20 SG Insecticide or other Group 4A insecticides to a single crop. Refer to "Resistance Management" section of label for further guidelines.

ORNAMENTAL PLANTS AND FORESTS – APPLICATION TO SOIL: For systemic insect control on containerized and field grown (in-ground) ornamental plants in nurseries, greenhouses, interior plantscapes, lath and shadehouses, outdoor landscapes (commercial, industrial, recreational and residential), tree plantations, reforestation nurseries and forests when applied via soil drench, soil injection, micro-irrigation (spaghetti tube or emitter), drip irrigation, overhead irrigation, ebb and flood irrigation equipment or motorized irrigation equipment.

Crops	Pests	Product Rate (By Weight)		Remarks
Ornamental plants including: Shrubs Bedding Plants Flowering Plants Foliage Plants Ground Covers Evergreens Ornamental Trees Non-Bearing Fruit Trees Non-Bearing Nut Trees Non-Bearing Vines Christmas Trees Trees in Plantations including: Conifers Deciduous Trees Reforestation Nurseries Forests and Wooded Areas: National, Private and State	Adelgids including: Hemlock Woolly Balsam Woolly Aphids including: Balsam Crepe Myrtle Green Peach Melon Bagworms Eastern Tent Caterpillar Erythinia Gall Wasp Flatheaded Borers including: Alder Bronze Birch Emerald Ash Flatheaded Appletree Two-Lined Chestnut Froghoppers Fungus Gnats (larvae) Gypsy Moth (larvae) Horned Oak Gall (continued)	**Containerized Plants Soil Media Drench** 3/4 to 1-1/2 pounds per 100 gallons 12 to 24 ounces per 100 gallons 1.5-3.0 teaspoons per gallon		Only apply to moist soil media. Do not apply to dry or saturated media. Do not apply media drench until roots from transplanted plugs or liners have extended at least half way to the edge of pots. Do not leach treated soil media for at least 7 days after application or performance may be reduced. Heavy rainfall or excessive irrigation following application may decrease performance. Higher rates will be needed to control insects on woody plants than on herbaceous plants. Poinsettia: For optimal control of whiteflies, treat plants 1-3 weeks after pinch. Late season drenches will take longer to provide effective control.
		Media Drench Volume for Individual Pots		
		Pot diameter (inches)	Fl oz of dilute solution per pot	
		4	2	
		5	3	
		6	4	
		7	5	
		8	6	
		For larger pot volumes, apply 3-4 fl oz of dilute solution (0.11 to 0.22 g product per 4 fl oz water) per gallon of potting media. Use a drench volume that is sufficient to wet soil media without resulting in overflow or runoff through drain holes in pot.		
		Containerized Plants Media Drench Volume for Plants in Raised Beds, Benches, Bedding Flats, Plug and Liner Trays: Apply sufficient dilute solution to wet soil media without loss of liquid from bottom of bed or liner.		

(continued)

ORNAMENTAL PLANTS AND FORESTS – APPLICATION TO SOIL (continued)

<table>
<tr><th>Crops</th><th>Pests</th><th colspan="2">Product Rate (By Weight)</th><th>Remarks</th></tr>
<tr><td rowspan="11">Ornamental plants including:
Shrubs
Bedding Plants
Flowering Plants
Foliage Plants
Ground Covers
Evergreens
Ornamental Trees
Non-Bearing Fruit Trees
Non-Bearing Nut Trees
Non-Bearing Vines
Christmas Trees
Trees in Plantations including:
Conifers
Deciduous Trees
Reforestation Nurseries
Forests and Wooded Areas: National, Private and State</td><td rowspan="11">(continued)
Japanese Beetle (adults)
Lacebugs including:
Azalea
Cotoneaster
Hawthorne
Rhododendron
Leaf Beetles including:
Elm
Viburnum
Leafhoppers including:
Glassy-Winged Sharpshooter
Potato
Leafminers including:
Birch
Boxwood
Chrysanthemum
Holly
Serpentine
(continued)</td><td colspan="2">Containerized Plants Ebb and Flood Irrigation</td><td rowspan="7">Bring several pots to field capacity, let soil dry and then measure amount of water required to bring pots back to field capacity. Multiply the average volume of water required to rehydrate one pot by the number of pots to be treated. Add this volume of water to the minimum amount of water needed to flood the area to be treated. Re-use any returned volume in subsequent irrigation of same plants.

For pot diameter greater than 8", use 3.7-7.5 ounces of Safari 20 SG Insecticide per 1,000 gallons of potting soil media.</td></tr>
<tr><td>Pot diameter (inches)</td><td>Ounces per 1,000 pots</td></tr>
<tr><td>4</td><td>1.9-3.7</td></tr>
<tr><td>5</td><td>2.8-5.6</td></tr>
<tr><td>6</td><td>3.7-7.5</td></tr>
<tr><td>7</td><td>4.7-9.3</td></tr>
<tr><td>8</td><td>5.6-11.2</td></tr>
<tr><td colspan="2">Chemigation of individual containers using a micro-irrigation system (spaghetti tube)</td><td rowspan="3">Use typical injection ratio for injectors (e.g. 1:100, which equals 1 part injector tank solution: 100 parts irrigation water). Do not mix more than 24 oz of Safari 20 SG Insecticide per gallon of injector tank water, or some product may settle out of solution. Calibrate irrigation system to deliver 3-4 fl oz of dilute solution per gallon of potting media.</td></tr>
<tr><td>Injection ratio</td><td>Ounces per gallon of injector tank water</td></tr>
<tr><td>1:100</td><td>12-24</td></tr>
</table>

(continued)

ORNAMENTAL PLANTS AND FORESTS – APPLICATION TO SOIL (continued)

Crops	Pests	Product Rate (By Weight)	Remarks
Ornamental plants including: Shrubs Bedding Plants Flowering Plants Foliage Plants Ground Covers Evergreens Ornamental Trees Non-Bearing Fruit Trees Non-Bearing Nut Trees Non-Bearing Vines Christmas Trees Trees in Plantations including: Conifers Deciduous Trees Reforestation Nurseries Forests and Wooded Areas: National, Private and State	(continued) Mealybugs: Citrus Longtailed Madeira Obscure Phormium Pink Hibiscus Root Mimosa Webworm (larvae) Peachtree Borer Pine Tip Moth (larvae) Plantbugs Psyllids including: Asian Citrus Boxwood Root Weevils (larvae and adults) including: Black Vine Diaprepes (continued)	**Field Grown (In-Ground) Shrubs** 3-6 grams (1.25-2.5 level teaspoons) per foot of height 1.0-2.1 ounces per 10 feet of height	When applied to the soil, *Safari* 20 SG Insecticide is taken up by actively growing trees and shrubs. Speed of control will be dependent on plant size, plant health, environmental conditions and how actively pests are feeding. In actively growing plants, control may be evident within 1-3 weeks after application depending on plant size. Time applications to coincide with when most vulnerable pest life stage is present on plants. Control may be less effective when applied to dry, saturated, or frozen soil, or at times when plants are not actively taking up water from soil. If possible, irrigate dry soils 1-3 days before application, or apply irrigation within 3 days after application. Heavy rainfall or inadequate irrigation immediately following application may decrease performance. Use higher labeled rates for broadleaf evergreens with dense foliage (ex. hollies), and with very large trees. **Soil Drench:** Mix required dose in water and uniformly apply to soil around base of shrub or tree. Pull back mulch before drenching. Apply 1-4 pints of drench solution per foot of height (shrubs) or inch of trunk diameter (trees). Adjust drench volume based on soil type, soil moisture and thickness of mulch so that product is moved into root zone. To enhance soil penetration in heavy soils and sloping terrain, dig shallow holes around tree or shrub, and apply drench solution in holes. Lower drench volumes may be less effective in dry soils or when applied over heavy mulch unless there is adequate rainfall or irrigation after application to move product into root zone.

(continued)

ORNAMENTAL PLANTS AND FORESTS – APPLICATION TO SOIL (continued)

Crops	Pests	Product Rate (By Weight)	Remarks
Ornamental plants including: Shrubs Bedding Plants Flowering Plants Foliage Plants Ground Covers Evergreens Ornamental Trees Non-Bearing Fruit Trees Non-Bearing Nut Trees Non-Bearing Vines Christmas Trees Trees in Plantations including: Conifers Deciduous Trees Reforestation Nurseries Forests and Wooded Areas: National, Private and State	(continued) Roundheaded Borers (excluding Asian Longhorned) Eucalyptus Longhorned Linden Locust Royal Palm Bug Sawfly larvae Scales (Armored and Soft) including: Azalea Bark Brown Soft Calico California Red Cottony Cushion Cottony Maple Cryptomeria Cycad Aulacaspis Duplachionaspis Elongate Hemlock Euonymus False Florida Red False Oleander (continued)	**Field Grown (In-Ground) Trees (Less than 24" diameter at breast height)** 3-12 grams (1.25-5.0 level teaspoons) per inch of trunk diameter at breast height (DBH) 1.05-4.2 ounces per 10 inches of trunk diameter at breast height (DBH) For multi-stem trees, base rate on cumulative inches of diameter of all stems at breast height. **Field Grown (In-Ground) Trees (24" diameter or greater at breast height)** 6-12 grams (2.5-5.0 level teaspoons) per inch of trunk diameter at breast height (DBH) 2.1-4.2 ounces per 10 inches of trunk diameter at breast height (DBH) For multi-stem trees, base rate on cumulative inches of diameter of all stems at breast height.	Soil Injection: Mix required dose in water and make at least four injections per shrub or tree with a low-pressure applicator. Use same amount of solution per hole. Injections can be made using the following methods: Grid System – Space injections on a 2.5 ft center extending to drip line. Circle System – Make injections in concentric circles extending inward from drip line. Basal System – Space injections evenly around trunk no more than 24" out from the base. *Safari* 20 SG Insecticide may be soil injected with low volume (e.g. Kioritz injector) or high volume injection equipment. Inject 1-32 fl oz of dilute solution per foot of height or inch of trunk diameter depending on application equipment. Make shallow injections where feeder roots are most concentrated.
		Hedges 0.25-1.0 oz per foot of hedge height per 100 linear feet of hedge row	Apply in enough water to wet the lower 12" of trunk and surrounding soil surface. Apply in a one foot wide band over base of trunk and soil down center of hedgerow. To improve performance, rake back mulch before application.

(continued)

Appendix 3A

ORNAMENTAL PLANTS AND FORESTS – APPLICATION TO SOIL (continued)

<table>
<tr><th>Crops</th><th>Pests</th><th colspan="2">Product Rate (By Weight)</th><th>Remarks</th></tr>
<tr><td rowspan="9">Ornamental plants including:
Shrubs
Bedding Plants
Flowering Plants
Foliage Plants
Ground Covers
Evergreens
Ornamental Trees
Non-Bearing Fruit Trees
Non-Bearing Nut Trees
Non-Bearing Vines
Christmas Trees
Trees in Plantations including:
Conifers
Deciduous Trees
Reforestation Nurseries
Forests and Wooded Areas: National, Private and State</td><td rowspan="9">Scales (Armored and Soft) (continued)
Fig (Ficus) Wax
Fletcher
Florida Red
Florida Wax
Indian Wax
Lecanium
Lobate Lac
Melanaspis deklei
Obscure
Oystershell
Poplar (Aspen)
Pine Needle
Tea
Tuliptree
Spittlebugs
Tent Caterpillar (larvae)
Thrips including:
Chilli (suppression)
Citrus
Cuban Laurel
Gladiolus
Gynaikothrips uzeli (suppression)
Western Flower (suppression)
Treehoppers
Walnut Twig Beetle
Whiteflies including:
Ficus
Giant
Greenhouse
Silverleaf / Sweetpotato (B and Q Biotypes)
White Grubs including:
Oriental Beetle
White Pine Weevil</td><td colspan="2">Field Grown Nursery Stock
Banded spray application to soil surface
(2.7 lbs per acre)</td><td rowspan="8">Apply as a uniform band in row over root zone and lower 6-12" of trunk. Apply from peak adult flight to peak egg hatch.
Apply in at least two gallons of water per 1,000 linear feet. Irrigate after application to move product into soil profile.
Control any weeds in treated area prior to application, or performance may be reduced.
Adjust rates accordingly for other row spacing. Irrigate after application to move Safari 20 SG Insecticide to the root zone.</td></tr>
<tr><td>Row spacing in feet</td><td>Ounces per 1,000 linear feet of row</td></tr>
<tr><td>3</td><td>3</td></tr>
<tr><td>4</td><td>4</td></tr>
<tr><td>5</td><td>5</td></tr>
<tr><td>6</td><td>6</td></tr>
<tr><td>7</td><td>7</td></tr>
<tr><td>8</td><td>8</td></tr>
<tr><td colspan="2">Broadcast spray to soil of plant beds
(2.7 lbs per acre)</td><td>Apply over the top of ornamental plant beds in a water volume sufficient to move product to soil surface. If necessary, irrigate after application to move product off of foliage and into upper root zone of soil. May be less effective on large woody shrubs than on herbaceous annuals and perennials.</td></tr>
</table>

Important Notes:
One (1) level teaspoon contains 2.4 grams, and 1 cup (8 fl oz) contains 4.0 oz by weight of *Safari* 20 SG Insecticide.

For all soil applications, including chemigation, retreatments may be made after 7 days but do not apply more than 2.7 lbs (0.54 lbs ai) per acre of nursery, landscape or forest per year.

Restrictions:
Do not apply more than 2.7 lbs (0.54 lbs ai) per acre of nursery, landscape or forest per year.

To delay the development of resistance in greenhouses, nurseries and interiorscapes, do not make more than one soil application per crop cycle or three months, whichever is shorter. Refer to "Resistance Management" section of the label for additional guidelines.

Appendix 3A

ORNAMENTAL PLANTS AND FORESTS

BASAL TRUNK SPRAYS IN TREES AND LARGE SHRUBS

For systemic insect control in containerized and field grown (in-ground) ornamental trees and shrubs in nurseries, interior plantscapes, lath and shadehouses, outdoor landscapes (commercial, industrial, recreational and residential), tree plantations and forests when applied as a trunk spray.

Crops	Pests	Product Rate (By Weight)	Remarks
Shrubs Ornamental Trees Non-Bearing Fruit Trees Non-Bearing Nut Trees Trees in Plantations including: Conifer Deciduous Reforestation Nurseries Forests and Wooded Areas: National, Private and State	Adelgids including: Hemlock Woolly Aphids Flatheaded Borers including: Alder Bronze Birch Emerald Ash Flatheaded Appletree Two-lined Chestnut Lacebugs Leaf Beetles Leafhoppers Leafminers Mealybugs Mountain Pine Beetle Pine Tip Moth (larvae) Psyllids Roundheaded Borers (excluding Asian Longhorned) Scales including: Calico Cryptomeria Elongate Hemlock Fig (Ficus) Wax Thrips (suppression) Walnut Twig Beetle Whiteflies including: Fig (Ficus)	12-24 oz per gallon Depending on bark type and thickness, one gallon of spray solution will typically cover 65-85" of cumulative trunk diameter (1.5-2.0 fl oz per inch of trunk diameter) when applied to trunk between soil surface and 4-5 feet above soil surface.	When sprayed on the trunk, *Safari* 20 SG Insecticide will be absorbed through the bark and into the vascular system, and then transported throughout the tree. Speed of control will be dependent on tree size, tree health, environmental conditions and how actively pests are feeding. In actively transpiring trees, control may be evident within 1-3 weeks after application. Spray bark on root flare (buttress roots) and on trunk between soil surface and 4-5 feet above the soil surface. Adjust nozzle to uniformly distribute spray over the entire circumference of the tree trunk and buttress roots. Wet bark just to the point of saturation and run off onto soil. Apply ONLY with a low volume sprayer operated at less than 20 PSI to prevent tree damage, bounce back and drift of spray droplets. Time applications to coincide with when most vulnerable pest life stage is present on plants. **Do not apply to wet bark, during rainfall or if rain is expected within 12 hours.** Control may be less effective in trees with thick bark, and at times when trees are not actively growing or transpiring. For Mountain Pine Beetle: apply from 2 weeks before to 2 weeks after expected peak of adult flight activity.
Christmas Trees Ornamental Trees with trunk diameter less than 3" at soil line	Elongate Hemlock Scale Cryptomeria Scale Ficus (Fig) Whitefly	1.5-6.0 oz/gallon One gallon of spray solution will typically cover 325-425" of cumulative trunk diameter (0.3-0.4 fl oz per inch of trunk diameter) when applied to trunk between soil surface and 1 foot above soil surface	For Christmas trees and ornamental trees less than 3" in diameter at soil line, spray trunk just to point of runoff between soil surface and 12" above soil surface.

One (1) level teaspoon contains 2.4 grams, and 1 cup (8 fl oz) contains 4.0 oz by weight of *Safari* 20 SG Insecticide.

Restrictions:
Do not apply more than 2.7 lbs (0.54 lbs ai) per acre of nursery, forest or landscape per year.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage, disposal or cleaning of equipment.

Pesticide Storage: Keep pesticide in original container. Do not put concentrate or dilute into food or drink containers. Store in a cool dry place. Do not store diluted spray. For help with any spill, leak, fire or exposure involving this material, call day or night 1-800-892-0099.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Handling: Nonrefillable container: Do not reuse or refill this container. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

CONDITIONS OF SALE

Valent U.S.A. Corporation warrants that this product in its unopened package conforms to the chemical description on the label and is reasonably fit for the purposes set forth on the label when used according to directions under normal use conditions to the crops specified. To the extent consistent with applicable law, there are no other warranties, expressed or implied, concerning the use of this product other than indicated on the label. To the extent consistent with applicable law, this warranty does not extend to the handling or use of this product contrary to label instructions or under abnormal conditions or conditions not reasonably foreseeable to seller, and buyer assumes all risk of any such use.

Safari and *Products That Work, From People Who Care* is a registered trademark of Valent U.S.A. Corporation

Manufactured for
Valent U.S.A. Corporation
P.O. Box 8025
Walnut Creek CA 94596-8025
Made in U.S.A.
Form 1510-G
LMS 16APR14
EPA Reg. No. 86203-11-59639
EPA Est. 67545-AZ-01

Information contained in this booklet is accurate at the time of printing. Since product testing is a continuous process, please read and follow the directions on the product label for the most current directions and precautionary statements.

Always check with your state to verify state registration status or call 800-89-VALENT (898-2536).

For state registration and/or supplemental labels, please call or visit us online.
Products That Work, From People Who Care® | **valentpro.com** | 800-89-VALENT (898-2536)
Always read and follow label instructions.

Safety Data Sheet

Safari™ 20 SG Insecticide

1. IDENTIFICATION: CHEMICAL PRODUCT AND COMPANY

PRODUCT NAME:	Safari™ 20 SG Insecticide
VC NUMBER(S):	1455
SYNONYM(S):	Dinotefuran 20% SG
EPA REGISTRATION NUMBER:	86203-11-59639; 33657-16-59639
PRODUCT DESCRIPTION:	Insecticide for greenhouse, nursery, interior plantscape and outdoor landscape use.

Safari is a registered trademark of Valent U.S.A. Corporation.

MANUFACTURER/DISTRIBUTOR
VALENT U.S.A. CORPORATION
P.O. Box 8025
1600 Riviera Avenue, Suite 200
Walnut Creek, CA 94596-8025

EMERGENCY TELEPHONE NUMBERS
HEALTH EMERGENCY OR SPILL (24 hr):
(800) 892-0099
TRANSPORTATION (24 hr.): CHEMTREC
(800) 424-9300 or (202) 483-7616

PRODUCT INFORMATION
PROFESSIONAL PRODUCTS: (800) 898-2536

The current SDS is available through our website (www.valent.com), or by calling the product information numbers listed above.

2. HAZARDS IDENTIFICATION

For EPA FIFRA-specific information see Section 15

Classification

Acute toxicity - Oral	Category 4

Label elements

EMERGENCY OVERVIEW

WARNING

Hazard statements
Harmful if swallowed

Precautionary Statements - Prevention
Read product label prior to using this product. For specific handling instruction refer to Section 7, Handling and Storage

Precautionary Statements - Response
See Section 4, First Aid Measures

Precautionary Statements - Storage
For information on Storage and Handling see Section 7.

Precautionary Statements - Disposal
For further information on product and container disposal see Section 13.

Hazards not otherwise classified (HNOC)
Other Information
<5% of the mixture consists of ingredient(s) of unknown toxicity

For information on Transportation requirements see Section 14.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS Number	Weight/ Percent	TRADE SECRET
Dinotefuran Technical (99% ai)	165252-70-0	20.2	
Sodium dodecylbenzene sulfonate	25155-30-0	1 - 5	
Others	(Various CAS#s)	72	

* The chemical name, CAS number and/or exact percentage have been withheld as a trade secret

Other ingredients, which may be maintained as trade secrets, are any substances other than an active ingredient contained in this product. Some of these may be hazardous, but their identities are withheld because they are considered trade secrets. The hazards associated with the other ingredients are addressed in this document. Specific information on other ingredients for the management of exposures, spills, or safety assessments can be obtained by a treating physician or nurse by calling **(800) 892-0099** at any time.

4. FIRST AID MEASURES

EMERGENCY NUMBER (800) 892-0099

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact **1-800-892-0099** for emergency medical treatment information.

EYE CONTACT:
Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

SKIN CONTACT:
Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

INGESTION:
Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. DO NOT induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

INHALATION:
Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

NOTES TO PHYSICIAN:
None

5. FIRE FIGHTING MEASURES

Flash point °C Not Applicable
EXTINGUISHING MEDIA: Water fog, carbon dioxide, foam, dry chemical

FLAMMABLE LIMITS IN AIR - LOWER (%): Not applicable
FLAMMABLE LIMITS IN AIR - UPPER (%): Not applicable

NFPA RATING:

Health:	1
Flammability:	3
Reactivity:	1
Special:	None

(Least-0, Slight-1, Moderate-2, High-3, Extreme-4). These values are obtained using professional judgement. Values were not available in the guidelines or published evaluations prepared by the National Fire Protection Association, NFPA.

FIRE FIGHTING INSTRUCTIONS: Products of combustion from fires involving this material may be toxic. Avoid breathing smoke and mists. Avoid personnel and equipment contact with fallout and runoff. Minimize the amount of water used for fire fighting. Do not enter any enclosed area without full protective equipment, including self-contained breathing equipment. Contain and isolate runoff and debris for proper disposal. Decontaminate personal protective equipment and fire fighting equipment before reuse.

This material is not expected to burn or explode in normal conditions, but will burn violently if involved in a fire. Dinotefuran becomes self-reactive in high temperatures. Exposure to heat may promote violent decomposition.

HAZARDOUS DECOMPOSITION PRODUCTS: Normal combustion forms carbon dioxide, water vapor and may produce: Oxides of nitrogen.

6. ACCIDENTAL RELEASE MEASURES

VALENT EMERGENCY PHONE NUMBER: (800) 892-0099
CHEMTREC EMERGENCY PHONE NUMBER: (800) 424-9300
OBSERVE PRECAUTIONS IN SECTION 8: PERSONAL PROTECTION
Stop the source of the spill if safe to do so. Contain the spill to prevent further contamination of the soil, surface water, or ground water. For additional spill response information refer to the North American Emergency Response Guidebook.

UN/NA NUMBER: Not applicable **EMERGENCY RESPONSE GUIDEBOOK NO.:** Not applicable

FOR SPILLS ON LAND:

CONTAINMENT: Remove all sources of ignition. Ventilate area of leak or spill. Clean-up personnel may require protection from inhalation of dust. Avoid runoff into storm sewers or other bodies of water.

CLEANUP: Clean up spill immediately in a manner that does not disperse dust into the air and place in a chemical waste container. Wash area with soap and water. Pick up wash liquid with additional absorbent and place in a chemical waste container.

FOR SPILLS IN WATER:

CONTAINMENT: This material will disperse or dissolve in water. Stop the source of the release. Contain and isolate to prevent further release into soil, surface water and ground water.

CLEANUP: Clean up spill immediately. Absorb spill with inert material. Remove contaminated water for treatment or disposal.

7. HANDLING AND STORAGE

END USER MUST READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

HANDLING:

Keep away from all possible sources of ignition (sparks or flame). Avoid high temperatures exceeding 150°C. Keep container closed. Use only with adequate ventilation.

To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring the material. Use explosion-proof electrical equipment. Take precautionary measures against static discharges.

STORAGE:

Keep pesticide in original container. Do not store or transport near food or feed. Do not contaminate food or feed. Do not put concentrate into food or drink containers. Do not dilute concentrate in food or drink containers. Store in a cool, dry place, out of direct sunlight. Do not contaminate water, food or feed by storage, disposal or cleaning of equipment. Do not store diluted spray.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

END USER MUST READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

INFORMATION FOR END USERS
Mixers, loaders, applicators and other handlers should refer to the product label before use for detailed information on personal protective equipment (PPE).

EYES & FACE: Do not get this material in your eyes. Eye contact can be avoided by wearing protective eyewear.

RESPIRATORY PROTECTION: Use this material only in well ventilated areas. If operating conditions result in airborne concentrations of this material, the use of an approved respirator is recommended.

SKIN & HAND PROTECTION: Applicators and other handlers must wear: long-sleeved shirt and long pants, shoes plus socks and chemical-resistant gloves made of any waterproof material.

Follow manufacturer's instructions for cleaning/maintaining PPE. If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENGINEERING CONTROLS: Use in a well ventilated area.

EXPOSURE LIMITS

Chemical Name	ACGIH Exposure Limits	OSHA Exposure Limits	Manufacturer's Exposure Limits
Dinotefuran Technical (99% ai)	None	None	None
Sodium dodecylbenzene sulfonate	None	None	None
Others	Unknown	Unknown	Unknown

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	Solid		
Appearance	Granules	**Odor**	Odorless
Color	Off-white	**Odor threshold**	No information available

PROPERTIES	Values	Remarks • Method
pH	7.6	(1% solution)
Melting point/freezing point	107.5 °C	Melting point (Dinotefuran Technical)
Boiling point/boiling range	Decomposed at 208°C (Technical)	
Flash point	Not Applicable	
Evaporation rate	No information available	
Flammability (solid, gas)	No information available	
Flammability Limits in Air		
Upper flammability limits	No information available	
Lower flammability limit	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific Gravity	No information available	
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Partition coefficient	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Viscosity	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	
Density	No information available	
Bulk density	0.56 g/mL	

10. STABILITY AND REACTIVITY

Reactivity
Not an oxidizing or reducing agent.

Chemical stability
Stable under normal ambient conditions.

Possibility of Hazardous Reactions
This material is combustible and may form explosive dust-air mixture.

Conditions to avoid
Extremes of temperature and direct sunlight.

Incompatible materials
Heat and ignition sources. Oxidizers.

Hazardous Decomposition Products
Normal combustion forms carbon dioxide, water vapor and may produce: oxides of nitrogen.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY:

Oral Toxicity LD_{50} (rats)	> 2,000 mg/kg	EPA Tox Category	III
Dermal Toxicity LD_{50} (rabbits)	> 2,000 mg/kg	EPA Tox Category	III
Inhalation Toxicity LC_{50} (rats)	> 2.94 mg/L (4 hr)	EPA Tox Category	IV
Eye Irritation (rabbits)	Brief and/or minor irritation	EPA Tox Category	IV
Skin Irritation (rabbits)	Brief and/or minor irritation	EPA Tox Category	IV
Skin Sensitization (guinea pigs)	Non-sensitizer	EPA Tox Category	Not applicable

CARCINOGEN CLASSIFICATION

Chemical Name	IARC	OSHA - Select Carcinogens	NTP Carcinogen List
Dinotefuran Technical (99% ai)	Not listed	Not listed	Not listed
Sodium dodecylbenzene sulfonate	Not listed	Not listed	Not listed
Others	Unknown	Unknown	Unknown

TOXICITY OF DINOTEFURAN TECHNICAL

SUBCHRONIC: ~~Dinotefuran technical was tested in 13-week dietary toxicity studies in rats,~~ mice and dogs. In the rat study, a NOEL of 500 ppm was established, based on reduced body weight gain in females and adrenal cortical vacuolation in males and a NOAEL of 5,000 ppm based on marked growth retardation at 25,000 ppm (adrenal cortical vacuolation not adverse). A NOEL of 25,000 ppm was established in the mouse study based on reduced body weight gain at 50,000 ppm. In the dog 13-week dietary study, a NOEL of 8,000 ppm was established based on reduced body weight gain. No target organs were identified in subchronic inhalation or dermal toxicity studies in rats.

CHRONIC/CARCINOGENICITY: Dinotefuran technical was tested in lifetime studies with rats and mice and a one-year study with dogs. In common with the subchronic studies in these species, no specific target organs could be identified. In the 78-week mouse study a NOAEL of 2500 ppm was established, based on decreased weight gain and a decrease in circulating platelet counts. In the 104-week rat study a NOAEL of 2000 ppm was established, based on a decrease in weight gain in females. There were no treatment-related effects in rats or mice on survival or the nature and incidence of neoplastic and adverse non-neoplastic histomorphological findings in either species at any dose level. In the 52-week dog study a NOAEL of 16000 ppm was established based on decreased weight gain in both sexes and decreased food consumption in females.

NEUROTOXICITY: Dinotefuran did not produce any functional or histomorphological evidence of neurotoxicity in acute (gavage) and 13-week (dietary) neurotoxicity studies in rats. The NOEL for neurotoxicity in the acute study was 1,500 mg/kg, the highest dose level administered. The NOEL for neurotoxicity in the 13-week dietary study was 50,000 ppm. The NOEL for all effects in this study was 5,000 ppm based on reduced body weight gain and food consumption.

DEVELOPMENTAL TOXICITY: In a developmental toxicity study of Dinotefuran technical in rats the maternal NOAEL was 300 mg/kg/day based on reduced weight gain, food consumption and water intake at 1000 mg/kg/day. Dinotefuran technical did not produce developmental effects in rats at doses up to 1000 mg/kg/day (the highest does tested). In a study with rabbits the maternal NOAEL was 52 mg/kg/day based on reduced weight gain, food consumption and water intake and clinical signs noted at 300 mg/kg/day and pathology findings in the liver and stomach at 125 mg/kg/day and higher. The developmental NOEL was 300 mg/kg/day.

REPRODUCTION: Dinotefuran technical was tested in a two-generation rat reproduction study at doses of 0, 300, 1000, 3000 and 10000 ppm. The NOAEL for systemic toxicity in parental animals was 3000 ppm based on decreased body weight gain and food consumption and decreased spleen and thyroid weights at the highest dose level evaluated (10000 ppm). The NOAEL for reproductive effects was 10000 ppm. The NOAEL for effects on the offspring was 3000 ppm based on reduced preweaning weight gain at 10000 ppm.

MUTAGENICITY: Dinotefuran technical was negative in the following in vitro assays: Ames Assay, mouse lymphoma (L5178Y), mammalian cytogenetics (CHL/IU) or DNA Repair. Dinotefuran technical was negative in the following in vivo assays: mouse micronucleus. Overall, Dinotefuran technical does not present a genetic hazard.

For a summary of the potential for adverse health effects from exposure to this product, refer to Section 2. For information regarding regulations pertaining to this product, refer to Section 15.

12. ECOLOGICAL INFORMATION

AVIAN TOXICITY:

Dinotefuran Technical is practically non-toxic to moderately toxic to avian species. Test results include:
Oral LD_{50} quail: greater than 2000 mg/kg
Dietary LC_{50} Mallard duck: greater than 997.9 ppm
Dietary LC_{50} quail: greater than 1301 ppm
Reproduction quail: NOEL = 5000 ppm
Reproduction Mallard duck: NOEL = 2000 ppm

AQUATIC ORGANISM TOXICITY:

Dinotefuran Technical is practically non-toxic to fish and ranges from practically nontoxic to highly toxic to aquatic invertebrate species (especially shrimp.) Test results include:
LC_{50} (96 hr) Bluegill Sunfish: greater than 100 mg/L
LC_{50} (96 hr) Rainbow Trout: greater than 100 mg/L
LC_{50} (96 hr) Common Carp: greater than 100 mg/L
LC_{50} (96 hr) Sheepshead Minnow: greater than 109 mg/L
NOEC (early life stage) Rainbow Trout: greater than 10 mg/L
EC_{50} (48 hr) Daphnia magna: greater than 1000 mg/L
NOEC (lifecycle) Daphnia magna: > 10 mg/L
LC_{50} (96 hr) saltwater Mysid Shrimp: 0.79 mg/L
NOEC (lifecycle) saltwater Mysid Shrimp: 0.089mg/L
EC_{50} (96 hr) Oyster Shell Deposition: greater than 141 mg/L
ErC_{50} (0-72 hr) Algae (P. subcapitata): greater than 100 mg/L

OTHER NON-TARGET ORGANISM TOXICITY:

Dinotefuran Technical is highly toxic to bees. The acute oral and contact LD_{50} in bees were 0.056 µg/bee and 0.022 ug/bee, respectively. This product is highly toxic to bees or other pollinating insects exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees or other pollinating insects are foraging in the treatment area.

OTHER ENVIRONMENTAL INFORMATION:
This pesticide is toxic to shrimp. Do not apply directly to water, to areas where surface water is present or to intertidal areas below mean high water mark. Do not apply where runoff is likely to occur. Do not apply where weather conditions favor drift from areas treated. Do not contaminate water when cleaning equipment or disposing of equipment washwater or rinsate.

13. DISPOSAL CONSIDERATIONS

END USERS MUST DISPOSE OF ANY UNUSED PRODUCT AS PER THE LABEL RECOMMENDATIONS.

PRODUCT DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Non-refillable container. Do not reuse or refill this container. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then offer for recycling, if available, or reconditioning, if appropriate, or puncture and dispose of in a sanitary landfill or by incineration.

DISPOSAL METHODS: Check government regulations and local authorities for approved disposal of this material. Dispose of in accordance with applicable laws and regulations.

14. TRANSPORTATION INFORMATION

DOT (ground) SHIPPING NAME:	Not regulated for domestic ground transport by U.S. DOT
REMARKS:	None
EMERGENCY RESPONSE GUIDEBOOK NO.:	Not applicable
ICAO/IATA SHIPPING NAME:	UN 3077 Environmentally Hazardous Substance, Solid, N.O.S. (Dinotefuran), 9, III, Marine Pollutant
REMARKS:	Single or inner packaging less than 5 L (liquid) or 5 Kg net (solids) excepted from Dangerous Goods regulations -- see IATA Special Provision A197. For U.S. Shipping, Emergency Response Guidebook No. 171
IMDG SHIPPING NAME:	UN 3077 Environmentally Hazardous Substance, Solid, N.O.S. (Dinotefuran), 9, III, Marine Pollutant
REMARKS:	Single or inner packaging less than 5 L (liquid) or 5 Kg net (solids) excepted from Dangerous Goods regulations – see IMDG 2.10.2.7US shipping, Emergency Response Guidebook No. 171
EMS NO.:	F-A, S-F

15. REGULATORY INFORMATION

EPA-FIFRA LABEL INFORMATION THAT DIFFERS FROM OSHA-GHS REQUIREMENTS:

This material is a pesticide product registered by the EPA under FIFRA and is subject to certain labeling requirements under federal pesticide law. These requirements may differ from the classification criteria and hazard information required by OSHA GHS for safety data sheets, and for workplace labels of non-pesticide chemicals. The following is the hazard information as required on the FIFRA pesticide label:

EPA FIFRA SIGNAL WORD: CAUTION

- ***Harmful if swallowed***
- ***Harmful if absorbed through skin***
- ***Causes moderate eye irritation***
- ***Avoid contact with eyes, skin and clothing***
- ***Wash thoroughly with soap and water after handling.***
- ***Remove contaminated clothing and wash before re-use.***
- ***Keep out of reach of children.***
-

PESTICIDE REGULATIONS: All pesticides are governed under FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act). Therefore, the regulations presented below are pertinent only when handled outside of the normal use and applications of pesticides. This includes waste streams resulting from manufacturing/formulation facilities, spills or misuse of products, and storage of large quantities of products containing hazardous or extremely hazardous substances.

U.S. FEDERAL REGULATIONS: Ingredients in this product are reviewed against an inclusive list of federal regulations. Therefore, the user should consult appropriate authorities. The federal regulations reviewed include: Clean Water Act, SARA, CERCLA, RCRA, DOT, TSCA and OSHA. If no components or information is listed in the space below this paragraph, then none of the regulations reviewed are applicable.

Sodium dodecylbenzene sulfonate

TSCA Inventory List -	Present
Clean Water Act - Hazardous Substances	Present
CERCLA Reportable Quantity (RQ):	1000 lb 454 kg

SARA (311, 312):

Immediate Health:	Yes
Chronic Health:	No
Fire:	Yes
Sudden Pressure:	No
Reactivity:	No

STATE REGULATIONS: Each state may promulgate standards more stringent than the federal government. This section cannot encompass an inclusive list of all state regulations. Therefore, the user should consult state or local authorities. The state regulations reviewed include: California Proposition 65, California Directors List of Hazardous Substances, Massachusetts Right to Know, Michigan Critical Materials List, New Jersey Right to Know, Pennsylvania Right to Know, Rhode Island Right to Know and the Minnesota Hazardous Substance list. For Washington State Right to Know, see Section 8 for Exposure Limit information. For Louisiana Right to Know refer to SARA information listed under U.S. Regulations above. If no components or information is listed in the space below this paragraph, then none of the regulations reviewed are applicable.

Sodium dodecylbenzene sulfonate

California - Directors List of Hazardous Substances	Present
MA Right To Know	Present
NJ Right To Know	1698
PA Right To Know	Environmental hazard

For information regarding potential adverse health effects from exposure to this product, refer to Sections 2 and 11.

16. OTHER INFORMATION

REASON FOR ISSUE:	Updated information to meet OSHA Hazcom 2012 (GHS) regulations.
SDS NO.:	0426
EPA REGISTRATION NUMBER:	86203-11-59639; 33657-16-59639
REVISION NUMBER:	1
REVISION DATE:	05/23/2015
SUPERCEDES DATE:	None
RESPONSIBLE PERSON(S):	Valent U.S.A. Corporation, Corporate EH&S, (925) 256-2803

This Safety Data Sheet (SDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-APPROVED PRODUCT LABELING (attached to and accompanying the product container). This SDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

Use, storage and disposal of pesticide products is regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling. All necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of federal law to use a pesticide product in any manner not prescribed on the EPA-approved label.

The information in this SDS is based on data available to us as of the revision date given herein, and believed to be correct. Contact Valent U.S.A. Corporation to confirm if you have the most current SDS.

Judgments as to the suitability of information herein for the individual's own use or purposes are necessarily the individual's own respon~~sibility. Although reasonable care has been taken in the preparation of~~ such information, Valent extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the individual's purposes or the consequences of its use.

Appendix 3A

4.8125"

5"

GROUP 4A INSECTICIDE

BAYER

MERIT® 2F

INSECTICIDE

For foliar and systemic insect control in turfgrass (including sod farms), landscape ornamentals, fruit and nut trees and interior plantscapes.

ACTIVE INGREDIENT:
*Imidacloprid,1-[(6-Chloro-3-pyridinyl) methyl]-N-nitro-2-imidazolidinimin 21.4%
OTHER INGREDIENTS: 78.6%
TOTAL: 100.0%
*Contains 2 pounds of imidacloprid per gallon.
SHAKE WELL BEFORE USING.
EPA Reg. No. 432-1312

STOP - READ THE LABEL BEFORE USE
KEEP OUT OF REACH OF CHILDREN
CAUTION

PARA EL USUARIO: Si usted no lee o entiende inglés, no use este producto hasta que le hayan explicado completamente las instrucciones que figuran en la etiqueta.
(TO THE USER: If you cannot read or understand English, do not use this product until the label has been fully explained to you.)
For MEDICAL And TRANSPORTATION Emergencies ONLY Call 24 Hours A Day 1-800-334-7577
For PRODUCT USE Information Call 1-800-331-2867

BACKED by BAYER™

Net Contents
1 Gallon
02406377
03407954E 131205AV1

4.8125"

5"

FIRST AID	
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
In case of emergency call toll free the Bayer Environmental Science Emergency Response Telephone No. 800-334-7577. Have a product container or label with you when calling a poison control center or doctor, or going for treatment.	
Note To Physician: No specific antidote is available. Treat the patient symptomatically.	

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Harmful if swallowed or absorbed through skin. Avoid contact with skin, eyes, or clothing. Wash thoroughly with soap and water after handling. Keep children or pets off treated area until spray is dry.

Personal Protective Equipment (PPE):

WPS USES: Applicators and Other Handlers who handle this product for any use covered by the Worker Protection Standard (40 CFR part 170) – in general, agricultural plant uses e.g., use in sod farms, must wear:

- Long-sleeved shirt and long pants
- Chemical resistant gloves made of any waterproof material such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinylchloride (PVC) or viton. If you want more options, follow the instructions for category A on an EPA chemical-resistance category selection chart.
- Shoes plus socks

Follow manufacturer's instructions for cleaning/ maintaining personal protective equipment, PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Non-WPS USES: Applicators and other handlers who handle this product for any use NOT covered by the Worker Protection Standard (40 CFR part 170) – in general, only agricultural plant uses are covered by the WPS, must wear:

- Shirt and pants
- Gloves
- Shoes plus socks

Engineering controls statements:

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

User should:

- Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.
- Remove and wash contaminated clothing before reuse.

ENVIRONMENTAL HAZARDS

This product is highly toxic to 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. Do not contaminate water when disposing of equipment washwaters.

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This product is highly toxic to bees exposed to direct treatment or residues on blooming crops/plants or weeds. Do not apply this product or allow it to drift to blooming crops/plants or weeds if bees are foraging the treatment area.
This chemical demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

PROTECTION OF POLLINATORS

APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.
Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.
Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to ~~pollinator attractive habitat can result in bee kills.~~

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at: http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx.
Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state, go to: www.aapco.org/officials.html. Pesticide incidents should also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

SEE INDIVIDUAL SITES FOR SPECIFIC POLLINATOR PROTECTION APPLICATION RESTRICTIONS. IF NONE EXIST UNDER THE SPECIFIC SITE, FOR OUTDOOR FOLIAR APPLICATIONS, FOLLOW THESE APPLICATION DIRECTIONS.

NON-AGRICULTURAL USES

Do not apply Merit® 2F Insecticide while bees are foraging. Do not apply Merit 2F Insecticide to plants that are flowering. Only apply after all flower petals have fallen off.

MERIT 2F Insecticide can be used as directed on sod farms, and on turfgrass, and ornamentals on such sites: residential home lawns, business and office complexes, shopping complexes, multi-family residential complexes, golf courses, airports, cemeteries, parks, playgrounds, and athletic fields.
MERIT 2F Insecticide can be used by soil application as directed on trees, shrubs, flowers, and groundcovers in sites: in and around the perimeter of industrial and commercial buildings and residential areas, and municipal, city, state, national, and private wooded and forested areas.

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RESTRICTION: Not for use in commercial greenhouses, nurseries, or on grasses grown for seed, or on commercial fruit and nut trees.
RESISTANCE: Some insects are known to develop resistance to insecticides after repeated use. As with any insecticide, the use of this product should conform to resistance management strategies established for the use area.
MERIT 2F Insecticide contains a Group 4A insecticide. Insect biotypes with acquired or inherent resistance to Group 4A insecticides may eventually dominate the insect population if Group 4A insecticides are used repeatedly as the predominant method of control for targeted species.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.
Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 12 hours.
Exception: If the product is applied by drenching, the Worker Protection Standard, under certain circumstances, allows workers to enter the treated area if there will be no contact with anything that has been treated.
PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- Coveralls
- Chemical resistant gloves made of any waterproof material such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinylchloride (PVC) or viton. If you want more options, follow the instructions for category A on an EPA chemical-resistance category selection chart.
- Shoes plus socks

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses and sod farm production.
Keep children and pets off treated area until dry.

APPLICATION TO TURFGRASS

MERIT 2F Insecticide can be used for the control of soil inhabiting pests of turfgrass, such as Northern & Southern masked chafers, *Cyclocephala borealis, C. immaculata,* and/or *C. lurida*; Asiatic garden beetle, *Maladera castanea*; European chafer, *Rhizotroqus majalis*; Green June beetle, *Cotinis nitida*; May or June beetle, *Phyllophaga* spp.; Japanese beetle, *Popillia japonica*; Oriental beetle, *Anomala orientalis*; Billbugs, *Spherophorus* spp.; Annual bluegrass weevil, *Hyperodes* spp.; Black turfgrass ataenius, *Ataenius spretulus* and *Aphodius* spp. European Crane Fly *Tipula paludosa*, and mole crickets,. *scapteriscus* spp. MERIT 2F Insecticide can also be used for suppression of cutworms and chinch bugs.
The active ingredient in MERIT 2F Insecticide has sufficient residual activity so that applications can be made preceding the egg laying activity of the target pests. High levels of control can be achieved when applications are made preceding or during the egg laying period. The need for an application can be based on historical monitoring of the site, previous records or experiences, current season adult trapping or other methods. Optimum control will be achieved when applications are made prior to egg hatch of the target pests, followed by sufficient irrigation or rainfall to move the active ingredient through the thatch.
Do not apply when turfgrass areas are waterlogged or the soil is saturated with water. Adequate distribution of the active ingredient cannot be achieved when these conditions exist. The treated turf area must be in such a condition that the rainfall or irrigation will penetrate vertically in the soil profile.
RESTRICTION: Do not apply more than a total of 1.6 pints (0.4 lb of active ingredient) per acre per year.

APPLICATION EQUIPMENT FOR USE ON TURFGRASS

Apply MERIT 2F Insecticide in sufficient water to provide adequate distribution in the treated area. The use of accurately calibrated equipment normally used for the application of turfgrass insecticides is required. Use equipment which will produce a uniform, coarse droplet spray, using a low pressure setting to eliminate off target drift. Check calibration periodically to ensure that equipment is working properly.

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APPLICATION TO ORNAMENTALS

MERIT 2F Insecticide is for use on ornamentals in commercial and residential landscapes and interior plantscapes. MERIT 2F Insecticide is a systemic product and will be translocated upward into the plant system from root uptake. To assure optimum effectiveness, the product must be placed where the growing portion of the target plant can absorb the active ingredient. The addition of a nitrogen containing fertilizer, where applicable, into the solution may enhance the uptake of the active ingredient. Application can be made by foliar application or soil applications; including soil injection, drenches, and broadcast sprays. Foliar applications offer locally systemic activity against insect pests.

When making soil applications to plants with woody stems, systemic activity will be delayed until the active ingredient is translocated throughout the plant. In some cases, this translocation delay could take 60 days or longer. For this reason, make application prior to anticipated pest infestation to achieve optimum levels of control.

RESTRICTION: Outdoor applications cannot exceed a total of 1.6 pints (0.4 lb of active ingredient) per acre per year.

ANT MANAGEMENT PROGRAMS

Use MERIT 2F to control aphids, scale insects, mealybugs and other sucking pests on ornamentals to limit the honeydew available as a food source for ant populations. MERIT 2F Insecticide applications can be then be supplemented with residual sprays, bait placements or other ant control tactics to further reduce the pest population.

APPLICATION EQUIPMENT FOR FOLIAR APPLICATIONS

MERIT 2F Insecticide mixes readily with water and may be used in many types of application equipment. Mix product with the required amount of water and apply as desired dependent upon the selected use pattern.

When making foliar applications on hard to wet foliage such as holly, pine, or ivy, the addition of a spreader/ sticker is recommended. If concentrate or mist type spray equipment is used, apply an equivalent amount on the area sprayed, as would be used in a dilute application.

MERIT 2F Insecticide has been found to be compatible with commonly used fungicides, miticides, liquid fertilizers, and other commonly used insecticides. Check physical compatibility using the correct proportion of products in a small jar test if local experience is unavailable.

RESTRICTION: Do not apply through any irrigation system.

~~DIRECTIONS FOR USE ON TURFGRASSES IN RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL AREAS~~

SITE	PEST			DOSAGE MERIT 2F INSECTICIDE
TURFGRASSES (Residential home lawns, business and office complexes, shopping complexes, multi-family residential complexes, golf courses, airports, cemeteries, parks, playgrounds, athletic fields)	**LARVAE OF:** Annual bluegrass weevil Asiatic garden beetle Billbug Black turfgrass ataenius	Cutworms (suppression) European chafer European Crane Fly Green June beetle Japanese beetle	Northern masked chafer Oriental beetle *Phyllophaga* spp. Southern masked chafer	1.25 to 1.6 pt/A or 0.46 to 0.6 fl oz (14 to 17 mL) per 1000 sq ft
	For optimum control of grubs, billbugs, annual bluegrass weevil, and European Crane Fly make application prior to egg hatch of the target pest. Be sure to read "APPLICATION EQUIPMENT" Section of this label.			
	Chinchbugs (suppression)	Mole crickets		1.6 pt/A or 0.6 fl oz (17 mL) per 1000 sq ft
	For suppression of chinch bugs, make application prior to the hatching of the first instar nymphs. For control of mole crickets make application prior to or during the peak egg hatch period. If application is not made prior to egg hatch or when adults or large nymphs are present and actively tunneling, apply Merit 2F Insecticide in combination with a remedial insecticide to minimize damage to turf. Follow label instructions for other insecticides when tank-mixing.			

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DIRECTIONS FOR USE ON TURFGRASSES IN RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL AREAS
Consult your local turf, state Agricultural Experiment Station, or State Extension Service Specialists for more specific information regarding timing of application. For optimum control, if rainfall does not occur within 24 hours after application, irrigate to move the active ingredient through the thatch. **RESTRICTIONS:** • Do not apply more than 1.6 pt (0.4 lb of active ingredient) per acre per year. • Do not mow turf or lawn area until after sufficient irrigation or rainfall has occurred so that uniformity of application will not be affected. • Do not allow this product to contact plants in bloom while bees are foraging the treatment area. • Do not graze treated areas or use clippings from treated areas for feed or forage. • Do not allow runoff or puddling of irrigation water following application. • Keep children and pets off treated area until dry. • Do not apply Merit 2F Insecticide to areas which are water logged or saturated, which will not allow penetration into the root zone of the plant.

DIRECTIONS FOR USE ON SOD FARMS

SITE	PEST			DOSAGE MERIT 2F INSECTICIDE
TURFGRASSES (Sod Farms)	**LARVAE OF:** Annual bluegrass weevil Asiatic garden beetle Billbug Black turfgrass ataenius	Cutworms (suppression) European chafer European Crane Fly Green June beetle Japanese beetle	Northern masked chafer Oriental beetle *Phyllophaga* spp. Southern masked chafer	1.25 to 1.6 pt/A or 0.46 to 0.6 fl oz (14 to 17 mL) per 1,000 sq ft
	For optimum control of grubs, billbugs, annual bluegrass weevil, and European Crane Fly make application prior to egg hatch of the target pest. Be sure to read "APPLICATION EQUIPMENT" Section of this label.			
	Chinchbugs (suppression)	Mole crickets		1.6 pt/A or 0.6 fl oz (17 mL) per 1,000 sq ft
	For suppression of chinch bugs, make application prior to the hatching of the first instar nymphs. For control of mole crickets make application prior to or during the peak egg hatch period. If application is not made prior to egg hatch or when adults or large nymphs are present and actively tunneling, apply Merit 2F Insecticide in combination with a remedial insecticide to minimize damage to turf. Follow label instructions for other insecticides when tank-mixing.			

Consult your local turf, state Agricultural Experiment Station, or State Extension Service Specialists for more specific information regarding timing of application.
For optimum control, if rainfall does not occur within 24 hours after application, irrigate to move the active ingredient through the thatch.

RESTRICTIONS:
- Do not apply more than 1.6 pt (0.4 lb of active ingredient) per acre per year.
- Do not allow this product to contact plants in bloom while bees are foraging the treatment area.
- Do not use for seed production.
- Do not allow runoff or puddling of irrigation water following application.
- Do not apply Merit 2F Insecticide to areas which are water logged or saturated, which will not allow penetration into the root zone of the plant.

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DIRECTIONS FOR APPLICATION TO OUTDOOR ORNAMENTALS IN RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL LANDSCAPE AREAS		
SITE	**PEST**	**DOSAGE MERIT 2F INSECTICIDE**
Trees Shrubs Evergreens Flowers Foliage plants Groundcovers	Adelgids (including hemlock woolly adelgid) Aphids Leaf-feeding beetles (Japanese beetle, emerald ash borer and vine weevil adults) Leaf-feeding bugs (including lace bugs, leaf bugs, and plant bugs) Leafhoppers, planthoppers, sharpshooters (including glassy-winged sharpshooter) and spittle bugs) Mealybugs Psyllids Sawfly larvae Thrips (foliage only) Whiteflies	1.5 fl oz (45mL) per 100 gal of water
	Foliar Applications: Start treatments prior to establishment of high pest populations and reapply on an as needed basis.	
	White grub larvae (such as Japanese beetle larvae, Chafers, *Phyllophaga* spp., Asiatic garden beetle, Oriental beetle)	0.46 to 0.6 fl oz (14 to 17mL) per 1,000 sq ft
	Broadcast Applications: Mix required amount of product in sufficient water to uniformly and accurately cover the area being treated. Do not use less than 2 gallons of water per 1000 sq ft. For optimum control, irrigate thoroughly to incorporate MERIT 2F Insecticide into the upper soil profile.	

RESTRICTIONS:
- **Follow application restrictions for Non-Agricultural Uses on page 3 to protect bees and other insect pollinators**
- Do not apply more than 1.6 pt (0.4 lb of active ingredient) per acre per year.
- Keep children and pets off treated area until dry.
- Do not apply this product, by any application method, to linden, basswood, or other Tilia species.

DIRECTIONS FOR APPLICATION TO PLANTS GROWN INDOORS		
SITE	**PEST**	**DOSAGE MERIT 2F INSECTICIDE**
Interior plantscapes	Adelgids (including hemlock woolly adelgid) Aphids Leaf-feeding beetles (Japanese beetle, emerald ash borer and vine weevil adults) Leaf-feeding bugs (including lace bugs, leaf bugs, and plant bugs) Leafhoppers, planthoppers, sharpshooters (including glassy-winged sharpshooter) and spittle bugs) Mealybugs Psyllids Sawfly larvae Thrips (foliage only) Whiteflies	1.5 fl oz (45mL) per 100 gal of water
	Foliar Applications: Start treatments prior to establishment of high pest populations and reapply on an as needed basis.	
	White grub larvae (such as Japanese beetle larvae, Chafers, *Phyllophaga* spp., Asiatic garden beetle, Oriental beetle)	0.46 to 0.6 fl oz (14 to 17mL) per 1,000 sq ft
	Broadcast Applications: Mix required amount of product in sufficient water to uniformly and accurately cover the area being treated. Do not use less than 2 gallons of water per 1,000 sq ft. For optimum control, irrigate thoroughly to incorporate Merit 2F Insecticide into the upper soil profile.	

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DIRECTIONS FOR APPLICATION TO PLANTS GROWN INDOORS

RESTRICTIONS:
- Not for use in commercial greenhouses.

DIRECTIONS FOR APPLICATION TO TREES AND SHRUBS BY SOIL DRENCH AND SOIL INJECTION

For use in and around the perimeter of industrial and commercial buildings, in residential and recreational areas, and in municipal, city, state, national, and private wooded and forested areas.

Trees and Shrubs	0.1 to 0.2 fl oz (3 to 6 mL) per inch of trunk diameter (D.B.H.) or per foot of shrub height

Adelgids (including hemlock woolly adelgid)
Aphids
Leaf-feeding beetles (including Japanese beetle and vine weevil adults)
Leaf-feeding bugs (including lace bugs, leaf bugs, and plant bugs)
Leafhoppers, planthoppers, sharpshooters (including glassy-winged sharpshooter) and spittle bugs
Leafminers
Mealybugs
Pine tip moth larvae
Psyllids
Royal palm bug
Sawfly larvae
Soft scales
Whiteflies

Trees and Shrubs	0.2 fl oz (6 mL) per inch of trunk diameter (D.B.H.) or per foot of shrub height

Armored scales (including but not limited to: camellia, false oleander, Florida red, oystershell, tea, and white peach scales)
Flatheaded borers (including emerald ash borer)
Roundheaded borers (including Asian longhorned beetle)
Thrips (foliage only)
White grub, billbug, and root weevil larvae

Trees with a 15 inch of trunk diameter at breast height (D.B.H.) or greater	Apply the following rates as a function of tree diameter at breast height (DBH) 0.1 to 0.4 fl. oz (3 to 12 mL) per inch of trunk diameter (DBH). You may use the higher rate (0.3 -0.4 fl oz) to control the pests listed below. RESTRICTION: Do not apply more than 1.6 pints (0.4 lb of active ingredient) per acre per year. DBH = is measured at 4.5 feet from the ground

Emerald Ash Borer   Bronze birch borer   Asian Longhorned Beetle   Eucalyptus Longhorned Borer   Alder Borer

Soil Injection: GRID SYSTEM: Space holes on 2.5 foot centers, in a grid pattern, extending to the drip line of the tree. CIRCLE SYSTEM: Apply in holes evenly spaced in circles, (use more than one circle dependent upon the size of the tree) beneath the drip line of the tree extending in from that line. BASAL SYSTEM: Space injection holes evenly around the base of the tree trunk no more than 6 to 12 inches out from the base.

Mix required dosage in sufficient water to inject an equal amount of solution in each hole. Maintain a low pressure and use sufficient solution for distribution of the liquid into the treatment zone. For optimum control, keep the treated area moist for 7 to 10 days. Do not use less than 4 holes per tree or shrub.

Soil Drench: Uniformly apply the dosage in no less than 10 gallons of water per 1000 square feet as a drench around the base of the tree, directed to the root zone. Remove plastic or any other barrier that will stop solution from reaching the root zone.

For Control of Specified Borers: Application to trees already heavily infested may not prevent the eventual loss of the trees due to existing pest damage and tree stress.

RESTRICTION:

No Soil Injection Applications Allowed in Nassau or Suffolk Counties of New York.

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DIRECTIONS FOR APPLICATION TO TREES AND SHRUBS BY SOIL DRENCH AND SOIL INJECTION	
GROUND TREATMENT PRE-PLANTING	0.46 to 0.6 fl oz (14 to 17 mL) per 1000 sq ft
Apply as a broadcast treatment and incorporate into the soil before planting.	
RESTRICTION: • Do not apply more than 1.6 pints (0.4 lb of active ingredient) per acre per year. • Keep children and pets off treated area until dry. • Do not apply Merit 2F Insecticide to areas which are water logged or saturated, which will not allow penetration into the root zone of the plant. • Do not apply this product, by any application method, to linden, basswood, or other Tilia species.	

DIRECTIONS FOR FOLIAR APPLICATION TO POME FRUITS, PECANS, AND GRAPES GROWN IN RESIDENTIAL AREAS			
SITE	**PEST**	**RATE PER APPLICATION**	
Pome Fruits Apple Crabapple Loquat Mayhaw Pear Pear (oriental) Quince	Aphids (except Wooly apple aphid) Leafhoppers (including glassy-winged sharpshooter) Leafminer Mealybugs* San Jose scale*	1.5 fl oz (45 mL) per 100 gal	6.0 fl oz/A[1]
Apply specified dosage as foliar spray as needed after petal-fall is complete. For control of rosy apple aphid, apply prior to leafrolling caused by the pest. For first generation leafminer control, make first application as soon as petal-fall is complete. Greatest leafminer control will result from the earliest possible application. For second and succeeding generations of leafminer, optimal control is obtained from applications made early in the adult flight against egg and early instar larvae. A second application may be required 10 days later if severe pressure continues or if generations are overlapping. A single application may result in suppression only. MERIT 2F Insecticide will not control late stage larvae. For San Jose Scale, time applications to the crawler stage. Treat each generation. For late season (preharvest) control of leafhopper species, apply MERIT 2F Insecticide while most leafhoppers are in the nymphal stage. For optimal control of mealybug, insure good spray coverage of the trunk and scaffolding limbs or other resting sites of the mealybug.			
RESTRICTIONS • **Follow application restrictions for Non-Agricultural Uses on page 3 to protect bees and other insect pollinators.** • Do not apply more than 6.0 fl oz per acre in a single application. • Do not make more than 4 applications. • Allow 10 or more days between applications. • Do not apply more than 1.6 pints (0.4 lb of active ingredient) per acre per year. • Allow at least 7 days between last application and harvest. • * Not for use in California for control on pears. • Keep children and pets off treated area until dry.			
Pecans*	Yellow pecan aphid Black margined aphid Pecan leaf phylloxera Pecan spittlebug Pecan stem phylloxera	1.5 fl oz (45 mL) per 100 gal	6.0 fl oz/A[1]
Make foliar applications as pests begin to build before populations become extreme. Two applications at a 10 to 14 day interval may be required to achieve control. Scout and retreat if needed. Thorough uniform coverage of foliage is necessary for optimal control. Addition of an organosilicone-based spray adjuvant at a rate not to exceed the adjuvant manufacturer's recommended use rate may improve coverage.			

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DIRECTIONS FOR FOLIAR APPLICATION TO POME FRUITS, PECANS, AND GRAPES GROWN IN RESIDENTIAL AREAS				
SITE	**PEST**		**RATE PER APPLICATION**	
RESTRICTIONS • **Follow application restrictions for Non-Agricultural Uses on page 3 to protect bees and other insect pollinators.** • Do not apply more than a total of 18.0 fl oz of Merit 2F Insecticide per acre per year. • Do not make more than 3 applications. • Allow 10 or more days between applications. • Allow at least 7 days between last application and harvest. • Keep children and pets off treated area until dry.				
[1] The amount of MERIT 2F required per acre will depend on tree size and volume of foliage present. The rate per acre is based on a standard of 400 gallons of dilute spray solution per acre for large trees. * Use on pecans not permitted in California unless directed by specific supplemental labeling.				
Grapes	Leafhoppers (including glassy-winged sharpshooter)	Mealybugs	1.5 fl oz (45 mL) per 100 gal	3.0 fl oz/A 90 mL/A
Apply specified dosage as a foliar spray using 200 gallons of water per acre.				
RESTRICTIONS • **Follow application restrictions for Non-Agricultural Uses on page 3 to protect bees and other insect pollinators.** • Do not apply more than a total of 6.0 fl oz of Merit 2F Insecticide per acre per year. • Allow at least 14 days between applications. • Applications may be applied up to and including day of harvest. • Keep children and pets off treated area until dry.				

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage: Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food, and feed. Store in original container and out of the reach of children, preferably in a locked storage area.

Handle and open container in a manner as to prevent spillage. If the container is leaking, invert to prevent leakage. If container is leaking or material spilled for any reason or cause, carefully dam up spilled material to prevent runoff. Refer to Precautionary Statements on label for hazards associated with the handling of this material. Do not walk through spilled material. Absorb spilled material with absorbing type compounds and dispose of as directed for pesticides above. In spill or leak incidents, keep unauthorized people away. You may contact the Bayer Environmental Science Emergency Response Team for decontamination procedures or any other assistance that may be necessary. The Bayer Environmental Science Emergency Response Telephone No. is 1-800-334-7577 or contact Chemtrec at 1-800-424-9300.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Handling: Non-refillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Offer for recycling, if available, or reconditioning, or puncture and dispose of in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.

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IMPORTANT: READ BEFORE USE

Read the entire Directions for Use, Conditions, Disclaimer of Warranties and Limitations of liability before using this product.

If terms are not acceptable, return the unopened product container at once. By using this product, user or buyer accepts the following Conditions, Disclaimer of Warranties and Limitations of Liability.

CONDITIONS: The directions for use of this product are believed to be adequate and must be followed carefully. However, it is impossible to eliminate all risks associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of Bayer CropScience LP. All such risks shall be assumed by the user or buyer.

DISCLAIMER OF WARRANTIES: TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, BAYER CROPSCIENCE LP MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, THAT EXTEND BEYOND THE STATEMENTS MADE ON THIS LABEL. No agent of Bayer CropScience is authorized to make any warranties beyond those contained herein or to modify the warranties contained herein. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, BAYER CROPSCIENCE LP DISCLAIMS ANY liability whatsoever for special, incidental or consequential damages, resulting from the use or handling of this product.

LIMITATIONS OF LIABILITY: TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, WHETHER IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, SHALL NOT EXCEED THE PURCHASE PRICE PAID, OR AT BAYER CROPSCIENCE LP'S ELECTION, THE REPLACEMENT OF PRODUCT.

Bayer (reg'd), the Bayer Cross (reg'd), Merit® and Backed by Bayer™ are trademarks of Bayer.

Produced for:
Bayer Environmental Science
A Division of Bayer CropScience LP
2 T. W. Alexander Drive
Research Triangle Park, NC 27709

Merit 2F 1 gal 3407954E 131205AV1 ETL 022714 with crops.qxp Merit 2F 1 gal 3407954E 131205AV1 ETL 022714 with crops 2/27/14 1

4.8125"

5"

12

5.5"

5"

MERIT® 2F INSECTICIDE

GROUP 4A INSECTICIDE

For foliar and systemic insect control in turfgrass (including sod farms), landscape ornamentals, fruit and nut trees and interior plantscapes.

ACTIVE INGREDIENT: *Imidacloprid,1-[(6-Chloro-3-pyridinyl)methyl]-*N*-nitro-2-imidazolidinimin 21.4%
OTHER INGREDIENTS: 78.6%
TOTAL: 100.0%

*Contains 2 pounds of imidacloprid per gallon.
SHAKE WELL BEFORE USING.
EPA Reg. No. 432-1312

STOP - READ THE LABEL BEFORE USE
KEEP OUT OF REACH OF CHILDREN
CAUTION

PARA EL USUARIO: Si usted no lee o entiende inglés, no use este producto hasta que le hayan explicado completamente las instrucciones que figuran en la etiqueta.
(TO THE USER: If you cannot read or understand English, do not use this product until the label has been fully explained to you.)
For MEDICAL And TRANSPORTATION Emergencies ONLY Call 24 Hours A Day 1-800-334-7577
For PRODUCT USE Information Call 1-800-331-2867

FIRST AID	
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If on skin or clothing:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes:	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.

In case of emergency call toll free the Bayer Environmental Science Emergency Response Telephone No. 800-334-7577. Have a product container or label with you when calling a poison control center or doctor, or going for treatment.

Note To Physician: No specific antidote is available. Treat the patient symptomatically.

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
CAUTION

Harmful if swallowed or absorbed through skin. Avoid contact with skin, eyes, or clothing. Wash thoroughly with soap and water after handling. Keep children or pets off treated area until spray is dry.

ENVIRONMENTAL HAZARDS

This product is highly toxic to 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. Do not contaminate water when disposing of equipment washwaters.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops/plants or weeds. Do not apply this product or allow it to drift to blooming crops/plants or weeds if bees are foraging the treatment area.

This chemical demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage: Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food, and feed. Store in original container and out of the reach of children, preferably in a locked storage area.

Handle and open container in a manner as to prevent spillage. If the container is leaking, invert to prevent leakage. If container is leaking or material spilled for any reason or cause, carefully dam up spilled material to prevent runoff. Refer to Precautionary Statements on label for hazards associated with the handling of this material. Do not walk through spilled material. Absorb spilled material with absorbing type compounds and dispose of as directed for pesticides above. In spill or leak incidents, keep unauthorized people away. You may contact the Bayer Environmental Science Emergency Response Team for decontamination procedures or any other assistance that may be necessary. The Bayer Environmental Science Emergency Response Telephone No. is 1-800-334-7577 or contact Chemtrec at 1-800-424-9300.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Handling: Non-refillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Offer for recycling, if available, or reconditioning, or puncture and dispose of in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.

See inside leaflet for complete First Aid Instructions, Precautionary Statements, Directions for Use and Storage and Disposal Instructions.

Net Contents
1 Gallon
02406377
03407954E 131205AV1

BACKED by BAYER™

Produced for:
Bayer Environmental Science
A Division of Bayer CropScience LP
2 T. W. Alexander Drive
Research Triangle Park, NC 27709

(01)00785740100899

PULL HERE TO OPEN ▶

Product of China

Bayer Environmental Science
SAFETY DATA SHEET

MERIT® 2F INSECTICIDE

Version 3.0 / USA
102000015064

Revision Date: 03/07/2014
Print Date: 03/26/2015

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product identifier

Trade name	MERIT® 2F INSECTICIDE
Product code (UVP)	06004481
SDS Number	102000015064
EPA Registration No.	432-1312

Relevant identified uses of the substance or mixture and uses advised against

Use	Insecticide
Restrictions on use	See product label for restrictions.

Information on manufacturer

Bayer Environmental Science
2 T.W. Alexander Drive
Research Triangle PK, NC 27709
United States

Emergency Telephone Number (24hr/ 7 days)	1-800-334-7577 (24 hours/day)
Product Information Telephone Number	1-800-331-2867
SDS Information or Request	SDSINFO.BCS-NA@bayer.com

SECTION 2: HAZARDS IDENTIFICATION

Classification in accordance with regulation HCS 29CFR §1910.1200
Eye irritation : Category 2B
Signal word: Warning

Hazard statements
Causes eye irritation.

Precautionary statements
Wash thoroughly after handling.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.

Other hazards
No other hazards known.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Component Name	CAS-No.	Average % by Weight
Imidacloprid	138261-41-3	21.40
Glycerine	56-81-5	10.00

SECTION 4: FIRST AID MEASURES

Description of first aid measures

General advice When possible, have the product container or label with you when calling a poison control center or doctor or going for treatment.

Inhalation Move to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a physician or poison control center immediately.

Skin contact Take off contaminated clothing and shoes immediately. Wash off immediately with plenty of water for at least 15 minutes. Call a physician or poison control center immediately.

Eye contact Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a physician or poison control center immediately.

Ingestion Call a physician or poison control center immediately. Rinse out mouth and give water in small sips to drink. DO NOT induce vomiting unless directed to do so by a physician or poison control center. Never give anything by mouth to an unconscious person. Do not leave victim unattended.

Most important symptoms and effects, both acute and delayed

Symptoms To date no symptoms are known.

Indication of any immediate medical attention and special treatment needed

Treatment Appropriate supportive and symptomatic treatment as indicated by the patient's condition is recommended. There is no specific antidote.

SECTION 5: FIREFIGHTING MEASURES

Extinguishing media

Suitable Water spray, Foam, Carbon dioxide (CO_2), Dry chemical

Unsuitable None known.

Advice for firefighters

Special protective equipment for fire-fighters Firefighters should wear NIOSH approved self-contained breathing apparatus and full protective clothing.

Further information	Keep out of smoke. Fight fire from upwind position. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses.
Flash point	> 93 °C
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Explosivity	not applicable
Dust explosion class	Not applicable.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Precautions	Keep unauthorized people away. Isolate hazard area. Avoid contact with spilled product or contaminated surfaces.

Methods and materials for containment and cleaning up

Methods for cleaning up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Collect and transfer the product into a properly labelled and tightly closed container. Clean contaminated floors and objects thoroughly, observing environmental regulations.
Additional advice	Use personal protective equipment. Do not allow to enter soil, waterways or waste water canal.
Reference to other sections	Information regarding safe handling, see section 7. Information regarding personal protective equipment, see section 8. Information regarding waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling	Handle and open container in a manner as to prevent spillage. Maintain exposure levels below the exposure limit through the use of general and local exhaust ventilation.
Hygiene measures	Wash hands thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, using the toilet or applying cosmetics. Remove Personal Protective Equipment (PPE) immediately after handling this product. Before removing gloves clean them with soap and water. Remove soiled clothing immediately and clean thoroughly before using again. Wash thoroughly and put on clean clothing.

Conditions for safe storage, including any incompatibilities

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Print Date: 03/26/2015

Requirements for storage areas and containers Store in a cool, dry place and in such a manner as to prevent cross contamination with other crop protection products, fertilizers, food, and feed. Store in original container and out of the reach of children, preferably in a locked storage area.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Components	CAS-No.	Control parameters	Update	Basis
Imidacloprid	138261-41-3	0.7 mg/m3 (TWA)		OES BCS*
Imidacloprid	138261-41-3	5ug/m3 (AN ESL)	07 2011	TX ESL
Imidacloprid	138261-41-3	50ug/m3 (ST ESL)	07 2011	TX ESL
Glycerine (Total dust.)	56-81-5	15 mg/m3 (PEL)	02 2006	OSHA Z1
Glycerine (Respirable fraction.)	56-81-5	5 mg/m3 (PEL)	02 2006	OSHA Z1
Glycerine (Respirable fraction.)	56-81-5	5 mg/m3 (TWA)	1989	OSHA Z1A
Glycerine (Total dust.)	56-81-5	10 mg/m3 (TWA)	1989	OSHA Z1A
Glycerine (Total dust and mist.)	56-81-5	10 mg/m3 (TWA)	06 2008	TN OEL
Glycerine (Respirable fraction and dust or fume.)	56-81-5	5 mg/m3 (TWA)	06 2008	TN OEL
Glycerine (Particulate.)	56-81-5	50ug/m3 (ST ESL)	02 2013	TX ESL
Glycerine (Particulate.)	56-81-5	5ug/m3 (AN ESL)	02 2013	TX ESL
Glycerine (Vapor.)	56-81-5	100ug/m3 (AN ESL)	02 2013	TX ESL
Glycerine (Vapor.)	56-81-5	1000ug/m3 (ST ESL)	02 2013	TX ESL

*OES BCS: Internal Bayer CropScience "Occupational Exposure Standard"

Exposure controls

Personal protective equipment
In normal use and handling conditions please refer to the label and/or leaflet. In all other cases the following recommendations would apply.

Respiratory protection When respirators are required, select NIOSH approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industry recommendations.

Appendix 3A

Hand protection	Chemical resistant nitrile rubber gloves
Eye protection	Tightly fitting safety goggles
Skin and body protection	Wear long-sleeved shirt and long pants and shoes plus socks.
General protective measures	Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and warm/tepid water. Keep and wash PPE separately from other laundry.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	white to light beige
Physical State	liquid suspension
Odor	mild
Odour Threshold	no data available
pH	7.5
Vapor Pressure	no data available
Vapor Density (Air = 1)	no data available
Density	1.12 g/cm³ at 20 °C
Evapouration rate	no data available
Boiling Point	no data available
Melting / Freezing Point	-6.7 °C / 19.9 °F
Water solubility	dispersible
Minimum Ignition Energy	not applicable
Decomposition temperature	no data available
Partition coefficient: n-octanol/water	no data available
Viscosity	350 - 600 mPa.s
Flash point	> 93 °C
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Explosivity	not applicable
Dust explosion class	Not applicable.

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SECTION 10: STABILITY AND REACTIVITY

Reactivity

Thermal decomposition	no data available
Chemical stability	Stable under recommended storage conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	freezing
Incompatible materials	no data available
Hazardous decomposition products	No decomposition products expected under normal conditions of use.

SECTION 11: TOXICOLOGICAL INFORMATION

Exposure routes	~~Ingestion, Skin Absorption, Eye contact, Inhalation~~

Immediate Effects

Eye	May cause mild irritation to eyes.
Skin	May cause slight irritation. Harmful if absorbed through skin.
Ingestion	Harmful if swallowed.

Information on toxicological effects

Acute oral toxicity	LD50 (male rat) > 4,870 mg/kg LD50 (female rat) 4,143 mg/kg
Acute inhalation toxicity	LC50 (male/female combined rat) > 5.33 mg/l Exposure time: 4 h Determined in the form of liquid aerosol. (actual) LC50 (male/female combined rat) > 20 mg/l Exposure time: 1 h Determined in the form of liquid aerosol. Extrapolated from the 4 hr LC50. (actual)
Acute dermal toxicity	LD50 (male/female combined rabbit) > 2,000 mg/kg
Skin irritation	No skin irritation (rabbit)
Eye irritation	Minimally irritating. (rabbit)
Sensitisation	Non-sensitizing. (guinea pig)

Assessment repeated dose toxicity

Imidacloprid did not cause specific target organ toxicity in experimental animal studies.

Assessment Mutagenicity

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Imidacloprid was not mutagenic or genotoxic based on the overall weight of evidence in a battery of in vitro and in vivo tests.

Assessment Carcinogenicity

Imidacloprid was not carcinogenic in lifetime feeding studies in rats and mice.

ACGIH

None.

NTP

None.

IARC

None.

OSHA

None.

Assessment toxicity to reproduction

Imidacloprid caused reproduction toxicity in a two-generation study in rats only at dose levels also toxic to the parent animals. The reproduction toxicity seen with Imidacloprid is related to parental toxicity.

Assessment developmental toxicity

Imidacloprid caused developmental toxicity only at dose levels toxic to the dams. The developmental effects seen with Imidacloprid are related to maternal toxicity.

Further information

Only acute toxicity studies have been performed on the formulated product.
The non-acute information pertains to the active ingredient(s).

SECTION 12: ECOLOGICAL INFORMATION

Toxicity to fish	LC50 (Rainbow trout (Oncorhynchus mykiss)) 211 mg/l Exposure time: 96 h The value mentioned relates to the active ingredient imidacloprid.
Toxicity to aquatic invertebrates	EC50 (Water flea (Daphnia magna)) 85 mg/l Exposure time: 48 h The value mentioned relates to the active ingredient imidacloprid. LC50 (Chironomus riparius (non-biting midge)) 0.0552 mg/l Exposure time: 24 h The value mentioned relates to the active ingredient imidacloprid.
Toxicity to aquatic plants	EC50 (Desmodesmus subspicatus) > 10 mg/l Growth rate; Exposure time: 72 h The value mentioned relates to the active ingredient imidacloprid.
Biodegradability	Imidacloprid: ; not rapidly biodegradable

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Koc	Imidacloprid: Koc: 225
Bioaccumulation	Imidacloprid: ; Does not bioaccumulate.
Mobility in soil	Imidacloprid: Moderately mobile in soils
Environmental precautions	Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate surface or ground water by cleaning equipment or disposal of wastes, including equipment wash water. Apply this product as specified on the label. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods

Product	Do not contaminate water, food, or feed by disposal. Dispose in accordance with all local, state/provincial and federal regulations.
Contaminated packaging	Do not re-use empty containers. Triple rinse containers. Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill or incineration, or if allowed by State and Local authorities, by burning. If burned, stay out of smoke.
RCRA Information	Characterization and proper disposal of this material as a special or hazardous waste is dependent upon Federal, State and local laws and are the user's responsibility. RCRA classification may apply.

SECTION 14: TRANSPORT INFORMATION

49CFR	Not dangerous goods / not hazardous material

IMDG

UN number	**3082**
Class	9
Packaging group	III
Marine pollutant	YES
Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (IMIDACLOPRID SOLUTION)

IATA

UN number	**3082**
Class	9
Packaging group	III
Environm. Hazardous Mark	YES

Appendix 3A

Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (IMIDACLOPRID SOLUTION)

This transportation information is not intended to convey all specific regulatory information relating to this product. It does not address regulatory variations due to package size or special transportation requirements.

Freight Classification:	INSECTICIDES OR FUNGICIDES, N.O.I., OTHER THAN POISON

SECTION 15: REGULATORY INFORMATION

EPA Registration No. 432-1312
US Federal Regulations
TSCA list
Glycerine 56-81-5
US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)
None.
SARA Title III - Section 302 - Notification and Information
None.
SARA Title III - Section 313 - Toxic Chemical Release Reporting
None.
US States Regulatory Reporting
CA Prop65
This product does not contain any substances known to the State of California to cause cancer.

This product does not contain any substances known to the State of California to cause reproductive harm.

US State Right-To-Know Ingredients
Glycerine 56-81-5 MN

Canadian Regulations
Canadian Domestic Substance List
Glycerine 56-81-5

Environmental
CERCLA
None.
Clean Water Section 307 Priority Pollutants
None.
Safe Drinking Water Act Maximum Contaminant Levels
None.

International Regulations
European Inventory of Existing Commercial Substances (EINECS)
Glycerine 56-81-5

EPA/FIFRA Information:

Appendix 3A

Bayer Environmental Science
SAFETY DATA SHEET

MERIT® 2F INSECTICIDE

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information required on the pesticide label:

Signal word: Caution!

Hazard statements:
Hazard to humans and domestic animals.
Keep out of reach of children and animals.
Harmful if swallowed or absorbed through skin.
Avoid contact with skin, eyes and clothing.
Avoid breathing spray mist.

SECTION 16: OTHER INFORMATION

NFPA 704 (National Fire Protection Association):

Health - 1	Flammability - 1	Instability - 1	Others - none

HMIS (Hazardous Materials Identification System, based on the Third Edition Ratings Guide)

Health - 1	Flammability - 1	Physical Hazard - 1	PPE -

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard

Reason for Revision: Revised according to the current OSHA Hazard Communication Standard (29CFR1910.1200)

Revision Date: 03/07/2014

Appendix 3A

MARATHON® II

GREENHOUSE and NURSERY INSECTICIDE — SPECIMEN LABEL

For Foliar and Systemic Insect Control on Ornamentals, Fruit and Nut Trees, and Vegetable Plants in Greenhouses, Nurseries and Interior Plantscapes

ACTIVE INGREDIENT:	
* Imidacloprid,1-[(6-Chloro-3-pyridinyl)methyl]-*N*-nitro-2-imidazolidinimine	21.4%
OTHER INGREDIENTS:	78.6%
TOTAL:	100.0%

Contains 2 pounds of imidacloprid per gallon

SHAKE WELL BEFORE USING

* Protected by U.S Patent No. 4,742,060

EPA Est. indicated by second and third digits of the batch number on this package.

EPA Reg. No. 432-1369-59807

(65) = 432-TX-1 (03) = 3125-MO-1

STOP - READ THE LABEL BEFORE USE
KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: ~~Harmful if swallowed or absorbed through skin.~~ Avoid contact with skin, eyes, or clothing. Wash thoroughly with soap and water after handling. Keep children or pets off treated area until spray is dry.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves made of any waterproof material such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinylchloride (PVC) or viton
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering controls statements: When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

Important: When reduced PPE is worn because a closed system is being used, handlers must be provided all PPE specified above for "Applicators and Other Handlers" and have such PPE immediately available for use in an emergency, such as a spill or equipment breakdown.

USER SAFETY RECOMMENDATIONS

User should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

FIRST AID	
IF SWALLOWED	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.
IF INHALED	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.
IF ON SKIN OR CLOTHING	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • Call a poison control center or doctor for treatment advice.

ohp Partners with solutions

Net Contents: 250 Milliliters (8.45 fl. oz.)

FIRST AID continued	
IF IN EYES	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
In case of emergency call toll free the OHP, Inc. Emergency Response Telephone No. 800-356-4647. Have a product container or label with you when calling a poison control center or doctor, or going for treatment.	
Note To Physician: No specific antidote is available. Treat the patient symptomatically.	

ENVIRONMENTAL HAZARDS

This product is highly toxic to 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. Do not contaminate water when disposing of equipment washwaters.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

This chemical demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170.

This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours following application. Earlier entry by exception.

Exception: If the product is drenched, soil-injected or soil-incorporated, workers may enter the treated area at any time if there will be no contact with anything that has been treated.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Chemical-resistant gloves made of any waterproof material such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinylchloride (PVC) or viton
- Shoes plus socks

Do not formulate this product into other end-use products.

APPLICATION TO ORNAMENTALS AND VEGETABLE PLANTS

MARATHON II Insecticide is for insect control on ornamental and vegetable plants in nurseries and greenhouses and interior plantscapes. **MARATHON II Insecticide** is a systemic product and will be translocated upward into the plant system. To assure optimum effectiveness, the product must be placed where the growing portion of the target plant can absorb the active ingredient. The addition of a nitrogen containing fertilizer, where applicable, into the solution may enhance the uptake of the active ingredient. Application can be made by foliar application or soil applications; including soil injection, drenches, chemigation and broadcast sprays.

When making soil applications to plants with woody stems, systemic activity will be delayed until the active ingredient is translocated throughout the plant. For this reason, applications should be made prior to anticipated pest infestation to achieve optimum levels of control.

For outdoor ornamentals, broadcast applications cannot exceed a total of 1.6 pints (0.4 lb of active ingredient) per acre per year.

BARK MEDIA: Media with 30% or more bark content may confer a shorter period of protection when treated with **MARATHON II Insecticide.**

RESISTANCE: Some insects are known to develop resistance to insecticides after repeated use. As with any insecticide, the use of this product should conform to resistance management strategies established for the use area. Consult your Cooperative Extension Service for resistance management strategies and recommended pest management practices for your area.

Application Equipment For Ornamentals And Vegetable Plants

MARATHON II Insecticide mixes readily with water and may be used in many types of application equipment. Mix product with the required amount of water and apply as desired dependent upon the selected use pattern.

When making foliar applications on hard to wet foliage such as holly, pine, or ivy, the addition of a spreader/ sticker is recommended. If concentrate or mist type spray equipment is used, an equivalent amount of product should be used on the area sprayed, as would be used in a dilute application.

MARATHON II Insecticide has been found to be compatible with commonly used fungicides, miticides, liquid fertilizers, and compatibility using the correct proportion of products in a small jar test if local experience is unavailable.

APPLICATION THROUGH IRRIGATION SYSTEMS

MARATHON II Insecticide may be applied at rates recommended on the label either alone or in tank mixtures with other pesticides and chemicals registered for application through irrigation systems. The normal dilution ratio is 1:100 to 1:200, depending on the system. Always meter the product into the irrigation water during the first part of the irrigation cycle. The product may be mixed separately prior to injection. Agitation may be necessary if the mixture is allowed to stand more than 24 hours.

Remove scale, pesticide residue and other foreign matter from the tank and entire irrigation system.

Apply **MARATHON II Insecticide** only through micro irrigation (individual spaghetti tubes), drip irrigation, overhead irrigation, ebb and flood, or hand-held or motorized calibrated irrigation equipment.

Do not apply this product through any other type of irrigation system. Crop injury or lack of effectiveness can result from non uniform distribution of treated water.

If you have any questions about calibration, contact your State Extension Service specialist, equipment manufacturers or other experts in this area.

Do not connect an irrigation system (including greenhouse systems) used for pesticide application to a public water system unless the pesticide label-prescribed safety devices for public water systems are in place.

A person knowledgeable of the chemigation system and responsible for its operation, or a person who is under the supervision of the responsible person, shall shut the system down and make necessary adjustments should the need arise.

SAFETY DEVICES FOR IRRIGATION SYSTEMS CONNECTED TO PUBLIC WATER SUPPLIES:

If the source of water for your irrigation system is a public water supply, follow the instructions below:

1. Public water system means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.
2. Chemigation systems connected to public water systems must contain a functional, reduced-pressure zone, backflow preventer (RPZ) or the functional equivalent in the water supply line upstream from the point of pesticide introduction. As an option to the RPZ, water from the public water system should be discharged into a reservoir tank prior to pesticide introduction. There shall be a complete physical break (air gap) between the outlet end of the fill pipe and the top or overflow rim of the reservoir tank of at least twice the inside diameter of the fill pipe.
3. The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.
4. The pesticide injection pipeline must contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
5. The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops, or in cases where there is no water pump, when the water pressure decreases to the point where pesticide distribution is adversely affected.
6. Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.
7. Do not apply when wind speed favors drift beyond the area intended for treatment.

SAFETY DEVICES FOR IRRIGATION SYSTEMS NOT CONNECTED TO A PUBLIC WATER SUPPLY:

1. The system must contain a functional check valve, vacuum relief valve and low pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from backflow.
2. The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.
3. The pesticide injection pipeline must also contain a functional normally closed solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
4. The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.
5. The irrigation line or water pump must include a functional pressure switch which will stop the water pump motor when the water pressure decreases to the point where the pesticide distribution is adversely affected.
6. Systems must use a metering pump such as a positive displacement injection pump (e.g. diaphragm pump) effectively designed and constructed of material that is compatible with pesticides and capable of being fitted with a system interlock.
7. Do not apply when wind speed favors drift beyond the area intended for treatment.

APPLICATION TO GRASSY AREAS IN NURSERIES

MARATHON II Insecticide can be used for the control of soil inhabiting pests of grassy areas of nurseries, such as Northern and Southern masked chafers, *Cyclocephala borealis*, *C. immaculata*, and/or *C. lurida*; Asiatic garden beetle, *Maladera castanea*; European chafer, *Rhizotroqus majalis*; Green June beetle, *Cotinis nitida*; May or June beetle, *Phyllophaga* spp.; Japanese beetle, *Popillia japonica*; Oriental beetle, *Anomala orientalis*; Billbugs, *Spherophorus* spp.; Annual bluegrass weevil, *Hyperodes* spp.; Black turfgrass ataenius, *Ataenius spretulus* and *Aphodius* spp. and mole crickets, *Scapteriscus* spp. **MARATHON II Insecticide** can also be used for suppression of cutworms and chinchbugs. **MARATHON II Insecticide** can be used as directed on nursery grass in sites such as under or around field or container grown plants, on roadways or other grassy areas in or around nurseries. **MARATHON II Insecticide** cannot be used on commercial sod farms.

The active ingredient in **MARATHON II Insecticide** has sufficient residual activity so that applications can be made preceding the egg laying activity of the target pests. High levels of control can be achieved when applications are made preceding or during the egg laying period. The need for an application can be based on historical monitoring of the site, previous records or experiences, current season adult trapping or other methods. Optimum control will be achieved when applications are made prior to egg hatch of the target pests, followed by sufficient irrigation or rainfall to move the active ingredient through the thatch.

Applications should not be made when grassy areas are waterlogged or the soil is saturated with water. Adequate distribution of the active ingredient cannot be achieved when these conditions exist. The treated grassy area must be in such a condition that the rainfall or irrigation will penetrate vertically in the soil profile. Application cannot exceed a total of 1.6 pints (0.4 lb of active ingredient) per acre per year.

Application Equipment for Use on Grassy Areas in Nurseries

Apply **MARATHON II Insecticide** in sufficient water to provide adequate distribution in the treated area. The use of accurately calibrated equipment normally used for the application of soil insecticides is required. Use equipment which will produce a uniform, course droplet spray, using a low pressure setting to eliminate off target drift. Check calibration periodically to ensure that equipment is working properly.

Appendix 3A

RECOMMENDED APPLICATIONS		
CROP	**PEST**	**DOSAGE**
Grassy areas of Field & Forest Nurseries	**Larvae of:** Annual bluegrass weevil Asiatic garden beetle Billbugs Black turfgrass ataenius Cutworms (suppression) European chafer Green June beetle Japanese beetle Northern masked chafer Oriental beetle *Phyllophaga* spp. Southern masked chafer	19.2 to 25.6 oz per acre or 0.45 to 0.6 fl oz (13 to 17 mL) per 1000 sq ft.
	Chinchbugs (suppression) Mole crickets	25.6 oz /A or (17 mL) per 1000 sq. ft.

For optimum control of grubs, billbugs and annual bluegrass-weevil, make application prior to egg hatch of the target pest.

Be sure to read "APPLICATION EQUIPMENT" Section of this label.

For suppression of chinchbugs, make application prior to the hatching of the first instar nymphs. For control of mole crickets make application prior to or during the peak egg hatch period. When adults or large nymphs are present and actively tunneling, **MARATHON II Insecticide** application should be accompanied by a curative insecticide. Follow label instructions for other insecticides when tank-mixing.

Consult your local turf, state Agricultural Experiment Station, or State Extension Service Specialist for more specific information regarding timing of application. NOTE: For optimum control, irrigation or rainfall should occur within 24 hours after application to move the active ingredient through the thatch.

Do not apply more than 1.6 pt (0.4 lb of active ingredient) per acre per year. Avoid mowing grass area until after sufficient irrigation or rainfall has occurred so that uniformity of application will not be affected.

RECOMMENDED APPLICATIONS FOR USE ON OR IN ORNAMENTALS

For foliar and systemic insect control in and around field-grown nursery and containers stock, indoor and outdoor ornamentals (including both greenhouse and interior plantscapes) and ornamentals grown in flats, benches or beds.

CROP	PEST	DOSAGE
Trees (including non-bearing fruit and nut) **Shrubs** **Evergreens** **Flowers** **Foliage plants** **Ground covers** **Interior plantscapes** **Vegetable plants***	Adelgids Aphids Japanese beetles (adults) Lacebugs Leaf beetles (including elm and viburnum leaf beetles) Leafhoppers (including glassy-winged sharpshooter) Leafminers Mealybugs Sawfly larvae Thrips (suppression) Whiteflies	1.7 fl. oz. (50mL) per 100 gal of water
	Foliar Applications: Start treatments prior to establishment of high pest populations and reapply on an as needed basis. For resistance management purposes, a **MARATHON II Insecticide** foliar application following a soil application in the same crop is not recommended.	
	White grub larvae (such as Japanese beetle larvae, Chafers, *Phyllophaga* spp. Asiatic garden beetle, Oriental beetle)	0.45 to 0.6 fl oz (13 to 17 mL) per 1000 sq. ft.
	Broadcast Applications: Mix required amount of product in sufficient water to uniformly and accurately cover the area being treated. Do not use less than 2 gallons of water per 1000 sq. ft. For optimum control, irrigate thoroughly to incorporate **MARATHON II Insecticide** into the upper soil profile. Refer to REMARKS section for use directions specific for "Flowers and Ground Covers" concerning additional use directions. * Only for use on vegetable plants intended for resale including: Broccoli, Chinese Broccoli, Broccoli Raab, Brussels Sprouts, Cabbage, Chinese Cabbage, Cauliflower, Collards, Eggplant, Ground Cherry, Kale, Kohlrabi, Lettuce, Mustard Greens, Pepinos, Peppers, Potatoes, Rape Greens, Sorghum, Sugarbeets, Tomatillo, and Tomato.	

RECOMMENDED APPLICATIONS FOR NURSERY, GREENHOUSE AND INTERIORSCAPE PLANTS		
Adelgids Aphids Armored scales (suppression) Black vine weevil larvae Eucalyptus longhorned borers Flatheaded borers (including bronze birch and alder borers)	Japanese beetles (adults) Lacebugs Leaf beetles (including elm and viburnum leaf beetles) Leafhoppers (including glassy-winged sharpshooter) Leafminers Mealybugs	Pine Tip moth larvae Psyllids Royal palm bugs Sawfly larvae Soft scales Thrips (suppression) White grub larvae Whiteflies

Trees	0.1 to 0.2 fl. oz. (3 to 6 mL) per inch of trunk diameter (D.B.H.)

Soil Injection: GRID SYSTEM: Holes should be spaced on 2.5 foot centers, in a grid pattern, extending to the drip line of the tree. CIRCLE SYSTEM: Apply in holes evenly spaced in circles, (use more than one circle dependent upon the size of the tree) beneath the drip line of the tree extending in from that line. BASAL SYSTEM: Space injection holes evenly around the base of the tree trunk no more than 6 to 12 inches out from the base.

Mix required dosage in sufficient water to inject an equal amount of solution in each hole. Maintain a low pressure and use sufficient solution for distribution of the liquid into the treatment zone. For optimum control, keep the treated area moist for 7 to 10 days. Do not use less than 4 holes per tree.

No Soil Injection Application Allowed in Nassau or Suffolk Counties of New York.

Soil Drench: Uniformly apply the dosage in no less than 10 gallons of water per 1000 square feet as a drench around the base of the tree, directed to the root zone. Remove plastic or any other barrier that will stop solution from reaching the root zone.

For Control of Specified Borers: Application to trees already heavily infested may not prevent the eventual loss of the trees due to existing pest damage and tree stress.

Shrubs	0.1 to 0.2 fl. oz. (3 to 6 mL) per foot of shrub height

Soil Injection: Apply to individual plants using dosage indicated.

Mix required dosage in sufficient water to inject an equal amount of solution in each hole. Maintain a low pressure and use sufficient solution for distribution of the liquid into the treatment zone. Keep the treated area moist for 7 to 10 days. Do not use less than 4 holes per shrub.

No Soil Injection Application Allowed in Nassau or Suffolk Counties of New York.

Soil Drench: Uniformly apply the dosage in no less than 10 gallons of water per 1000 square feet as a drench around the base of the tree, directed to the root zone. Remove plastic or any other barrier that will stop solution from reaching the root zone.

Flowers and Ground Covers	0.45 to 0.6 fl oz (13 to 17 mL) per 1000 sq. ft.

Apply as a broadcast treatment and incorporate into the soil before planting or apply after plants are established. If application is made to established plants, optimum control will be attained if area is irrigated thoroughly after application.

MARATHON II Insecticide Ebb & Flood Application

MARATHON II Insecticide may be applied through Ebb and Flood applications. To assure accurate uptake it is recommended that prior to treatment, a minimum of 10 plants be brought up to a known field capacity and allowed to dry out for one or two days. Re-wet these plant to determine how much water on average each plant will absorb to bring it back at field capacity. Use the volume absorbed per plant (keeping pot sizes uniform) multiplied by the number of pots being treated. Add to this volume a required minimum to flood your smallest treatment area. This should minimize the return back to the storage tank. Re-use the returned volume with subsequent irrigation or nutrients on the same plants.

MARATHON II INSECTICIDE EBB & FLOOD APPLICATIONS		
Adelgids Aphids Armored scales (suppression) Fungus Gnats (larvae only) [1] Japanese Beetles (adults) Lacebugs Leaf beetles (including elm and viburnum leaf beetles)	Leafhoppers (including glassy-winged sharpshooter) Leafminers Mealybugs Psyllids Root mealybugs [2] Root Weevil Complex: (such as Apopka Weevil, Black Vine Weevil, Citrus Root Weevil [3]) 	Soft Scales Thrips (suppression)[4] Whiteflies White Grub larvae (such as Japanese Beetle, Masked Chafers, European Chafer, Oriental Beetle, Asiatic Garden Beetle)

Pot sizes (inches)	Herbaceous species including vegetable plants[5] (one or two plants per pot)	Woody perennials, Herbaceous species including vegetable plants[5] (3 or more plants per pot)
	ML per 100 Plants	ML per 100 Plants
2	1.6 mL	2.5 mL
3	2.5 mL	3.7 mL
4	3.3 mL	5.0 mL
5	4.2 mL	6.3 mL
6	5.0 mL	7.7 mL
7	5.9 mL	9.1 mL
8	6.6 mL	10.0 mL
9	7.4 mL	11.1 mL
10	8.3 mL	12.5 mL
11	9.0 mL	14.3 mL
12	10.0 mL	16.7 mL

1 **Fungus gnat larvae** in the soil will be controlled by drench or incorporation. No adult Fungus Gnat control. Other foliar insect control is achieved by the uptake of **MARATHON II** from a healthy root system translocating the active ingredient up into the plant.

2 **Root Mealybug** control will require a thorough drenching of containerized media. Coverage is essential for control while minimizing the amount of leachate. Rate: 1.7 fl oz (50 mL) in 150 gallons of water.

3 **Citrus Root Weevil:** For use on non-bearing citrus nursery stock.

4 **Thrips** suppression on foliage only. Thrips in buds and flowers will not be suppressed.

5 **Note:** For use on vegetable plants intended for resale only including: Broccoli, Chinese Broccoli, Broccoli Raab, Brussels Sprouts, Cabbage, Chinese Cabbage, Cauliflower, Collards, Eggplant, Ground Cherry, Kale, Kohlrabi, Lettuce, Mustard Greens, Pepinos, Peppers, Potatoes, Rape Greens, Sorghum, Sugarbeets, Tomatillo and Tomato.

Appendix 3A

RECOMMENDED DRENCH AND IRRIGATION APPLICATIONS
For use only on greenhouse and nursery ornamentals, vegetable plants, and interiorscape plants using soil drenches, micro-irrigation, drip irrigation, overhead irrigation, ebb and flood irrigation, or hand-held or motorized calibrated irrigation equipment.

Pest	Use Pattern		Dosage - MARATHON II		Remarks
Adelgids Aphids Fungus Gnats [1] (larvae only) Japanese Beetles (adults) Lacebugs Leaf beetles (including elm and viburnum leaf beetles) Leafhoppers (including glassy-winged sharpshooter) Leafminers Mealybugs Psyllids Root mealybugs [2] Root Weevil Complex (Such as Apopka Weevil, Black Vine Weevil, Citrus Root Weevil [3]) Soft Scale Thrips (suppression)[4] Whiteflies White Grub larvae (such as Japanese Beetle, Masked Chafers, European Chafer, Oriental Beetle, Asiatic Garden Beetle)	Plants in Containers	Herbaceous Species – including vegetable plants [5] (one or two plants per pot)	Container size (inches) 2 3 4 5 6 7 8 9 10 11 12	No. pots treated with 1.7 fl oz (50 mL) 3000 2000 1500 1200 1000 850 750 675 600 550 500	Use sufficient volume to wet most of the potting medium without loss of liquid from the bottom of the container. Apply according to label directions. Follow application with moderate irrigation. Irrigate carefully during the next 10 days in order to avoid loss of active ingredient due to leaching.
		Woody Perennials	2 3 4 5 6 7 8 9 10 11 12	2000 1350 1000 800 650 550 500 450 400 350 300	
		Herbaceous Species including vegetable plants [5] (three or more plants per pot)	Use the above woody perennial rates		
	Ornamental and vegetable plants [5] grown in flats, benches, or beds		1.7 fl oz (50 mL) per 3000 square feet		Mix required amount in sufficient water to uniformly cover the area being treated. Do not use less than 2 gallons of mixture per 1000 sq. ft. Apply as a broadcast treatment and incorporate into the medium before planting or apply after plants are established. If application is made to established plants, optimum control will be attained if areas are lightly irrigated after application. Allow no leaching or runout for 10 days after application

1 **Fungus gnat larvae** in the soil will be controlled by drench or incorporation. **No adult Fungus Gnat control.** Other foliar insect control is achieved by the uptake of **MARATHON II Insecticide** from a healthy root system translocating the active ingredient up into the plant.

2 **Root Mealybug** control will require a thorough drenching of containerized media. Coverage is essential for control while minimizing the amount of leachate. Rate: 1.7 fl oz (50 mL) in 150 gallons of water.

3 **Citrus Root Weevil:** For use on non-bearing citrus nursery stock.

4 **Thrips** suppression on foliage only. Thrips in buds and flowers will not be suppressed.

5 **Note:** For use on vegetable plants intended for resale only including: Broccoli, Chinese Broccoli, Broccoli Raab, Brussels Sprouts, Cabbage, Chinese Cabbage, Cauliflower, Collards, Eggplant, Ground Cherry, Kale, Kohlrabi, Lettuce, Mustard Greens, Pepinos, Peppers, Potatoes, Rape Greens, Sorghum, Sugarbeets, Tomatillo, and Tomato.

Appendix 3A

RECOMMENDED DRENCH AND IRRIGATION APPLICATIONS
For use only on greenhouse and, nursery ornamentals, vegetable plants, and interiorscape plants using soil drenches, micro -irrigation, drip irrigation, overhead irrigation, ebb and flood irrigation, or hand-held or motorized calibrated irrigation equipment.

APPLICATION INSTRUCTIONS: Use 1.7 fl oz (50 mL) of product in an appropriate amount of water to avoid leaching to treat the number of pots based on pot size in the table below.

Pest	Use Pattern	Dosage - MARATHON II		Remarks
Adelgids Aphids Fungus Gnats Larvae [1] Japanese Beetle (adult) Lacebugs Leaf beetles (including elm and viburnum leaf beetles) Leafhoppers (including glassy winged sharpshooter) Leafminers Mealybugs Psyllids Root Mealybugs [2] Root Weevil Complex (such as: Apopka Weevil, Black Vine Weevil, Citrus Root Weevil [3]) Soft Scale Thrips (suppression) [4] Whiteflies **White Grub larvae** (such as: Japanese Beetle, Masked Chafers, European Chafer, Oriental Beetle, Asiatic Garden Beetle)	Containerized plants	Container Size 1 gallon 2 gallon 3 gallon 5 gallon 7 gallon 10 gallon 15 gallon 20 gallon	No. pots treated with 1.7 fl oz (50 mL) 340 to 244 280 to 210 220 to 165 160 to 110 100 to 75 60 to 45 40 to 30 20 to 15	Apply in sufficient water to wet the potting medium. For optimum control, make applications prior to egg hatch of the target pest. Irrigate moderately after application to move the active ingredient into the root zone.
White Grub larvae (such as: Japanese Beetle, Masked Chafers, European Chafer, Oriental Beetle, Asiatic Garden Beetle)	Field and Forest Nurseries	Apply as a uniform band on either side of the row using a band width six (6) inches wider than the actual root ball diameter to be dug. Do not allow bands in adjacent rows to overlap. Use 1.7 fl oz (50 mL) per 1000 ft of row or 3,000 sq. ft. For grub control in areas of turf, apply as a broadcast application using 1.35 to 1.7 fl oz (40 to 50 mL) per 3000 sq. ft.		Vegetation in the area to be treated should be mowed to a height of 3 inches or less prior to application. Mowing to the lowest possible height will insure greater consistency of control. Apply May through July. For optimum control, treatment should be followed by rainfall or irrigation. Do not use less than 2 gallons of spray volume per 1000 square feet.

1 **Fungus gnat larvae** in the soil will be controlled by drench or incorporation. **No adult Fungus Gnat control**. Other foliar insect control is achieved by the uptake of **MARATHON II Insecticide** from a healthy root system translocating the active ingredient up into the plant.

2 **Root Mealybug** control will require a thorough drenching of containerized media. Coverage is essential for control while minimizing the amount of leachate. Rate: 1.7 fl oz (50 mL) in 150 gallons of water.

3 **Citrus Root Weevil**: For use on non-bearing citrus nursery stock.

4 **Thrips** suppression on foliage only. Thrips in buds and flowers will not be suppressed.

RESTRICTIONS

Do not graze treated areas or use clippings for treated areas for feed or forage. Avoid runoff or puddling of irrigation water following application.

Do not apply **MARATHON II Insecticide** to soils which are water logged or saturated, which will not allow penetration into the root zone of the plants.

Do not allow leachate run out for the first 10 days after application, in order to retain the product and facilitate full plant uptake of the active ingredient.

For outdoor ornamentals grown in beds or turf, applications of **MARATHON II Insecticide** cannot exceed a total of 1.6 pt (0.4 lb of active ingredient) per acre per year.

Food Crops: Treated areas may be replanted with any crop specified on an imidacloprid label, or with any crop for which a tolerance exists for the active ingredient.

For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12 month plant-back interval should be observed.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage: Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of the reach of children, preferably in a locked storage area.

Handle and open container in a manner as to prevent spillage. If the container is leaking, invert to prevent leakage. If container is leaking or material spilled for any reason or cause, carefully dam up spilled material to prevent runoff. Refer to Precautionary Statement on label for hazards associated with the handling of this material. Do not walk through spilled material. Absorb spilled material with absorbing type compounds and dispose of as directed for pesticides below. In spill or leak incidents, keep unauthorized people away. The OHP, Inc. Emergency Response Telephone number is 800-356-4647, or contact Chemtrec at 800-424-9300.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of the smoke.

IMPORTANT: READ BEFORE USE

Read the entire Directions for Use, Conditions, Disclaimer of Warranties and Limitations of liability before using this product.

If terms are not acceptable, return the unopened product container at once. By using this product, user or buyer accepts the following conditions, disclaimer of warranties and limitations of liability.

CONDITIONS: The directions for use of this product are believed to be adequate and should be followed carefully. However, because of manner of use and other factors beyond OHP, Inc.'s control it is impossible for OHP, Inc. to eliminate all risks associated with the use of this product. As a result, crop injury or ineffectiveness is always possible. All such risks shall be assumed by the user of buyer.

DISCLAIMER OF WARRANTIES: OHP, INC. MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, THAT EXTEND BEYOND THE STATEMENTS MADE ON THIS LABEL. No agent of OHP, Inc. is authorized to make any warranties beyond those contained herein or to modify the warranties contained herein. OHP, Inc. disclaims any liability whatsoever for special, incidental or consequential damages, resulting from the use or handling of this product.

LIMITATIONS OF LIABILITY: THE EXCLUSIVE REMEDY OF THE USER OR BUYER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, WHETHER IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, SHALL NOT EXCEED THE PURCHASE PRICE PAID, OR AT OHP, INC.'S ELECTION, THE REPLACEMENT OF PRODUCT.

This Product is specially formulated and sold under license from Bayer only for the uses set forth on this label. The active ingredient of this product, formulations containing this active ingredient, and/or methods of making or using this active ingredient or its formulations may be the subject of one or more Bayer patents, including but not limited to U.S. Patent No. 4,742, 060. The purchase and/or use of this product constitutes acceptance of a limited license to use this product only in strict accordance with the instructions set forth on this label. Any use of this product other than as expressly set forth on this label is prohibited and is not licensed through the purchase and/or use of this product and may result in the infringement of one or more Bayer patents and/or other intellectual property rights.

Marathon is a registered trademark of OHP, Inc.

Manufactured for:
OHP, Inc.
P. O. Box 230
Mainland, PA 19451
(800) 356-4647

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OHP985250

Partners with solutions

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SAFETY DATA SHEET

Revision Date: 03/07/2014
Print Date: 05/04/2015

MARATHON® II GREENHOUSE AND NURSERY INSECTICIDE

EPA Registration Number: 432-1369-59807

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product identifier

Trade name. . . . . : MARATHON® II GREENHOUSE AND NURSERY INSECTICIDE

EPA Registration No.. . . . . : 432-1369-59807

Relevant identified uses of the substance or mixture and uses advised against

Use . . . . : Insecticide

Restrictions on use . . . . . . : See product label for restrictions.

Company Information . . . . : OHP, Inc.
PO Box 51230
Mainland, PA 19451
(800) 659-6745

TRANSPORTATION EMERGENCY (24 hours a day) call . . . . . : Chemtrec: 1-800-424-9300

MEDICAL EMERGENCY (24 hours a day) and Product Information call . . . . : 1-800-356-4647

SDS Information or Request. . . . . : ohp.com

2. HAZARDS IDENTIFICATION

Classification in accordance with regulation HCS 29CFR §1910.1200

Eye irritation. . . . . : Category 2B

Signal word . . . . : Warning

Hazard statements. . . . . . . : Causes eye irritation.

Precautionary statements

Wash thoroughly after handling.

IF IN EYES . . . . : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If eye irritation persists . . . : Get medical advice/ attention.

Other hazards . . . . : No other hazards known.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Component Name	CAS-No.	Average % by weight
Imidacloprid	138261-41-3	21.40
Glycerine	56-81-5	10.00

4. FIRST AID MEASURES

Description of first aid measures

General advice. . . . . : When possible, have the product container or label with you when calling a poison control center or doctor or going for treatment.

Inhalation . . . . : Move to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a physician or poison control center immediately.

Skin contact . . . . : Take off contaminated clothing and shoes immediately. Wash off immediately with plenty of water for at least 15 minutes. Call a physician or poison control center immediately.

Eye contact. . . . . : Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a physician or poison control center immediately.

Ingestion. . . . . : Call a physician or poison control center immediately. Rinse out mouth and give water in small sips to drink. DO NOT induce vomiting unless directed to do so by a physician or poison control center. Never give anything by mouth to an unconscious person. Do not leave victim unattended.

Most important symptoms and effects, both acute and delayed

Symptoms . . . . : To date no symptoms are known.

Indication of any immediate medical attention and special treatment needed

Treatment. . . . . : Appropriate supportive and symptomatic treatment as indicated by the patient's condition is recommended. There is no specific antidote.

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SAFETY DATA SHEET

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MARATHON® II GREENHOUSE AND NURSERY INSECTICIDE

EPA Registration Number: 432-1369-59807

5. FIREFIGHTING MEASURES

Extinguishing media

Suitable . . . . : Water spray, Foam, Carbon dioxide (CO_2), Dry chemical

Unsuitable . . . . : None known.

Advice for firefighters

Special protective equipment for fire-fighters . . . . : Firefighters should wear NIOSH approved self-contained breathing apparatus and full protective clothing.

Further information . . . . . . : Keep out of smoke. Fight fire from upwind position. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses.

Flash point . . . . : > 93 °C

Autoignition temperature . : no data available

Lower explosion limit . . . . : no data available

Upper explosion limit . . . . : no data available

Explosivity . . . . : not applicable

Dust explosion class . . . . . : Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Precautions . . . . : Keep unauthorized people away. Isolate hazard area. Avoid contact with spilled product or contaminated surfaces.

Methods and materials for containment and cleaning up

Methods for cleaning up . . : Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Collect and transfer the product into a properly labelled and tightly closed container. Clean contaminated floors and objects thoroughly, observing environmental regulations.

Additional advice . . . . : Use personal protective equipment. Do not allow to enter soil, waterways or waste water canal.

Reference to other sections . . . . : Information regarding safe handling, see section 7.
Information regarding personal protective equipment, see section 8.
Information regarding waste disposal, see section 13.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling . . : Handle and open container in a manner as to prevent spillage. Maintain exposure levels below the exposure limit through the use of general and local exhaust ventilation.

Hygiene measures . . . . : Wash hands thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, using the toilet or applying cosmetics.

Remove Personal Protective Equipment (PPE) immediately after handling this product. Before removing gloves clean them with soap and water. Remove soiled clothing immediately and clean thoroughly before using again. Wash thoroughly and put on clean clothing.

Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers . . . . : Store in a cool, dry place and in such a manner as to prevent cross contamination with other crop protection products, fertilizers, food, and feed. Store in original container and out of the reach of children, preferably in a locked storage area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Components	CAS-No.	Control parameters	Update	Basis
Imidacloprid	138261-41-3	0.7 mg/m3 (TWA)		OES BCS*
Imidacloprid	138261-41-3	5ug/m3 (AN ESL)	07 2011	TX ESL
Imidacloprid	138261-41-3	50ug/m3 (ST ESL)	07 2011	TX ESL
Glycerine (Total dust.)	56-81-5	15 mg/m3 (PEL)	02 2006	OSHA Z1
Glycerine (Respirable fraction.)	56-81-5	5 mg/m3 (PEL)	02 2006	OSHA Z1
Glycerine (Respirable fraction.)	56-81-5	5 mg/m3 (TWA)	1989	OSHA Z1A

EXPOSURE CONTROLS / PERSONAL PROTECTION continued next page

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Control parameters *continued*

Components	CAS-No.	Control parameters	Update	Basis
Glycerine (Total dust.)	56-81-5	10 mg/m3 (TWA)	1989	OSHA Z1A
Glycerine (Total dust and mist.)	56-81-5	10 mg/m3 (TWA)	06 2008	TN OEL
Glycerine (Respirable fraction and dust or fume.)	56-81-5	5 mg/m3 (TWA)	06 2008	TN OEL
Glycerine (Particulate.)	56-81-5	50ug/m3 (ST ESL)	02 2013	TX ESL
Glycerine (Particulate.)	56-81-5	5ug/m3 (AN ESL)	02 2013	TX ESL
Glycerine (Vapor.)	56-81-5	100ug/m3 (AN ESL)	02 2013	TX ESL
Glycerine (Vapor.)	56-81-5	1000ug/m3 (ST ESL)	02 2013	TX ESL

*OES BCS: Internal Bayer CropScience "Occupational Exposure Standard"

Exposure controls

Personal protective equipment
In normal use and handling conditions please refer to the label and/or leaflet. In all other cases the following recommendations would apply.

Respiratory protection . . . : When respirators are required, select NIOSH approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industry recommendations.

Hand protection . . . . : Chemical resistant nitrile rubber gloves

Eye protection . . . . : Tightly fitting safety goggles

Skin and body protection . : Wear long-sleeved shirt and long pants and shoes plus socks.

General protective measures . . . . : Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and warm/ tepid water.

Keep and wash PPE separately from other laundry.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance . . . . : white to light beige
Physical State . . . . : liquid suspension
Odor . . . . : mild
Odour Threshold . . . . : no data available
pH . . . . : 7.5
Vapor Pressure . . . . : no data available
Vapor Density (Air = 1) . . . . : no data available
Density . . . . : 1.12 g/cm³ at 20 °C
Evapouration rate . . . . : no data available
Boiling Point . . . . : no data available
Melting / Freezing Point . . . : -6.7 °C / 19.9 °F
Water solubility . . . . : dispersible
Minimum Ignition Energy . . : not applicable
Decomposition temperature . . . . : no data available
Partition coefficient: n-octanol/water . . . . : no data available
Viscosity . . . . : 350 - 600 mPa.s
Flash point . . . . : > 93 °C
Autoignition temperature . . : no data available
Lower explosion limit . . . . . : no data available
Upper explosion limit . . . . . : no data available
Explosivity . . . . : not applicable
Dust explosion class . . . . . . : Not applicable.

10. STABILITY AND REACTIVITY

Reactivity

Thermal decomposition . . : no data available

Chemical stability . . . . : Stable under recommended storage conditions.

Possibility of hazardous reactions . . . . : No dangerous reaction known under conditions of normal use.

Conditions to avoid . . . . . . : freezing

Incompatible materials . . . : no data available

Hazardous decomposition products . . . . : No decomposition products expected under normal conditions of use.

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11. TOXICOLOGICAL INFORMATION

Exposure routes . . . . : Ingestion, Skin Absorption, Eye contact, Inhalation

Immediate Effects

Eye . . . . : May cause mild irritation to eyes.

Skin . . . . : May cause slight irritation. Harmful if absorbed through skin.

Ingestion . . . . : Harmful if swallowed.

Information on toxicological effects

Acute oral toxicity . . . . : LD50 (male rat) > 4,870 mg/kg
LD50 (female rat) 4,143 mg/kg

Acute inhalation toxicity . . : LC50 (male/female combined rat) > 5.33 mg/l
Exposure time: 4 h
Determined in the form of liquid aerosol.
(actual)

LC50 (male/female combined rat) > 20 mg/l
Exposure time: 1 h

Determined in the form of liquid aerosol.
Extrapolated from the 4 hr LC50.
(actual)

Acute dermal toxicity . . . . : LD50 (male/female combined rabbit) > 2,000 mg/kg

Skin irritation . . . . : No skin irritation (rabbit)

Eye irritation . . . . : Minimally irritating. (rabbit)

Sensitisation . . . . : Non-sensitizing. (guinea pig)

Assessment repeated dose toxicity
Imidacloprid did not cause specific target organ toxicity in experimental animal studies.

Assessment Mutagenicity
Imidacloprid was not mutagenic or genotoxic based on the overall weight of evidence in a battery of in vitro and in vivo tests.

Assessment Carcinogenicity
Imidacloprid was not carcinogenic in lifetime feeding studies in rats and mice.

ACGIH . . . . : None.

NTP . . . . : None.

IARC . . . . : None.

OSHA . . . . : None.

Assessment toxicity to reproduction
Imidacloprid caused reproduction toxicity in a two-generation study in rats only at dose levels also toxic to the parent animals. The reproduction toxicity seen with Imidacloprid is related to parental toxicity.

Assessment developmental toxicity
Imidacloprid caused developmental toxicity only at dose levels toxic to the dams. The developmental effects seen with Imidacloprid are related to maternal toxicity.

Further information

Only acute toxicity studies have been performed on the formulated product.

The non-acute information pertains to the active ingredient(s).

12. ECOLOGICAL INFORMATION

Toxicity to fish . . . . : LC50 (Rainbow trout (Oncorhynchus mykiss)) 211 mg/l
Exposure time: 96 h
The value mentioned relates to the active ingredient imidacloprid.

Toxicity to aquatic invertebrates . . . . : EC50 (Water flea (Daphnia magna)) 85 mg/l
Exposure time: 48 h
The value mentioned relates to the active ingredient imidacloprid.

LC50 (Chironomus riparius (non-biting midge)) 0.0552 mg/l
Exposure time: 24 h
The value mentioned relates to the active ingredient imidacloprid.

ECOLOGICAL INFORMATION *continued next page*

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ECOLOGICAL INFORMATION continued

Toxicity to aquatic plants EC50 (Desmodesmus subspicatus) > 10 mg/l Growth rate; Exposure time: 72 h
The value mentioned relates to the active ingredient imidacloprid.

Biodegradability ....: Imidacloprid: not rapidly biodegradable

Koc ....: Imidacloprid: Koc: 225

Bioaccumulation ....: Imidacloprid: Does not bioaccumulate.

Mobility in soil ....: Imidacloprid: Moderately mobile in soils

Environmental precautions ....: Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark.

Do not contaminate surface or ground water by cleaning equipment or disposal of wastes, including equipment wash water.

Apply this product as specified on the label.

Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Product ....: Do not contaminate water, food, or feed by disposal.

Dispose in accordance with all local, state/provincial and federal regulations.

Contaminated packaging .: Do not re-use empty containers.

Triple rinse containers.

Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill or incineration, or if allowed by State and Local authorities, by burning.

If burned, stay out of smoke.

RCRA Information ....: Characterization and proper disposal of this material as a special or hazardous waste is dependent upon Federal, State and local laws and are the user's responsibility. RCRA classification may apply.

14. TRANSPORT INFORMATION

49CFR ....: Not dangerous goods / not hazardous material

IMDG

UN number ....: 3082

Class ....: 9

Packaging group ....: III

Marine pollutant ....: YES

Proper shipping name....: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (IMIDACLOPRID SOLUTION)

IATA

UN number ....: 3082

Class ....: 9

Packaging group ....: III

Environm. Hazardous Mark: YES

Proper shipping name....: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (IMIDACLOPRID SOLUTION)

This transportation information is not intended to convey all specific regulatory information relating to this product. It does not address regulatory variations due to package size or special transportation requirements.

Freight Classification ....: INSECTICIDES OR FUNGICIDES, N.O.I., OTHER THAN POISON

15. REGULATORY INFORMATION

EPA Registration No. .....: 432-1369-59807

US Federal Regulations

TSCA list

Glycerine 56-81-5

US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)....: None.

SARA Title III - Section 302 - Notification and Information ....: None.

SARA Title III - Section 313 - Toxic Chemical Release Reporting ....: None.

US States Regulatory Reporting

CA Prop65

This product does not contain any substances known to the State of California to cause cancer.

REGULATORY INFORMATION continued next page

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MARATHON® II GREENHOUSE AND NURSERY INSECTICIDE

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REGULATORY INFORMATION continued

This product does not contain any substances known to the State of California to cause reproductive harm.

US State Right-To-Know Ingredients

Glycerine	56-81-5	MN

Canadian Regulations

Canadian Domestic Substance List

Glycerine	56-81-5

Environmental

CERCLA . . . .: None.

Clean Water Section 307 Priority Pollutants . . . .: None.

Safe Drinking Water Act Maximum Contaminant Levels. . . . .: None.

International Regulations

European Inventory of Existing Commercial Substances (EINECS)

Glycerine	56-81-5

EPA/FIFRA Information:
This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information required on the pesticide label:

Signal word . . . .: Caution!

Hazard statements. . . . . . .: Hazard to humans and domestic animals.

Keep out of reach of children and animals.

Harmful if swallowed or absorbed through skin.

Avoid contact with skin, eyes and clothing.

Avoid breathing spray mist.

16. OTHER INFORMATION

NFPA 704 (National Fire Protection Association):

Health - 1 Flammability - 1 Instability - 1 Others - none

HMIS (Hazardous Materials Identification System, based on the Third Edition Ratings Guide)

Health - 1 Flammability - 1 Physical Hazard - 1 PPE -

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard

Reason for Revision . . . . . .: Revised according to the current OSHA Hazard Communication Standard (29CFR1910.1200)

Revision Date. . . . .: 03/07/2014

This information is provided in good faith but without express or implied warranty. The customer assumes all responsibility for safety and use not in accordance with label instructions.

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OHP985250 05/2015

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: Causes moderate eye irritation. Harmful if swallowed, inhaled, or absorbed through skin. Avoid contact with skin, eyes or clothing. Avoid breathing spray mist. Wear long sleeved shirt, long pants, shoes plus socks and chemical resistant gloves made of any waterproof material when mixing or handling concentrate. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

ENVIRONMENTAL HAZARDS

Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

FIRST AID

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a Poison Control Center or doctor for treatment advice.

IF ON SKIN: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a Poison Control Center or doctor for treatment advice.

IF SWALLOWED: Call a Poison Control Center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a Poison Control Center or doctor. Do not give anything to an unconscious person.

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance then give artificial respiration, preferably mouth-to-mouth if possible. Call a Poison Control Center or doctor for further treatment advice.

Have the product container or label with you when calling a Poison Control Center or doctor or going for treatment.

CONDITIONS OF SALE AND WARRANTY

Creative Marketing & Research, Inc. warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated when used in accordance with the use directions under normal conditions. Creative Marketing & Research, Inc. neither makes, nor authorizes any agent or representative to make, any other warranties, express or implied, including fitness or merchantability.

The directions for use of this product are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as timing and method of application, weather and crop conditions, presence of other materials, or other influencing factors, all of which are beyond the control of Creative Marketing & Research, Inc. and Seller. Buyer and user acknowledge and assume all risks and liability resulting from the handling, storage and use of this material not in strict accordance with directions given herewith. In no case shall Creative Marketing & Research, Inc. or the Seller be liable for consequential, special, indirect, or incidental damages or losses resulting from the handling or use of this product. The foregoing is a condition of sale by Creative Marketing & Research, Inc. and is accepted as such by the Buyer.

NO FOAM B

SPREADER • ACTIVATOR • BUFFER

COMBINED ANIONIC-NONIONIC SURFACTANT BLEND FOR TERRESTRIAL / AQUATIC USE SITES

PRINCIPAL FUNCTIONING AGENTS:	
Octyl phenoxy polyethoxy ethanol, Linear alykyl sulfonates, Ethanolamine	25%
CONSTITUENTS INEFFECTIVE AS SPRAY ADJUVANT:	75%
TOTAL:	100%

CA Reg. No. 1050775-50008-AA

KEEP OUT OF REACH OF CHILDREN

CAUTION

See side panel for additional Precautionary Statements

NET CONTENTS: 5 GALLONS / 18.9 LITERS

Manufactured by

CREATIVE MARKETING & RESEARCH, INC.
P.O. Box 35000 • Fresno, CA 93745-5000
(559) 499-2100

DIRECTIONS FOR USE

NO FOAM B is designed to increase the efficiency of acaracides, defoliants, desiccants, fungicides, herbicides and insecticides, especially organophosphate pesticides. It assures quick wetting and uniform coverage of spray applications. NO FOAM B may be used on agricultural, forestry, turf and ornamental, industrial, structural and non-cropland sites. It should also be used to buffer highly alkaline water.

NO FOAM B is formulated from materials which do not tend to burn foliage or leave harmful residues. There will be no excessive foaming when high pressures are used.

Read and follow the precautions, restrictions and recommendations on the labels of pesticides used with NO FOAM B. Use according to the most restrictive label directions for each product in any tank mix.

COMPATIBILITY: NO FOAM B is compatible with most pesticides. However, if the desired combination has not been previously used, a compatibility test is recommended.

MIXING: Shake well before using. Fill spray tank ½ full of water and begin agitation. Add the recommended amount of NO FOAM B. Add pesticides as directed by label or in the following sequence and continue filling tank: (1) Dry flowables or water dispersing granules, (2) Wettable powders, (3) Flowables, (4) Solutions, (5) Emulsifiable concentrates. Continue agitation until spray solution is completely mixed. Continuous agitation of finished spray is recommended. If spray solution has been allowed to stand, thoroughly agitate and remix before application.

RECOMMENDATIONS: Proper quantity to use will vary with the type of equipment, water volume per acre, temperature, type of foliage to be wet, and the pesticide formulation. Also, higher rates than those below may be used if recommended by pesticide labeling. Follow pesticide label directions. However, do not add this product at a rate which exceeds 5% of the finished spray volume.

AIR or GROUND: Use ½-3 pints per 100 gallons of finished spray solution. For improved efficacy, use at least ½ pint per acre when finished spray volume is less than 20 gallons per acre. For backpack or hand held sprayers, use 1 fl. oz. per gallon of finished spray solution.

STORAGE AND DISPOSAL

DO NOT CONTAMINATE WATER, FOOD OR FEED BY STORAGE OR DISPOSAL

STORAGE: Store in original container away from children, animals, foods, feeds and seeds. Handle in accordance with Precautionary Statements. In the event of spillage or leakage, soak up the material with absorbent clay, sand, sawdust or other absorbent material. Scrape up and dispose in accordance with Product Disposal. **PRODUCT DISPOSAL:** Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility. **CONTAINER DISPOSAL:** Triple rinse (or equivalent) during mixing and loading. Recycling decontaminated containers is the best option of container disposal. The Agricultural Container Recycling Council (ACRC) operates the national recycling program. To contact your state or local ACRC recycler, visit the ACRC web page at www.acrecycle.org. Decontaminated containers may also be disposed of in a sanitary landfill.

0381/0504(07)

Appendix 3A

MATERIAL SAFETY DATA SHEET

SECTION 1.	PRODUCT AND COMPANY IDENTIFICATION

Chemical Product
NO FOAM® B

CA Reg. No.:	1050775-50008
Common Name:	Surfactant (Adjuvant).
Chemical Description:	Liquid mixture of anionic and nonionic surfactants.
TSCA/CAS No.:	This product is a mixture — there is no specific CAS number.

Manufactured By
Creative Marketing & Research
P. O. Box 35000
Fresno, CA 93745-5000

Emergency Phone Numbers
Emergency Telephone: DAYS: (559) 499-2100 EVES.: (559) 431-7390
CHEMTREC (24-Hour Emergency Number): (800) 424-9300
EPA National Response Center: (800) 424-8802

SECTION 2.	HAZARDOUS INGREDIENTS

CHEMICAL	CAS NO.	%	TLV OR PEL	RQ (lbs)
POE Nonylphenol	26027-38-3	12.86	*N.A.	*N.P.
~~Dodecylbenzene sulfonate~~	~~27176-87-0~~	~~5.7~~	~~N.A.~~	1,000
Isopropyl alcohol	67-63-0	2.1	400 ppm (PEL)	N.P.
Sodium xylene sulfonate	1300-72-7	< 1.0	N.A.	N.P.

* N.A. - Not Available.
* N.P. - Not Pertinent.

SECTION 3.	EMERGENCY/HAZARDS OVERVIEW

Viscous, green liquid with slight rancid odor. Avoid contact with strong alkalies at high temperatures, acids, oxidizing agents, or materials reactive with hydroxyl compounds. Burning may result in formation of carbon oxides, sulfur dioxide and hydrogen sulfide. Contain any liquid runoff. Not D.O.T. regulated.

HEALTH: 1 REACTIVITY: 0 FLAMMABILITY: 0 ENVIRONMENT: 1

(0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme)

SECTION 4.	FIRST AID

Eyes:	Immediately flush eyes with plenty of water and get medical attention.
Skin:	Immediately wash skin with plenty of soap and water while removing contaminated clothing and shoes. If irritation persists, seek medical attention.
Ingestion:	Call a physician or Poison Control Center. Drink 1 or 2 glasses of water. If so advised by a physician or Poison Control Center, induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person.
Inhalation:	Remove victim to fresh air.

SECTION 5. FIRE AND EXPLOSION HAZARDS

Flash Point:	204°F.
Test Method:	ASTM-D93
LEL Flammable Limits:	Not pertinent.
UEL Flammable Limits:	Not pertinent.
Autoignition Temperature:	Not pertinent.
Flammability Classification:	Non-flammable.
Known Hazardous Products of Combustion:	None.
Properties that Initiate/Contribute to Intensity of Fire:	None.
Potential For Dust Explosion:	None.
Reactions that Release Flammable Gases or Vapors:	Not known.
Potential For Release of Flammable Vapors:	None.
Unusual Fire & Explosion Hazards:	Burning may result in formation of carbon oxides.
Extinguishing Media:	Foam, CO_2, dry chemical, water.
Special Firefighting Procedures:	Wear positive pressure, self-contained breathing apparatus and goggles. Avoid smoke inhalation. Contain any liquid runoff.

SECTION 6. SPILLS AND LEAKS

Containment: Prevent product spillage from entering drinking water supplies or streams.

Clean Up: Collect liquid or absorb onto absorbent material and package for disposal.

Evacuation: Not necessary.

SECTION 7. STORAGE AND HANDLING

Storage: Store in plastic or stainless steel container in a cool, well-ventilated, dry place at temperatures above 40°F. Keep away from strong alkalies, acids and/or oxidizing agents. Do not store near food or feeds. Do not stack pallets more than two (2) high.

Transfer Equipment: Transfer product using chemical-resistant plastic or stainless steel tanks, pumps, valves, etc.

Work/Hygienic Practices: Harmful if swallowed. May cause irritation of eyes, nose, throat and skin. Avoid contact with eyes, skin and clothing. Avoid breathing spray mist. Wash thoroughly before reuse. Do not contaminate feed and foodstuffs.

Do not apply this product in such a manner as to directly or through drift expose workers or other persons. The area being treated must be vacated by unprotected persons.

SECTION 8. PERSONAL PROTECTIVE EQUIPMENT

Eyes: Chemical dust/splash goggles or full-face shield to prevent eye contact. As a general rule, do not wear contact lenses when handling.

Skin: Impervious gloves and clothes.

Respiratory: Not normally needed. If use generates an aerosol mist or respiratory irritation, use NIOSH-approved dust/mist respirator (such as 3M #8710).

Ventilation: Recommended but no TLV established.

SECTION 9. PHYSICAL AND CHEMICAL DATA

Appearance:	Viscous, green liquid.
Odor:	Slight rancid odor.
pH:	2.5
Vapor Pressure:	0.75 (psi)
Vapor Density (Air = 1):	> 1.0
Boiling Point:	88.9°C (192°F)
Freezing Point:	Not available.
Water Solubility:	Miscible.
Density:	8.76 lbs./gal.
Evaporation Rate:	Not available.
Viscosity:	Not available.
% Volatile:	Not available.
Octanol/Water Partition Coefficient:	Not available.
Saturated Vapor Concentration:	Not available.

SECTION 10. STABILITY AND REACTIVITY

Stability:	Stable.
Conditions To Avoid:	Avoid contact with strong alkalies at high temperatures, acids, oxidizing agents, or materials reactive with hydroxyl compounds.
Incompatibility:	Not available.
Hazardous Decomposition ~~Products:~~	~~Burning may result in formation of carbon oxides.~~
Hazardous Polymerization:	Will not occur.

SECTION 11. POTENTIAL HEALTH EFFECTS

Acute Effects:

Eyes:	Mild irritant. Vapors or mist may cause redness and burning.
Skin:	Mild irritant, especially from prolonged exposure. Causes redness, drying and cracking.
Ingestion:	LD_{50} (Rat) > 5000 kg/mg.
Inhalation:	None expected but aerosol mist may cause mild irritation of nasal mucous membranes.
Subchronic Effects:	None known.
Chronic Effects:	None known.

SECTION 12. ECOLOGICAL INFORMATION

Algal/Lemna Growth Inhibition:	Not known.
Toxicity to Fish and Invertebrates:	Not known.
Toxicity to Plants:	Not known.
Toxicity in Birds:	Not known.

SECTION 13. DISPOSAL

Do not contaminate lakes, streams, ponds, estuaries, oceans or other waters by discharge of waste effluents or equipment washwaters. Dispose of waste effluents in accordance with state and local waste disposal regulations. Also, chemical additions or other alterations of this product may invalidate any disposal information in this MSDS. Therefore, consult local waste regulators for proper disposal.

SECTION 14. TRANSPORTATION

D.O.T.:	Not D.O.T. Regulated.
Other Shipping Description:	Adhesives, Adjuvants, Spreaders or Stickers, Liquid. NMFC Item 4612, LTL Class 60

SECTION 15. REGULATORY INFORMATION

CERCLA: Dodecylbenzene sulfonate is listed as a priority pollutant under the Clean Water Act and, as such, falls under the CERCLA spill reporting requirements of 40 CFR 302.

SARA TITLE III, Section 313 Toxic Chemicals: Isopropyl alcohol (2.1%).

PROPOSITION 65 (CA): None.

SECTION 16. OTHER

All information appearing in this document was based on data provided by third party sources and was compiled to comply with the Federal Hazard Communication Standard and the California Hazardous Substances Information and Training Act. The information is believed to be accurate as of the preparation date, but is not warrant~~ed as being the final authority in the use of this product. This inform~~ation does not purport to be legal or medical advice.

Appendix B: Critical NO(A)ELs Selected for Human Risk Characterization

Appendix B-1: Critical NO(A)ELs Selected for Risk Characterization

Table 1: Critical NO(A)ELs Selected for Risk Characterization of Dinotefuran

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	-	-	USEPA, 2012d	The chemical has been designated Not of Concern (NOC) for this specific route of exposure. Please refer to the Chemical Summary for more details. According to USEPA 2012d Human Health Risk Assessment for Proposed Section 3 Uses On Tuberous and Corm Vegetables, no quantification is required. No systemic toxicity was seen in a 28-day inhalation toxicity study at doses that were in ≈ 10,000-fold excess of the highest anticipated human exposure. There are no developmental toxicity concerns.	NOC
Acute Child Inhalation	-	-	USEPA, 2012d	The chemical has been designated Not of Concern (NOC) for this specific route of exposure. Please refer to the Chemical Summary for more details. According to USEPA 2012d Human Health Risk Assessment for Proposed Section 3 Uses On Tuberous and Corm Vegetables, no quantification is required. No systemic toxicity was seen in a 28-day inhalation toxicity study at doses that were in ≈ 10,000-fold excess of the highest anticipated human exposure. There are no developmental toxicity concerns.	NOC
Acute Dermal	-	-	USEPA, 2012d	The chemical has been designated Not of Concern (NOC) for this specific route of exposure. Please refer to the Chemical Summary for a more details.	NOC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Oral	125	Developmental toxicity rabbit study; Effects observed include hypoactivity, prone position, panting, tremors, and erythema	USEPA, 2012d	Effects were only observed in dams and not in offspring. Therefore, this endpoint is identified as of potential toxicological concern (PTC)	PTC
Subchronic Adult Inhalation	-	-	USEPA, 2012d	The chemical has been designated Not of Concern (NOC) for this specific route of exposure.According to USEPA 2012d Human Health Risk Assessment for Proposed Section 3 Uses On Tuberous and Corm Vegetables, no quantification is required. No systemic toxicity was seen in a 28-day inhalation toxicity study at doses that were in ~ 10,000-fold excess of the highest anticipated human exposure. There are no developmental toxicity concerns.	NOC
Subchronic Child Inhalation	-	-	USEPA, 2012d	The chemical has been designated Not of Concern (NOC) for this specific route of exposure. According to USEPA 2012d Human Health Risk Assessment for Proposed Section 3 Uses On Tuberous and Corm Vegetables, no quantification is required. No systemic toxicity was seen in a 28-day inhalation toxicity study at doses that were in ≈ 10,000-fold excess of the highest anticipated human exposure. There are no developmental toxicity concerns.	NOC

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Dermal	-	-	USEPA, 2012d	The chemical has been designated Not of Concern (NOC) for this specific route of exposure. According to USEPA 2012d Human Health Risk Assessment for Proposed Section 3 USes on Tuberous and Corm Vegetables, no systemic toxicty was seen at the limit dose in a 28-day rat dermal toxicity study in which neurotoxicity was evaluated and there are no developmental toxicity concerns.	NOC
Subchronic Oral	99.7	Chronic toxicity and carcinogenicity rat study; Decreased body weight and nephrotoxicity	USEPA, 2012d	Consistent with USEPA's or DPR's methodology, a carcinogenic endpoint was used because no other endpoint data were available.	PTC
Chronic Adult Inhalation	-		USEPA, 2012d	The chemical has been designated Not of Concern (NOC) for this specific route of exposure. Please refer to the Chemical Summary for more details. According to USEPA 2012d Human Health Risk Assessment for Proposed Section 3 Uses On Tuberous and Corm Vegetables, no quantification is required. No systemic toxicity was seen in a 28-day inhalation toxicity study at doses that were in ~ 10,000-fold excess of the highest anticipated human exposure. There are no developmental toxicity concerns.	

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Child Inhalation	-		USEPA, 2012d	The chemical has been designated Not of Concern (NOC) for this specific route of exposure. Please refer to the Chemical Summary for more details. According to USEPA 2012d Human Health Risk Assessment for Proposed Section 3 Uses On Tuberous and Corm Vegetables, no quantification is required. No systemic toxicity was seen in a 28-day inhalation toxicity study at doses that were in ~ 10,000-fold excess of the highest anticipated human exposure. There are no developmental toxicity concerns.	
Chronic Dermal	2[1]	LOAEL of 20 mg/kg-day; Chronic oral toxicity dog study	USEPA, 2004b	Value listed is for an oral NO(A)EL. The chemical-specific dermal absorption factor was applied to the oral NO(A)EL during risk estimation to convert the NO(A)EL to a dermally absorbed dose. When only a LO(A)EL was available, a NO(A)EL was derived by the following equation: NO(A)EL = LO(A)EL/10 (USEPA, 2011e)	
Chronic Oral	99.7	Chronic toxicity and carcinogenicity rat study; Decreased body weight and nephrotoxicity	USEPA, 2012d	Consistent with USEPA's or CDPR's methodology, a carcinogenic endpoint was used because no other endpoint data were available.	

[1] Note that in the more recent USEPA (2012d) risk assessment for dinotefuran, dermal risk was not quantitatively evaluated as no dermal endpoints of concern were identified during reevalaution of dinotefuran toxicity. However, to yield a health protective estimate of chronic dermal risk, the chronic dermal point of departure selected in the USEPA (2004b) risk assessment was chosen to evaluate risk in this analysis.

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Table 2: Critical NO(A)ELs Selected for Risk Characterization of Dodecylbenzene Sulfonate

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Acute Child Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Acute Dermal	-	Dermal Toxicity study to rabbits, mice, and rats.	USEPA, 2013f	Dermal irritation is self-limiting to preclude dermal irritation, and no systemic toxicity was seen following repeated application of 200 mg/kg/day. Therefore, quantification of dermal risk is not required. No toxicological endpoints have been identified for dermal exposure and no toxicity was observed at the highest doses tested. Furthermore, alkylbenzene sulfonate did not exhibit systemic or developmental toxicity in several dermal toxicity studies.	NOC
Acute Oral	-	-	USEPA, 2013f	No adverse effects identified in single-dose animal studies at the highest doses tested.	NOC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Adult Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Subchronic Child Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Subchronic Dermal	-	Dermal Toxicity study to rabbits, mice, and rats.	USEPA, 2013f	Dermal irritation is self-limiting to preclude dermal irritation, and no systemic toxicity was seen following repeated application of 200 mg/kg/day. Therefore, quantification of dermal risk is not required. No toxicological endpoints have been identified for dermal exposure and no toxicity was observed at the highest doses tested. Furthermore, alkylbenzene sulfonate did not exhibit systemic or developmental toxicity in several dermal toxicity studies.	NOC
Subchronic Oral	40	6-month dietary rat study; Increased caecum weight and slight kidney damage	USEPA, 2013f	A chronic NO(A)EL was used as a surrogate for a subchronic NO(A)EL when no subchronic NO(A)EL was available.	PTC
Chronic Adult Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Child Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Chronic Dermal	-	Dermal Toxicity study to rabbits, mice, and rats.	USEPA, 2013f	Dermal irritation is self-limiting to preclude dermal irritation, and no systemic toxicity was seen following repeated application of 200 mg/kg/day. Therefore, quantification of dermal risk is not required. No toxicological endpoints have been identified for dermal exposure and no toxicity was observed at the highest doses tested. Furthermore, alkylbenzene sulfonate did not exhibit systemic or developmental toxicity in several dermal toxicity studies.	NOC
Chronic Oral	40	6-month dietary rat study; Increased caecum weight and slight kidney damage	USEPA, 2013f	-	PTC

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Table 3: Critical NO(A)ELs Selected for Risk Characterization of Ethanolamine

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	3.1	28-day rat inhalation study; Irritation in the larynx, trachea and lungs	USEPA, 2017a	-	PTC
Acute Child Inhalation	3.1	28-day rat inhalation study; Irritation in the larynx, trachea and lungs; Children have the same value as adults due to a FQPA safety factor of 1	USEPA, 2017a	-	PTC
Acute Dermal	25	Dermal developmental toxicity study in rabbits; Skin irritation, progressing from erythema to necrosis, scabbing and scar formation	USEPA, 2017a	-	PTC
Acute Oral	-	-	USEPA, 2017a	No adverse effects were observed at the highest oral dose tested in laboratory studies.	NOC
Subchronic Adult Inhalation	3.1	28-day rat inhalation study; Irritation in the larynx, trachea and lungs	USEPA, 2017a	-	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Child Inhalation	3.1	28-day rat inhalation study; Irritation in the larynx, trachea and lungs; Children have the same value as adults due to a FQPA safety factor of 1	USEPA, 2017a	-	PTC
Subchronic Dermal	25	Dermal developmental toxicity study in rabbits; Skin irritation, progressing from erythema to necrosis, scabbing and scar formation	USEPA, 2017a	-	PTC
Subchronic Oral	300	2-generation reproduction rat study; Decreased sperm head count in the cauda epididymidis, decreased absolute and relative weight of apeididymides, cauda epididymidis and prostate; fewer implantation sites, high post-implantation loss, smaller litters in F1 and F2	USEPA, 2017a	-	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Adult Inhalation	3.1	28-day rat inhalation study; Irritation in the larynx, trachea and lungs	USEPA, 2017a	-	PTC
Chronic Child Inhalation	3.1	28-day rat inhalation study; Irritation in the larynx, trachea and lungs; Children have the same value as adults due to a FQPA safety factor of 1	USEPA, 2017a	-	PTC
Chronic Dermal	25	Dermal developmental toxicity study in rabbits; Skin irritation, progressing from erythema to necrosis, scabbing and scar formation	USEPA, 2017a	-	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Oral	300	2-generation reproduction rat study; Decreased sperm head count in the cauda epididymidis, decreased absolute and relative weight of apeididymides, cauda epididymidis and prostate; fewer implantation sites, high post-implantation loss, smaller litters in F1 and F2	USEPA, 2017a	-	PTC

Table 4: Critical NO(A)ELs Selected for Risk Characterization of Glycerin

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	21.758	NOEC of 165 mg/m3; 13-week inhalation rat study; local irritants to the upper respiratory tract	UNEP, 2002b	A chronic NO(A)EL was used as a surrogate for an acute NO(A)EL when no acute NO(A)EL was available. HEC-adjusted adult inhalation NO(A)EL in mg/kg-day was derived by the following equation: ((X mg/m3 * 16 m3/day)/(80 kg)) * ((0.96 m3/kg-day)/(0.26 m3/kg-day))* (5 days/7 days) *(6 hours/24 hours).	PTC
Acute Child Inhalation	33.39	NOEC of 165 mg/m3; 13-week inhalation rat study; local irritants to the upper respiratory tract	UNEP, 2002b	A chronic NO(A)EL was used as a surrogate for an acute NO(A)EL when no acute NO(A)EL was available. HEC-adjusted child inhalation NO(A)EL in mg/kg-day was derived by the following equation: ((X mg/m3 * 10.1 m3/day)/(18.6 kg))*((0.96 m3/kg-day)/(0.46 m3/kg-day))* (5 days/7 days) *(6 hours/ 24 hours).	PTC
Acute Dermal	-	-	UNEP, 2002b	All reviewed sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity studies.	NOC
Acute Oral	10000	2-year rat study (20% in diet)	UNEP, 2002b	No systemic or local effects were observed in the parameters investigated.	PTC
Subchronic Adult Inhalation	21.758	NOEC of 165 mg/m3; 13-week inhalation rat study; local irritants to the upper respiratory tract	UNEP, 2002b	The acute adult inhalation NO(A)EL was used to assess subchronic risk for glycerin.	PTC
Subchronic Child Inhalation	33.39	NOEC of 165 mg/m3; 13-week inhalation rat study; local irritants to the upper respiratory tract	UNEP, 2002b	The acute child inhalation NO(A)EL was used to assess subchronic risk for glycerin.	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Dermal	-	-	UNEP, 2002b	All reviewed sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity studies.	NOC
Subchronic Oral	10000	2-year rat study (20% in diet)	UNEP, 2002b	No systemic or local effects were observed in the parameters investigated.	PTC
Chronic Adult Inhalation	21.758	NOEC of 165 mg/m3; 13-week inhalation rat study; local irritants to the upper respiratory tract	UNEP, 2002b	HEC-adjusted adult inhalation NO(A)EL in mg/kg-day was derived by the following equation: ((X mg/m3 * 16 m3/day)/(80 kg)) * ((0.96 m3/kg-day)/(0.26 m3/kg-day)) * (5 days/7 days) * (6 hours/24 hours).	PTC
Chronic Child Inhalation	33.39	NOEC of 165 mg/m3; 13-week inhalation rat study; local irritants to the upper respiratory tract	UNEP, 2002b	HEC-adjusted child inhalation NO(A)EL in mg/kg-day was derived by the following equation: ((X mg/m3 * 10.1 m3/day)/(18.6 kg))*((0.96 m3/kg-day)/(0.46 m3/kg-day))* (5 days/7 days) *(6 hours/ 24 hours).	PTC
Chronic Dermal	-	-	UNEP, 2002b	All reviewed sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity studies.	NOC
Chronic Oral	10000	2-year rat study (20% in diet)	UNEP, 2002b	No systemic or local effects were observed in the parameters investigated.	PTC

Table 5: Critical NO(A)ELs Selected for Risk Characterization of Imidacloprid

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	9	Acute oral gavage neurotoxicity mouse study	DPR, 2006b	In USEPA's and DPR's risk assessment, oral NO(A)ELs were used as a surrogate for inhalation NO(A)ELs. Value listed is the oral NO(A)EL referenced in the study and includes the inhalation absorption factor of 1. The inhalation absorption rate was assumed to be 100%.	PTC
Acute Child Inhalation	9	Acute oral gavage neurotoxicity mouse study	DPR, 2006b	In USEPA's and DPR's risk assessment, oral NO(A)ELs were used as a surrogate for inhalation NO(A)ELs. Value listed is the oral NO(A)EL referenced in the study and includes the inhalation absorption factor of 1. The inhalation absorption rate was assumed to be 100%.	PTC
Acute Dermal	9	Acute oral gavage neurotoxicity mouse study	DPR, 2006b	Value listed is the oral NO(A)EL referenced in the study and does not include the DAF. The DAF is presented in the chemical dermal absorption table and also incorporated as appropriate in subsequent exposure calculations.	PTC
Acute Oral	9	Acute oral gavage neurotoxicity mouse study	DPR, 2006b	-	PTC
Subchronic Adult Inhalation	0.9	Increase in liver weight, change in clinical chemistry parameters, and changes in liver function; 4 week subchronic inhalation study in rats	DPR, 2006b	-	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Child Inhalation	0.9	Increase in liver weight, change in clinical chemistry parameters, and changes in liver function; 4 week subchronic inhalation study in rats	DPR, 2006b	-	PTC
Subchronic Dermal	7.3	Morphologic changes in liver and thyroid and tremors; 4-week subchronic oral dog study	DPR, 2006b	Value listed is the oral NO(A)EL referenced in the study and does not include the DAF. The DAF is presented in the chemical dermal absorption table and also incorporated as appropriate in subsequent exposure calculations.	PTC
Subchronic Oral	7.3	Morphologic changes in liver and thyroid and tremors; 4-week subchronic oral dog study	DPR, 2006b	-	PTC
Chronic Adult Inhalation	0.09	Increase in liver weight, change in clinical chemistry parameters, and changes in liver function; 4 week subchronic inhalation study in rats	DPR, 2006b	The NO(A)EL selected for chronic inhalation is the subchronic inhalation NO(A)EL adjusted by an uncertainty factor of 10.	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Child Inhalation	0.09	Increase in liver weight, change in clinical chemistry parameters, and changes in liver function; 4 week subchronic inhalation study in rats	DPR, 2006b	The NO(A)EL selected for chronic inhalation is the subchronic inhalation NO(A)EL adjusted by an uncertainty factor of 10.	PTC
Chronic Dermal	5.7	Increased mineralized particles in thyroid; 2-year chronic oral rat study	USEPA, 2008n	Value listed is for an oral NO(A)EL. The chemical-specific dermal absorption factor was applied to the oral NO(A)EL during risk estimation to convert the NO(A)EL to a dermally absorbed dose. Consistent with USEPA's or DPR's methodology, a chronic endpoint was used because no other endpoint data were available.	PTC
Chronic Oral	5.7	Increased mineralized particles in thyroid; 2-year chronic oral rat study	USEPA, 2008n	-	PTC

Table 6: Critical NO(A)ELs Selected for Risk Characterization of Isopropyl Alcohol

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	226.9	NOEL of 500 ppm; 6-hour inhalation rat study; neurobehavioral effects in males	OEHHA, 2008a	Conversion for HEC-adjusted acute adult inhalation NO(A)EL done as follows: ((500 mL/m3 * 1 L/1000 mL * 16 m3/day * 1 mole/24.45 L * 60.1 g/ 1 mole* 1000 mg/1 g)/80 kg) * ((0.96 m3/kg-day)/(0.26 m3/kg-day)) * (6 hours/24 hours) = 226.90 mg/kg-day. Original sources Gill et al., 1995 and Gill and Hurley, 1995.	PTC
Acute Child Inhalation	348.2	NOEL of 500 ppm; 6-hour inhalation rat study; neurobehavioral effects in males	OEHHA, 2008a	Conversion for HEC-adjusted acute adult inhalation NO(A)EL done as follows: ((500 mL/m3 * 1 L/1000 mL * 10.1 m3/day * 1 mole/24.45 L * 60.1 g/ 1 mole* 1000 mg/1 g)/18.6 kg) * ((0.96 m3/kg-day)/(0.46 m3/kg-day)) * (6 hours/24 hours) = 348.2 mg/kg-day. Original sources Gill et al., 1995 and Gill and Hurley, 1995.	PTC
Acute Dermal	-	-	UNEP, 1997b	All reviewed sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity studies.	NOC
Acute Oral	240	6-18 gestation day, oral rabbit study; decreased mean body weights and decreased corrected maternal body weight change	USEPA, 1995b	A subchronic NOAEL was used in place of an acute NOAEL when an acute NOAEL was unavailable.	PTC

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Adult Inhalation	348.2	NOEL of 500 ppm; 6 hr/day, 5 days/week, 13 weeks rat and mice study; clinical signs including ataxia, narcosis, hypoactivity	USEPA, 1995b	Conversion for HEC-adjusted acute adult inhalation NO(A)EL done as follows: ((500 mL/m3 * 1 L/1000 mL * 10.1 m3/day * 1 mole/24.45 L * 60.1 g/ 1 mole* 1000 mg/1 g)/18.6 kg) * ((0.96 m3/kg-day)/(0.46 m3/kg-day)) * (6 hours/24 hours) = 348.2 mg/kg-day. Original sources Gill et al., 1995 and Gill and Hurley, 1995.	PTC
Subchronic Child Inhalation	226.9	NOEL of 500 ppm; 6 hr/day, 5 days/week, 13 weeks rat and mice study; clinical signs including ataxia, narcosis, hypoactivity	USEPA, 1995b	Conversion for HEC-adjusted subchronic adult inhalation NO(A)EL done as follows: ((500 mL/m3 * 1 L/1000 mL * 16 m3/day * 1 mole/24.45 L * 60.1 g/ 1 mole* 1000 mg/1 g)/80 kg) * ((0.96 m3/kg-day)/(0.26 m3/kg-day)) * (6 hours/24 hours) = 226.90 mg/kg-day. Original source: Burleigh-Flayer et al. 1991, 1994	PTC
Subchronic Dermal	-	-	UNEP, 1997b	All reviewed sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity studies.	NOC
Subchronic Oral	240	6-18 gestation day, oral rabbit study; decreased mean body weights and decreased corrected maternal body weight change	OEHHA, 2000a	-	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Adult Inhalation	226.9	NOEL of 500 ppm; 6 hours/day, 5 days/week inhalation for 78 weeks (mice) or 104 weeks (rats); impairment of kidney function and exacerbation of spontaneous chronic renal disease.	OEHHA, 2000a	Chronic inhalation NO(A)ELs used to develop REL by OEHHA. Conversion for HEC-adjusted acute adult inhalation NO(A)EL done as follows: ((500 mL/m3 * 1 L/1000 mL * 16 m3/day * 1 mole/24.45 L * 60.1 g/ 1 mole* 1000 mg/1 g)/80 kg) * ((0.96 m3/kg-day)/(0.26 m3/kg-day)) * (6 hours/24 hours) = 226.90 mg/kg-day. Original source is Burleigh-Flayer, 1997.	PTC
Chronic Child Inhalation	348.2	NOEL of 500 ppm; 6 hours/day, 5 days/week inhalation for 78 weeks (mice) or 104 weeks (rats); impairment of kidney function and exacerbation of spontaneous chronic renal disease.	OEHHA, 2000a	Chronic inhalation NO(A)ELs used to develop REL by OEHHA. Conversion for HEC-adjusted acute adult inhalation NO(A)EL done as follows: ((500 mL/m3 * 1 L/1000 mL * 16 m3/day * 1 mole/24.45 L * 60.1 g/ 1 mole* 1000 mg/1 g)/80 kg) * ((0.96 m3/kg-day)/(0.26 m3/kg-day)) * (6 hours/24 hours) = 226.90 mg/kg-day.	PTC
Chronic Dermal	-	-	UNEP, 1997b	All reviewed sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity studies.	NOC
Chronic Oral	24	6-18 gestation day, oral rabbit study; Decreased mean body weights and decreased corrected maternal body weight change	OEHHA, 2000a	A subchronic NO(A)EL was used as a surrogate for a chronic NO(A)EL when no chronic NO(A)EL was available. Chronic NO(A)EL = Subchronic NO(A)EL/10 (USEPA, 2011e).	PTC

Table 7: Critical NO(A)ELs Selected for Risk Characterization of POE Nonylphenol

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	-	-	-	The following sources were checked: USEPA, DPR, ATSDR, OEHHA, HSDB. No quantitative toxicity data (i.e. NOAEL, LOAEL, LD50, and LC50) were available.	NDA
Acute Child Inhalation	-	-	-	The following sources were checked: USEPA, DPR, ATSDR, OEHHA, HSDB. No quantitative toxicity data (i.e. NOAEL, LOAEL, LD50, and LC50) were available.	NDA
Acute Dermal	-	Gestation day 6-15, dermal rat teratogenicity study; When given epicutaneously nonoxynol-9 had no dose related effect on skeletal and soft tissues. No LOAEL established; highest dose tested was 500 mg/kg-day	Meyer et al., 1988	Sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity study.	NOC
Acute Oral	50	Gestation day 6-15, oral rat teratogenicity study with nonoxynol-9; Decreased in weight gain and food consumption; developmental effects (extra ribs)	Meyer et al., 1988	-	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Adult Inhalation	-	-	-	The following sources were checked: USEPA, DPR, ATSDR, OEHHA, HSDB. No quantitative toxicity data (i.e. NOAEL, LOAEL, LD50, and LC50) were available.	NDA
Subchronic Child Inhalation	-	-	-	The following sources were checked: USEPA, DPR, ATSDR, OEHHA, HSDB. No quantitative toxicity data (i.e. NOAEL, LOAEL, LD50, and LC50) were available.	NDA
Subchronic Dermal	-	Gestation day 6-15, dermal rat teratogenicity study; When given epicutaneously nonoxynol-9 had no dose related effect on skeletal and soft tissues. No LOAEL established; highest dose tested was 500 mg/kg-day	Meyer et al., 1988	Sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity study.	NOC

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Oral	40	90-day feeding study in beagles with NP4E; Relative liver weight increase. Original Source: Industrial Bio-Test Laboratories, Inc. 1963c. Unpublished study involving 90-day exposure to NP4E in beagles. Cited in Smyth and Calandra 1969.	USDA, 2003	-	PTC
Chronic Adult Inhalation	-	-	-	The following sources were checked: USEPA, DPR, ATSDR, OEHHA, HSDB. No quantitative toxicity data (i.e. NOAEL, LOAEL, LD50, and LC50) were available.	NDA
Chronic Child Inhalation	-	-	-	The following sources were checked: USEPA, DPR, ATSDR, OEHHA, HSDB. No quantitative toxicity data (i.e. NOAEL, LOAEL, LD50, and LC50) were available.	NDA

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Dermal	-	Gestation day 6-15, dermal rat teratogenicity study; When given epicutaneously nonoxynol-9 had no dose related effect on skeletal and soft tissues. No LOAEL established; highest dose tested was 500 mg/kg-day	Meyer et al., 1988	Sources indicate dermal toxicity is not of concern. Adverse effects were not observed at the highest dose tested in toxicity study.	NOC
Chronic Oral	28	2-year chronic oral exposure study in beagles with NP9E; Increase in relative liver weight. Original Source: Smyth, H.F, Jr., J.C. Calandra. 1969. Toxicologic studies of alkylphenol polyoxyethylene surfactants. Toxicology and Applied Pharmacology. 14:315-334.	USDA, 2003	-	PTC

Table 8: Critical NO(A)ELs Selected for Risk Characterization of Sodium Xylene Sulfonate

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	0.14	Subchronic inhalation monkey study; weight loss and decreased weight gain	USEPA, 2006r	A subchronic NO(A)EL was used as a surrogate for an acute NO(A)EL when no acute NO(A)EL was available. Due to lack of inhalation toxicity endpoints specific to sodium xylene sulfonate, alkylbenzene sulfonate inhalation toxicity endpoints were used. Alkylbenzene sulfonates were considered representative of sodium xylene sulfonate for purposes of this analysis.	PTC
Acute Child Inhalation	0.14	Subchronic inhalation monkey study; weight loss and decreased weight gain	USEPA, 2006r	A subchronic NO(A)EL was used as a surrogate for an acute NO(A)EL when no acute NO(A)EL was available. Due to lack of inhalation toxicity endpoints specific to sodium xylene sulfonate, alkylbenzene sulfonate inhalation toxicity endpoints were used. Alkylbenzene sulfonates were considered representative of sodium xylene sulfonate for purposes of this analysis.	PTC
Acute Dermal	1030	17-day dermal rat study; no effects at highest dose	UNEP, 2005a	A subchronic NO(A)EL for sodium xylene sulfonate was used as a surrogate for an acute NO(A)EL when no acute NO(A)EL was available.	PTC
Acute Oral	763	Subchronic oral in rats; decrease in relative spleen weight in females, and clinical chemistry and hematology changes	UNEP, 2005a	A subchronic NO(A)EL for sodium xylene sulfonate was used as a surrogate for an acute NO(A)EL when no acute NO(A)EL was available.	PTC

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Adult Inhalation	0.14	Subchronic inhalation monkey study; weight loss and decreased weight gain	USEPA, 2006r	Due to lack of inhalation toxicity endpoints specific to sodium xylene sulfonate, alkylbenzene sulfonate inhalation toxicity endpoints were used. Sodium xylene sulfonate is a part of the alkylbenzene sulfonate group. Original source is W. Coates, et al 1978. Tox. Appl. Pharmacol. 45: 477-496.	PTC
Subchronic Child Inhalation	0.14	Subchronic inhalation monkey study; weight loss and decreased weight gain	USEPA, 2006r	Due to lack of inhalation toxicity endpoints specific to sodium xylene sulfonate, alkylbenzene sulfonate inhalation toxicity endpoints were used. Sodium xylene sulfonate is a part of the alkylbenzene sulfonate group. Original source is W. Coates, et al 1978. Tox. Appl. Pharmacol. 45: 477-496.	PTC
Subchronic Dermal	440	90-day dermal mouse study; Epidermal hyperplasia	UNEP, 2005a	Effects local and described as "typically minimal in severity."	PTC
Subchronic Oral	763	90-day oral study in rats; decrease in relative spleen weight and clinical chemistry and hematology changes	UNEP, 2005a	-	PTC
Chronic Adult Inhalation	0.014	Subchronic inhalation monkey study; weight loss and decreased weight gain	USEPA, 2006r	A subchronic NO(A)EL was used as a surrogate for a chronic NO(A)EL when no chronic NO(A)EL was available. Chronic NO(A)EL = Subchronic NO(A)EL/10 (USEPA, 2011e). Due to lack of inhalation toxicity endpoints specific to sodium xylene sulfonate, alkylbenzene sulfonate inhalation toxicity endpoints were used. Alkylbenzene sulfonates were considered representative of sodium xylene sulfonate for purposes of this analysis.	PTC

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Child Inhalation	0.014	Subchronic inhalation monkey study; weight loss and decreased weight gain	USEPA, 2006r	A subchronic NO(A)EL was used as a surrogate for a chronic NO(A)EL when no chronic NO(A)EL was available. Chronic NO(A)EL = Subchronic NO(A)EL/10 (USEPA, 2011e). Due to lack of inhalation toxicity endpoints specific to sodium xylene sulfonate, alkylbenzene sulfonate inhalation toxicity endpoints were used. Alkylbenzene sulfonates were considered representative of sodium xylene sulfonate for purposes of this analysis.	PTC
Chronic Dermal	44	90-day dermal mouse study; epidermal hyperplasia	UNEP, 2005a	The subchronic dermal NO(A)EL of 440 mg/kg-d for sodium xylene sulfonate was used as a surrogate for a chronic NO(A)EL when no chronic NO(A)EL was available. Chronic NO(A)EL = Subchronic NO(A)EL/10 (USEPA, 2011e).	PTC
Chronic Oral	40	6-month dietary rat study; Increased caecum weight and slight kidney damage	USEPA, 2013f	Due to lack of oral toxicity endpoints specific to sodium xylene sulfonate, alkylbenzene sulfonate oral toxicity endpoints were used. Alkylbenzene sulfonates were considered representative of sodium xylene sulfonate for purposes of this analysis.	PTC

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Table 9: Critical NO(A)ELs Selected for Risk Characterization of Sodium Dodecylbenzene Sulfonate

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Acute Adult Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Acute Child Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Acute Dermal	-	Dermal Toxicity study to rabbits, mice, and rats.	USEPA, 2013f	Dermal irritation is self-limiting to preclude dermal irritation, and no systemic toxicity was seen following repeated application of 200 mg/kg/day. Therefore, quantification of dermal risk is not required. No toxicological endpoints have been identified for dermal exposure and no toxicity was observed at the highest doses tested. Furthermore, alkylbenzene sulfonate did not exhibit systemic or developmental toxicity in several dermal toxicity studies.	NOC
Acute Oral	-	-	USEPA, 2013f	No adverse effects identified in single dose animal studies at the highest doses tested.	NOC
Subchronic Adult Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC

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Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Subchronic Child Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Subchronic Dermal	-	Dermal Toxicity study to rabbits, mice, and rats.	USEPA, 2013f	Dermal irritation is self-limiting to preclude dermal irritation, and no systemic toxicity was seen following repeated application of 200 mg/kg/day. Therefore, quantification of dermal risk is not required. No toxicological endpoints have been identified for dermal exposure and no toxicity was observed at the highest doses tested. Furthermore, alkylbenzene sulfonate did not exhibit systemic or developmental toxicity in several dermal toxicity studies.	NOC
Subchronic Oral	40	6-month dietary rat study; Increased caecum weight and slight kidney damage	USEPA, 2013f	A chronic NO(A)EL was used as a surrogate for a subchronic NO(A)EL when no subchronic NO(A)EL was available.	PTC
Chronic Adult Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC
Chronic Child Inhalation	0.14	Subchronic Inhalation Monkey Study	USEPA, 2013f	Applies to short- intermediate- and long-term inhalation. NOAEL = 1 mg/m^3 detergent dust combined with 0.1 mg/m^3 enzyme dust equivalent to approximately 0.14 mg/kg/day (inhalation absorption rate = 100%) purity = 13% active ingredient. This air concentration is equivalent to appx. 1.4 mg/kg/day.	PTC

Exposure Pathway	NO(A)EL (mg/kg-d)	Study Type	Reference	Note	Endpoint Status
Chronic Dermal	-	Dermal Toxicity study to rabbits, mice, and rats.	USEPA, 2013f	Dermal irritation is self-limiting to preclude dermal irritation, and no systemic toxicity was seen following repeated application of 200 mg/kg/day. Therefore, quantification of dermal risk is not required. No toxicological endpoints have been identified for dermal exposure and no toxicity was observed at the highest doses tested. Furthermore, alkylbenzene sulfonate did not exhibit systemic or developmental toxicity in several dermal toxicity studies.	NOC
Chronic Oral	40	6-month dietary rat study; Increased caecum weight and slight kidney damage	USEPA, 2013f	-	PTC

Appendix B-2: Cancer Slope Factors Selected for Risk Characterization

Table 10: Critical CSFs Selected for Risk Characterization of Dinotefuran

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Not likely to be carcinogenic to humans	-	USEPA, 2012d	Determined not likely to be carcinogenic to humans based on the absence of significant tumor increases in two adequate rodent carcinogenicity studies	NOC
Inhalation CSF	Not likely to be carcinogenic to humans	-	USEPA, 2012d	Determined not likely to be carcinogenic to humans based on the absence of significant tumor increases in two adequate rodent carcinogenicity studies	NOC
Dermal CSF	Not likely to be carcinogenic to humans	-	USEPA, 2012d	Determined not likely to be carcinogenic to humans based on the absence of significant tumor increases in two adequate rodent carcinogenicity studies	NOC

Table 11: Critical CSFs Selected for Risk Characterization of Dodecylbenzene Sulfonate

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	Oral rat studies	USEPA, 2013f	No evidence of carcinogenicity in reported studies in rats done before 1980 GLPs. No CSFs suitable for risk analysis could be located.	NDA
Inhalation CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	Oral rat studies	USEPA, 2013f	No evidence of carcinogenicity in reported studies in rats done before 1980 GLPs. No CSFs suitable for risk analysis could be located.	NDA
Dermal CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	Oral rat studies	USEPA, 2013f	No evidence of carcinogenicity in reported studies in rats done before 1980 GLPs. No CSFs suitable for risk analysis could be located.	NDA

Table 12: Critical CSFs Selected for Risk Characterization of Ethanolamine

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Not likely to be carcinogenic to humans	Derek structural alert analysis	USEPA, 2017a	Based on a Derek structural alert analysis and the lack of mutagenicity, ethanolamine is anticipated not likely to be a carcinogen.	NOC
Inhalation CSF	Not likely to be carcinogenic to humans	Derek structural alert analysis	USEPA, 2017a	Based on a Derek structural alert analysis and the lack of mutagenicity, ethanolamine is anticipated not likely to be a carcinogen.	NOC
Dermal CSF	Not likely to be carcinogenic to humans	Derek structural alert analysis	USEPA, 2017a	Based on a Derek structural alert analysis and the lack of mutagenicity, ethanolamine is anticipated not likely to be a carcinogen.	NOC

Table 13 Critical CSFs Selected for Risk Characterization of Glycerin

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Not classifiable as to human carcinogenicity	-	UNEP, 2002b	No carcinogenic studies conducted to modern regulatory guidelines are available, making the available studies of lower quality. The results of the available studies are equivocal, but overall do not raise concern for carcinogenic potential.	NDA
Inhalation CSF	Not classifiable as to human carcinogenicity	-	UNEP, 2002b	No carcinogenic studies conducted to modern regulatory guidelines are available, making the available studies of lower quality. The results of the available studies are equivocal, but overall do not raise concern for carcinogenic potential.	NDA
Dermal CSF	Not classifiable as to human carcinogenicity	-	UNEP, 2002b	No carcinogenic studies conducted to modern regulatory guidelines are available, making the available studies of lower quality. The results of the available studies are equivocal, but overall do not raise concern for carcinogenic potential.	NDA

Table 14: Critical CSFs Selected for Risk Characterization of Imidacloprid

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Not likely to be carcinogenic to humans	-	HSDB, 2016a	Imidacloprid is classified as a "Group E" chemical (evidence of non-carcinogencity for humans) based upon lack of evidence of carcinogenicity in rats and mice.	NOC
Inhalation CSF	Not likely to be carcinogenic to humans	-	HSDB, 2016a	Imidacloprid is classified as a "Group E" chemical (evidence of non-carcinogencity for humans) based upon lack of evidence of carcinogenicity in rats and mice.	NOC
Dermal CSF	Not likely to be carcinogenic to humans	-	HSDB, 2016a	Imidacloprid is classified as a "Group E" chemical (evidence of non-carcinogencity for humans) based upon lack of evidence of carcinogenicity in rats and mice.	NOC

Table 15: Critical CSFs Selected for Risk Characterization of Isopropyl Alcohol

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Not classifiable as to human carcinogenicity	-	IARC, 1999	Isopropyl alcohol is classified as a "Group 3" chemical (not classifiable as to its carcinogenicity to humans)	NDA
Inhalation CSF	Not classifiable as to human carcinogenicity	-	IARC, 1999	Isopropyl alcohol is classified as a "Group 3" chemical (not classifiable as to its carcinogenicity to humans)	NDA
Dermal CSF	Not classifiable as to human carcinogenicity	-	IARC, 1999	Isopropyl alcohol is classified as a "Group 3" chemical (not classifiable as to its carcinogenicity to humans)	NDA

Table 16: Critical CSFs Selected for Risk Characterization of POE Nonylphenol

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	-	European Union, 2002	According to the European Union 2002, "[POE Nonylphenol] carcinogenicity has not been directly studied. However, some information on the carcinogenic potential can be derived from other data. On the basis of information currently available it is unlikely that nonylphenol is mutagenic, so concerns for cancer caused by a genotoxic mechanism are low. Considering the potential for carcinogenicity by a non-genotoxic mechanism, no evidence of sustained cell proliferation or hyperplasia was seen in standard repeated exposure studies. Nonylphenol has been reported to induce cell proliferation in the mammary gland of the Noble rat following subcutaneous exposure levels down to 0.05 mg/kg-day, but this finding could not be reproduced in a duplicated study; futhermore there are doubts about the relevance of this model to humans because of the route of exposure and sensitivity of the strain selected. Overall, there are low concerns for carcinogenicity by a non-genotoxic mechanism." The chemical has been designated Not of Concern (NOC) for this specific route of exposure. Please refer to the Chemical Summary for a more details.	NOC

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Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Inhalation CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	-	European Union, 2002	According to the European Union 2002, "[POE Nonylphenol] carcinogenicity has not been directly studied. However, some information on the carcinogenic potential can be derived from other data. On the basis of information currently available it is unlikely that nonylphenol is mutagenic, so concerns for cancer caused by a genotoxic mechanism are low. Considering the potential for carcinogenicity by a non-genotoxic mechanism, no evidence of sustained cell proliferation or hyperplasia was seen in standard repeated exposure studies. Nonylphenol has been reported to induce cell proliferation in the mammary gland of the Noble rat following subcutaneous exposure levels down to 0.05 mg/kg-day, but this finding could not be reproduced in a duplicated study; futhermore there are doubts about the relevance of this model to humans because of the route of exposure and sensitivity of the strain selected. Overall, there are low concerns for carcinogenicity by a non-genotoxic mechanism."The chemical has been designated Not of Concern (NOC) for this specific route of exposure. Please refer to the Chemical Summary for a more details.	NOC

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Dermal CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	-	European Union, 2002	According to the European Union 2002, "[POE Nonylphenol] carcinogenicity has not been directly studied. However, some information on the carcinogenic potential can be derived from other data. On the basis of information currently available it is unlikely that nonylphenol is mutagenic, so concerns for cancer caused by a genotoxic mechanism are low. Considering the potential for carcinogenicity by a non-genotoxic mechanism, no evidence of sustained cell proliferation or hyperplasia was seen in standard repeated exposure studies. Nonylphenol has been reported to induce cell proliferation in the mammary gland of the Noble rat following subcutaneous exposure levels down to 0.05 mg/kg-day, but this finding could not be reproduced in a duplicated study; futhermore there are doubts about the relevance of this model to humans because of the route of exposure and sensitivity of the strain selected. Overall, there are low concerns for carcinogenicity by a non-genotoxic mechanism."The chemical has been designated Not of Concern (NOC) for this specific route of exposure. Please refer to the Chemical Summary for a more details.	NOC

Table 17: Critical CSFs Selected for Risk Characterization of Sodium Dodecylbenzene Sulfonate

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	Oral rat studies	USEPA, 2013f	No evidence of carcinogenicity in reported studies in rats done before 1980 GLPs. No CSFs suitable for risk analysis could be located.	NDA
Inhalation CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	Oral rat studies	USEPA, 2013f	No evidence of carcinogenicity in reported studies in rats done before 1980 GLPs. No CSFs suitable for risk analysis could be located.	NDA
Dermal CSF	Although carcinogenicity data are available, the chemical has not been classified as to its potential carcinogenicity.	Oral rat studies	USEPA, 2013f	No evidence of carcinogenicity in reported studies in rats done before 1980 GLPs. No CSFs suitable for risk analysis could be located.	NDA

Table 18: Critical NO(A)Els for Sodium Xylene Sulfonate

Exposure Pathway	Carcinogenic Status	Study Type	Reference	Notes	Endpoint Status
Oral CSF	Not classifiable as to human carcinogenicity	N/A	UNEP, 2005a	For sodium xylene sulfonate, no positive findings have been reported for Ames, mouse lymphoma, sister chromatid exchange, and chromosome aberration assays. Currently, there is no evidence of carcinogenic potential for sodium xylene sulfonate and the available data are considered insufficient to evaluate carcinogenic risk.	NDA
Inhalation CSF	Not classifiable as to human carcinogenicity	N/A	UNEP, 2005a	For sodium xylene sulfonate, no positive findings have been reported for Ames, mouse lymphoma, sister chromatid exchange, and chromosome aberration assays. Currently, there is no evidence of carcinogenic potential for sodium xylene sulfonate and the available data are considered insufficient to evaluate carcinogenic risk.	NDA
Dermal CSF	Not classifiable as to human carcinogenicity	N/A	UNEP, 2005a	For sodium xylene sulfonate, no positive findings have been reported for Ames, mouse lymphoma, sister chromatid exchange, and chromosome aberration assays. Currently, there is no evidence of carcinogenic potential for sodium xylene sulfonate and the available data are considered insufficient to evaluate carcinogenic risk.	NDA

References

NOTE: References match those listed in the Dashboard Database. Therefore, lettering order following publication years may not always be in sequence in this report. Links to webpages and PDFs were active as of the listed access date. Access to those web resources and information presented therein are subject to change.

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Appendix C: Physical, Chemical, and Fate Properties Selected for Exposure Analysis

Physical, chemical, and environmental fate (PCF) properties utilized to estimate risk are presented in Table C-1 below. Individual literature values used to estimate final PCF values used in risk assessment are presented in Table C-2. Methods used to calculate final values for each PCF property are described in the Statewide PEIR.

Table C-1: Final PCF Values Used to Estimate Exposure

Chemical	Property	Value	Unit
dinotefuran	Aerobic Limnetic Half-life	8.27E+01	days
dinotefuran	Aerobic Soil Half-life	7.78E+01	days
dinotefuran	Anaerobic Benthic Half-life	2.70E+01	days
dinotefuran	Biomagnification Factor	1	ug/kg-lipid
dinotefuran	Dermal Absorption Factor	3.00E-01	unitless
dinotefuran	Foliar Half-Life	1.37E+01	days
dinotefuran	Heat of Henry	3.74E+04	J/mol
dinotefuran	Hydrolysis Half-life	1.44E+02	days
dinotefuran	Koc	3.14E+01	L/kg
dinotefuran	Log Koa	1.12E+01	unitless
dinotefuran	log Kow	-6.08E-01	unitless
dinotefuran	Molecular Weight	202.2	g/mol
dinotefuran	Vapor Pressure	1.30E-08	mmHg
dinotefuran	Water Photodegradation Half-life	1.80E+00	days
dinotefuran	Water Solubility	5.43E+04	mg/L
Dodecylbenzene sulfonate	Aerobic Limnetic Half-life	1.50E+00	days
Dodecylbenzene sulfonate	Aerobic Soil Half-life	2.94E+01	days
Dodecylbenzene sulfonate	Anaerobic Benthic Half-life	1.00E+00	days
Dodecylbenzene sulfonate	Biomagnification Factor	1	ug/kg-lipid
Dodecylbenzene sulfonate	Dermal Absorption Factor	1.00E+00	unitless
Dodecylbenzene sulfonate	Foliar Half-Life	7.40E+00	days
Dodecylbenzene sulfonate	Heat of Henry	4.57E+04	J/mol
Dodecylbenzene sulfonate	Hydrolysis Half-life	Stable	days
Dodecylbenzene sulfonate	Koc	9.26E+02	L/kg
Dodecylbenzene sulfonate	Log Koa	9.45E+00	unitless
Dodecylbenzene sulfonate	log Kow	1.67E+00	unitless
Dodecylbenzene sulfonate	Molecular Weight	348.5	g/mol
Dodecylbenzene sulfonate	Vapor Pressure	2.30E-15	mmHg
Dodecylbenzene sulfonate	Water Photodegradation Half-life	Stable	days
Dodecylbenzene sulfonate	Water Solubility	8.00E+02	mg/L

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Chemical	Property	Value	Unit
Ethanolamine	Aerobic Limnetic Half-life	4.30E-01	days
Ethanolamine	Aerobic Soil Half-life	1.40E+01	days
Ethanolamine	Anaerobic Benthic Half-life	Stable	days
Ethanolamine	Biomagnification Factor	1	ug/kg-lipid
Ethanolamine	Dermal Absorption Factor	1.00E+00	unitless
Ethanolamine	Foliar Half-Life	3.50E+00	days
Ethanolamine	Heat of Henry	4.99E+04	J/mol
Ethanolamine	Hydrolysis Half-life	Stable	days
Ethanolamine	Koc	2.08E+03	L/kg
Ethanolamine	Log Koa	6.51E+00	unitless
Ethanolamine	log Kow	-1.31E+00	unitless
Ethanolamine	Molecular Weight	61.1	g/mol
Ethanolamine	Vapor Pressure	4.04E-01	mmHg
Ethanolamine	Water Photodegradation Half-life	Stable	days
Ethanolamine	Water Solubility	1.00E+06	mg/L
Glycerin	Aerobic Limnetic Half-life	2.50E+00	days
Glycerin	Aerobic Soil Half-life	2.50E+00	days
Glycerin	Anaerobic Benthic Half-life	4.00E+00	days
Glycerin	Biomagnification Factor	1	ug/kg-lipid
Glycerin	Dermal Absorption Factor	1.00E+00	unitless
Glycerin	Foliar Half-Life	6.30E-01	days
Glycerin	Heat of Henry	6.65E+04	J/mol
Glycerin	Hydrolysis Half-life	Stable	days
Glycerin	Koc	2.75E+00	L/kg
Glycerin	Log Koa	4.39E+00	unitless
Glycerin	log Kow	-1.76E+00	unitless
Glycerin	Molecular Weight	92.1	g/mol
Glycerin	Vapor Pressure	1.68E-04	mmHg
Glycerin	Water Photodegradation Half-life	Stable	days
Glycerin	Water Solubility	5.30E+06	mg/L
Imidacloprid	Aerobic Limnetic Half-life	2.21E+02	days
Imidacloprid	Aerobic Soil Half-life	7.78E+01	days
Imidacloprid	Anaerobic Benthic Half-life	2.71E+01	days
Imidacloprid	Biomagnification Factor	1	ug/kg-lipid
Imidacloprid	Dermal Absorption Factor	5.00E-02	unitless
Imidacloprid	Foliar Half-Life	4.19E+00	days

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Chemical	Property	Value	Unit
Imidacloprid	Heat of Henry	5.40E+04	J/mol
Imidacloprid	Hydrolysis Half-life	Stable	days
Imidacloprid	Koc	3.22E+02	L/kg
Imidacloprid	Log Koa	1.37E+01	unitless
Imidacloprid	log Kow	5.68E-01	unitless
Imidacloprid	Molecular Weight	255.7	g/mol
Imidacloprid	Vapor Pressure	7.00E-12	mmHg
Imidacloprid	Water Photodegradation Half-life	1.75E-01	days
Imidacloprid	Water Solubility	6.10E+02	mg/L
Isopropyl alcohol	Aerobic Limnetic Half-life	4.00E+00	days
Isopropyl alcohol	Aerobic Soil Half-life	4.00E+00	days
Isopropyl alcohol	Anaerobic Benthic Half-life	4.00E+00	days
Isopropyl alcohol	Biomagnification Factor	1	ug/kg-lipid
Isopropyl alcohol	Dermal Absorption Factor	9.10E-01	unitless
Isopropyl alcohol	Foliar Half-Life	1.00E+00	days
Isopropyl alcohol	Heat of Henry	4.43E+04	J/mol
Isopropyl alcohol	Hydrolysis Half-life	Stable	days
Isopropyl alcohol	Koc	1.50E+00	L/kg
Isopropyl alcohol	Log Koa	3.53E+00	unitless
Isopropyl alcohol	log Kow	4.40E-02	unitless
Isopropyl alcohol	Molecular Weight	60.1	g/mol
Isopropyl alcohol	Vapor Pressure	4.54E+01	mmHg
Isopropyl alcohol	Water Photodegradation Half-life	Stable	days
Isopropyl alcohol	Water Solubility	1.00E+06	mg/L
POE Nonylphenol	Aerobic Limnetic Half-life	2.61E+01	days
POE Nonylphenol	Aerobic Soil Half-life	3.00E+01	days
POE Nonylphenol	Anaerobic Benthic Half-life	3.01E+02	days
POE Nonylphenol	Biomagnification Factor	6	ug/kg-lipid
POE Nonylphenol	Dermal Absorption Factor	8.60E-03	unitless
POE Nonylphenol	Foliar Half-Life	7.50E+00	days
POE Nonylphenol	Heat of Henry	4.99E+04	J/mol
POE Nonylphenol	Hydrolysis Half-life	Stable	days
POE Nonylphenol	Koc	2.80E+03	L/kg
POE Nonylphenol	Log Koa	1.69E+01	unitless
POE Nonylphenol	log Kow	4.03E+00	unitless
POE Nonylphenol	Molecular Weight	616.8	g/mol

Chemical	Property	Value	Unit
POE Nonylphenol	Vapor Pressure	9.70E-13	mmHg
POE Nonylphenol	Water Photodegradation Half-life	Stable	days
POE Nonylphenol	Water Solubility	1.00E+03	mg/L
Sodium dodecylbenzene sulfonate	Aerobic Limnetic Half-life	1.50E+00	days
Sodium dodecylbenzene sulfonate	Aerobic Soil Half-life	2.94E+01	days
Sodium dodecylbenzene sulfonate	Anaerobic Benthic Half-life	1.00E+00	days
Sodium dodecylbenzene sulfonate	Biomagnification Factor	1	ug/kg-lipid
Sodium dodecylbenzene sulfonate	Dermal Absorption Factor	1.00E+00	unitless
Sodium dodecylbenzene sulfonate	Foliar Half-Life	7.40E+00	days
Sodium dodecylbenzene sulfonate	Heat of Henry	4.57E+04	J/mol
Sodium dodecylbenzene sulfonate	Hydrolysis Half-life	Stable	days
Sodium dodecylbenzene sulfonate	Koc	9.26E+02	L/kg
Sodium dodecylbenzene sulfonate	Log Koa	9.45E+00	unitless
Sodium dodecylbenzene sulfonate	log Kow	1.67E+00	unitless
Sodium dodecylbenzene sulfonate	Molecular Weight	348.5	g/mol
Sodium dodecylbenzene sulfonate	Vapor Pressure	2.30E-15	mmHg
Sodium dodecylbenzene sulfonate	Water Photodegradation Half-life	Stable	days
Sodium dodecylbenzene sulfonate	Water Solubility	8.00E+02	mg/L
Sodium xylene sulfonate	Aerobic Limnetic Half-life	1.54E+01	days
Sodium xylene sulfonate	Aerobic Soil Half-life	7.72E+00	days
Sodium xylene sulfonate	Anaerobic Benthic Half-life	Stable	days
Sodium xylene sulfonate	Biomagnification Factor	1	ug/kg-lipid
Sodium xylene sulfonate	Dermal Absorption Factor	1.00E+00	unitless
Sodium xylene sulfonate	Foliar Half-Life	1.90E+00	days
Sodium xylene sulfonate	Heat of Henry	4.57E+04	J/mol
Sodium xylene sulfonate	Hydrolysis Half-life	Stable	days
Sodium xylene sulfonate	Koc	2.63E+01	L/kg
Sodium xylene sulfonate	Log Koa	5.04E+00	unitless
Sodium xylene sulfonate	log Kow	-1.86E+00	unitless
Sodium xylene sulfonate	Molecular Weight	209.2	g/mol
Sodium xylene sulfonate	Vapor Pressure	1.50E-07	mmHg
Sodium xylene sulfonate	Water Photodegradation Half-life	Stable	days
Sodium xylene sulfonate	Water Solubility	4.00E+05	mg/L

Table C-2: PCF Values By Chemical Used to Estimate Final Values

Chemical	Property	Value	Unit	Note	Source
dinotefuran	Aerobic Limnetic Half-life	79.3	days	Original source is Volkel, W. (2000) (Carbon-14)-MTI-446 Degradation and Metabolism in Aquatic Systems: Lab Project Number: 709604. Unpublished study prepared by RCC Ltd. 139 p.	USEPA, 2011o
dinotefuran	Aerobic Limnetic Half-life	76	days		USEPA, 2011o
dinotefuran	Aerobic Soil Half-life	63	days	Aerobic metabolism in loamy sand soil.	USEPA, 2011o
dinotefuran	Aerobic Soil Half-life	38	days	Aerobic metabolism in loamy sand soil.	USEPA, 2011o
dinotefuran	Aerobic Soil Half-life	17	days	Aerobic metabolism in loam soil.	USEPA, 2011o
dinotefuran	Aerobic Soil Half-life	78	days	Aerobic metabolism in loam soil.	USEPA, 2011o
dinotefuran	Aerobic Soil Half-life	89	days	Aerobic metabolism in loamy sand soil.	USEPA, 2011o
dinotefuran	Aerobic Soil Half-life	100	days	Aerobic metabolism in loamy sand soil.	USEPA, 2011o
dinotefuran	Aerobic Soil Half-life	87.7	days	Aerobic metabolism in loamy sand soil.	USEPA, 2011o
dinotefuran	Aerobic Soil Half-life	15.9	days	Aerobic metabolism in silt loam soil.	USEPA, 2011o
dinotefuran	Anaerobic Benthic Half-life	27	days	Anaerobic metabolism in microbially active water and accompanying sediment. Original source is Fritz, R. and Hellpointer, E. 1991. Degradation of pesticides under anaerobic conditions in the system water/sediment: Imidacloprid, NTN 33893.	DPR, 2006b
dinotefuran	Biomagnification Factor	1	ug/kg-lipid	off chart, Log Kow <1	Armitage and Gobas, 2007
dinotefuran	Dermal Absorption Factor	0.3	unitless		USEPA, 2004f
dinotefuran	Foliar Half-Life	38	days	Foliar half-life measured on ornamentals in California. Original Source: Hattermann D. 2002a. Dissipation of Dislodgeable Foliar Residues on Ornamentals Following Application of MTI-446	USDA, 2009
dinotefuran	Foliar Half-Life	1.4	days	Foliar half-life measured on turf in California. Original Source: {Hattermann 2002b} Hattermann D. 2002b. Determination of Transferable Turf Residues on Turf Treated with MTI-446	USDA, 2009

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
dinotefuran	Foliar Half-Life	1.6	days	Foliar half-life measured on leafy vegetables in California. Original Source: Hummel R. 2002a. Dissipation of Dislodgeable Foliar Residues on Leafy Vegetables Following Application of MTI-44	USDA, 2009
dinotefuran	Heat of Henry	37413	J/mol	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
dinotefuran	Hydrolysis Half-life	144	days	At pH 7. Original source is Sydney P. 1998. MTI-446: Determination of Hydrolysis as a Function of pH: Final Report: Lab Project Number: MTO/098: 95/MTO098/1216. Unpublished study prepared by Huntingdon Life Sciences. 47 p. MRID No. 45640101. [MRID01]	USDA, 2009
dinotefuran	Koc	22	L/kg	In silt loam soil. Original source is Volkel W. 2001b. Adsorption/Desorption of (Carbon-14)-MTI-446 on Soils: Lab Project Number: 728998. Unpublished study prepared by RCC Ltd. 102 p. MRID No. 45640114.	USEPA, 2011o
dinotefuran	Koc	42	L/kg	In loam soil. Original source is Volkel W. 2001b. Adsorption/Desorption of (Carbon-14)-MTI-446 on Soils: Lab Project Number: 728998. Unpublished study prepared by RCC Ltd. 102 p. MRID No. 45640114.	USEPA, 2011o
dinotefuran	Koc	45	L/kg	In sandy loam soil. Original source is Volkel W. 2001b. Adsorption/Desorption of (Carbon-14)-MTI-446 on Soils: Lab Project Number: 728998. Unpublished study prepared by RCC Ltd. 102 p. MRID No. 45640114.	USEPA, 2011o
dinotefuran	Koc	42	L/kg	In clay loam soil. Original source is Volkel W. 2001b. Adsorption/Desorption of (Carbon-14)-MTI-446 on Soils: Lab Project Number: 728998. Unpublished study prepared by RCC Ltd. 102 p. MRID No. 45640114.	USEPA, 2011o
dinotefuran	Koc	6	L/kg	In loamy sand soil. Original source is Volkel W. 2001b. Adsorption/Desorption of (Carbon-14)-MTI-446 on Soils: Lab Project Number: 728998. Unpublished study prepared by RCC Ltd. 102 p. MRID No. 45640114.	USEPA, 2011o
dinotefuran	Log Koa	11.23	unitless	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
dinotefuran	log Kow	0.227	unitless	Original source is Tomlin CDS, ed. Dinotefuran (165252-70-0). In: The e-Pesticide Manual, 13th Edition Version 3.1 (2004-05). Surrey UK, British Crop Protection Council.	HSDB, 2007b

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Chemical	Property	Value	Unit	Note	Source
dinotefuran	log Kow	0.23	unitless	Original source is {Tomizawa and Casida 2005} Tomizawa M; Casida JE. 2005. Neonicotinoid Insecticide Toxicology: Mechanisms of Selective Action. Annu Rev Pharmacol Toxicol. 45:247-68. [Set 01 - Neonic01].	USDA, 2009
dinotefuran	log Kow	0.283	unitless	At 25 deg C.	USEPA, 2011o
dinotefuran	Molecular Weight	202.2	g/mol	The molecular weight was derived from the empirical formula. Empirical formula is C7H14N4O3	HSDB, 2007b
dinotefuran	Vapor Pressure	1.28E-08	mmHg	At 30 deg C. Original source is van der Gaauw, A. (2002) Aqueous Photolysis of (Carbon-14)-MTI-446 Under Laboratory Conditions and Determination of Quantum Yield: Lab Project Number: 729011. Unpublished study prepared by RCC Ltd. 104 p. {OPPTS 835.2210}	USEPA, 2011o
dinotefuran	Vapor Pressure	0.000000013	mmHg	At 30 deg C.	USEPA, 2004b
dinotefuran	Water Photodegradation Half-life	1.8	days	Does not state whether direct or indirect aqueous photolysis. Original source is van der Gaauw A. 2002. Aqueous Photolysis of (Carbon-14)-MTI-446 Under Laboratory Conditions and Determination of Quantum Yield: Lab Project Number: 729011. Unpublished study	USEPA, 2011o
dinotefuran	Water Solubility	54300	mg/L	Temp is at 20 deg C. Original source is Tomlin CDS, ed. Dinotefuran (165252-70-0). In: The e-Pesticide Manual, 13th Edition Version 3.1 (2004-05). Surrey UK, British Crop Protection Council.	HSDB, 2007b
dinotefuran	Water Solubility	39830	mg/L	At 20 deg C. Original source is Lentz (2001) Aerobic Soil Metabolism of MTI-446: Lab Project Number: 013184-1. Unpublished study prepared by Ricerca, LLC. 80 p.	USEPA, 2011o
Dodecylbenzene sulfonate	Aerobic Limnetic Half-life	1.5	days	Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Halflives in aquatic and benthic compartments, where the RT can vary from days to weeks, are one day or less.	Larson et al., 1993

Chemical	Property	Value	Unit	Note	Source
Dodecylbenzene sulfonate	Aerobic Soil Half-life	13	days	Soil Location: Germany Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Original Source: Figge K, Scho¨ berl P. LAS and the application of sewage sludge in agriculture. Tenside Surfactants Deterg 1989;26:122–8.	Ying, 2006
Dodecylbenzene sulfonate	Aerobic Soil Half-life	26	days	Soil Location: Spain Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Original Source: Berna JL, Ferrer J, Moreno A, Prats D, Bevia FR. The fate of LAS in the environment. Tenside Surfactants Deterg 1989;26:101– 7.	Ying, 2006
Dodecylbenzene sulfonate	Aerobic Soil Half-life	33	days	Soil Location: Spain Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Original Source: Berna JL, Ferrer J, Moreno A, Prats D, Bevia FR. The fate of LAS in the environment. Tenside Surfactants Deterg 1989;26:101– 7.	Ying, 2006
Dodecylbenzene sulfonate	Aerobic Soil Half-life	9	days	Soil Location: Switzerland Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Original Source: Marcomini A, Capel PD, Lichtenseiger TH, Brunner PH, Giger W. Behaviour of aromatic surfactants and PCBs in sludge-treated soil and landfills. J Environ Qual 1989;18:523– 8.	Ying, 2006

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Dodecylbenzene sulfonate	Anaerobic Benthic Half-life	1	days	Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Halflives in aquatic and benthic compartments, where the RT can vary from days to weeks, are one day or less.	Larson et al., 1993
Dodecylbenzene sulfonate	Biomagnification Factor	1	ug/kg-lipid	0-1	Armitage and Gobas, 2007
Dodecylbenzene sulfonate	Dermal Absorption Factor	1	unitless	No specific DAF is available. Thus a default of 100% is used.	USEPA, 1997i
Dodecylbenzene sulfonate	Foliar Half-Life	7.4	days	The foliar half-life was derived by multiplying the aerobic soil degradation half-life by 0.25.	Juraske et al., 2008
Dodecylbenzene sulfonate	Heat of Henry	45727	J/mol	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Dodecylbenzene sulfonate	Hydrolysis Half-life	Stable	days	Stable at pH 7 buffers (monobasic/dibasic potassium phosphate buffers) at 25 C. Original Studies MRID 40548801, 40970701, and 40970701, Korsch 1988a; Korsch 1988b, Keene 1990 respectively.	USEPA, 2013f
Dodecylbenzene sulfonate	Hydrolysis Half-life	Stable	days	Stable; Sulfonic acids are generally resistant to aqueous hydrolysis (1); therefore, sodium dodecylbenzenesulfonate is not expected to hydrolyze in environmental media. (1) Meylan WM, Howard PH; Chemosphere 26: 2293-9 (1993)	HSDB, 2002b
Dodecylbenzene sulfonate	Koc	278	L/kg	Based on an experimental log Kow value of 1.96 (1), the Koc for sodium dodecylbenzenesulfonate can also be estimated to be 278(SRC) using a regression derived equation (2) Original Source: (1) Hand VC, Williams GK; Environ Sci Technol 21: 370-3 (1987); (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington DC: Amer Chem Soc pp. 4-9 (1990)	HSDB, 2002b
Dodecylbenzene sulfonate	Koc	1400	L/kg	Silt Clay Loam Soil. This value is from MRID 40655201 and 94032011; Korsch and Kapostasy, 1988 and Keene, 1990. Not available online	USEPA, 2013f
Dodecylbenzene sulfonate	Koc	2280	L/kg	Sily Loam Soil. This value is from MRID 40655201 and 94032011; Korsch and Kapostasy, 1988 and Keene, 1990. Not available online	USEPA, 2013f

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Chemical	Property	Value	Unit	Note	Source
Dodecylbenzene sulfonate	Koc	390	L/kg	Sandy Loam Soil. This value is from MRID 40655201 and 94032011; Korsch and Kapostasy, 1988 and Keene, 1990. Not available online	USEPA, 2013f
Dodecylbenzene sulfonate	Koc	280	L/kg	Sandy Soil. This value is from MRID 40655201 and 94032011; Korsch and Kapostasy, 1988 and Keene, 1990. Not available online	USEPA, 2013f
Dodecylbenzene sulfonate	Log Koa	9.45	unitless	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Dodecylbenzene sulfonate	log Kow	91.2011	unitless	log(Kow) = 1.96 Original Source: Hand VC, Williams G; Environ Sci Technol 21: 370-3 (1987)	HSDB, 2002b
Dodecylbenzene sulfonate	log Kow	2.82	unitless	log(Kow) = 0.45 Original Source: Hansch, C., A. Leo. Substituent Constants for Correlation Analysis in Chemistry and Biology. New York, NY: John Wiley and Sons, 1979., p. 300	HSDB, 2002b
Dodecylbenzene sulfonate	Molecular Weight	348.5	g/mol	The molecular weight was derived from the molecular formula. Molecular Formula: C18-H30-O3-S.Na	HSDB, 2002b
Dodecylbenzene sulfonate	Vapor Pressure	2.3E-15	mmHg	@25 deg C Original Source: (1) Lyman WJ; pg. 31 in Environmental Exposure From Chemicals Vol I, Neely WB, Blau GE (eds), Boca Raton, FL; CRC Press (1985)	HSDB, 2002b
Dodecylbenzene sulfonate	Water Photodegradation Half-life	Stable	days	Stable; Linear alkylbenzene sulfonates, which includes dodecylbenzene sulfonate, do not undergo significant degradation by photolysis as photolyzable groups are absent from the chemical structure.	UNEP, 2005b
Dodecylbenzene sulfonate	Water Solubility	800	mg/L	25 deg C. 8E+5 ug/L Original Source: Geyer H et al; Chemosphere 10: 1307-13 (1981)	HSDB, 2002b
Ethanolamine	Aerobic Limnetic Half-life	0.43	days	Tris(2-hydroxyethyl)amine (TEA) was used as a surrogate for ethanolamine. The aerobic aquatic half-life for TEA in 3% NaCl was 10.2 hours.	Campo et al., 2011
Ethanolamine	Aerobic Soil Half-life	14	days	Bacterial degradation of MEA in slurries of highly contaminated soils was slow, with ca. 8-20 days required for half of the initial concentrations of monoethanolamine to be degraded at 20 deg C. The mean of this range was used as the input.	Hawthorne et al., 2005

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Ethanolamine	Anaerobic Benthic Half-life	Stable	days	Benthic anaerobic metabolism data were not available for this chemical. Chemical assumed stable to this degradation pathway.	
Ethanolamine	Biomagnification Factor	1	ug/kg-lipid	off chart, Log Kow <1	Armitage and Gobas, 2007
Ethanolamine	Dermal Absorption Factor	1	unitless	An estimated Dermal Absorption in one study was 0.60, however, USEPA uses a DAF of 1.00 for a majority of the risk calculations. Consistently, a health-protective DAF of 1 was selected for risk calculations in this analysis.	USEPA, 2017a
Ethanolamine	Foliar Half-Life	3.5	days	The foliar half-life was derived by multiplying the aerobic soil degradation half-life by 0.25.	Juraske et al., 2008
Ethanolamine	Heat of Henry	49884	J/mol	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Ethanolamine	Hydrolysis Half-life	Stable	days	Stable; Ethanolamine is not expected to undergo hydrolysis in the environment due to the lack of hydrolyzable functional groups. Original Source: Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990)	HSDB, 2015a
Ethanolamine	Koc	2080	L/kg	A range was given for the measured Koc (160 to 4000) for four soil types. The average of the range was used. Original Source: Sorensen JA, et al. Amine Based Gas Sweetening Fluids. Waste Stream Characterization and Subsurface Transport and Fate; Gas Research Institutes Topical Report GRI 01/0127 2001. Not available online.	Hawthorne et al., 2005
Ethanolamine	Log Koa	6.51	unitless	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Ethanolamine	log Kow	4.90E-02	unitless	Log Kow is -1.31. Input value (Kow) is 0.04898. Original Source: Hansch, C. Leo, A. D. Hoekman. Exploring QSAR - Hydrophobic, Electronic, and Steric Constants. Washington, DC: American Chemical Society. 1995, pg. 5.	HSDB, 2015a
Ethanolamine	log Kow	4.90E-02	unitless	Log Kow is -1.31. Input value (Kow) is 0.04898. Original Source: MRID 49659208.	USEPA, 2017a
Ethanolamine	Molecular Weight	61.1	g/mol	The molecular weight was derived from the molecular formula. Molecular Formula: C2-H7-N-O	HSDB, 2015a

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Chemical	Property	Value	Unit	Note	Source
Ethanolamine	Vapor Pressure	0.404	mmHg	At 25 deg C. Original Source: [Dow Chemical; The Alkanolamine Handbook Midland, MI: Dow Chemical (1980)	HSDB, 2015a
Ethanolamine	Vapor Pressure	0.404	mmHg	At 25 deg C. Original Source: MRID 49659208.	USEPA, 2017a
Ethanolamine	Water Photodegradation Half-life	Stable	days	Stable; Ethanolamine does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight. Original Source: Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 8-12. 1990.	HSDB, 2015a
Ethanolamine	Water Solubility	1.00E+06	mg/L	At 25 deg C. Original Source: Riddick, J.A., W.B. Bunger, Sakano T.K. Techniques of Chemistry 4th ed., Volume II. Organic Solvents. New York, NY: John Wiley and Sons., 1985., p. 702	HSDB, 2015a
Ethanolamine	Water Solubility	1.00E+06	mg/L	1 x 10^6 mg/L at 25 deg C. Original Source MRID49659208.	USEPA, 2017a
Glycerin	Aerobic Limnetic Half-life	2.5	days	1,2-Propanediol was used as a surrogate. The half-life of 1,2-Propanediol in water is estimated to be 1-4 days under aerobic conditions. The average of this range was used as the input. Original Source: NA	ATSDR, 1997a
Glycerin	Aerobic Soil Half-life	2.5	days	1,2-propanediol was used as a surrogate. The half-life of 1,2-Propanediol in water is estimated to be 1-4 days under aerobic conditions. The average of the reported range was used as the input.	ATSDR, 1997a
Glycerin	Anaerobic Benthic Half-life	4	days	1,2-Propanediol was used as a surrogate. The half-life of 1,2-Propanediol in water is estimated to be 3-5 days under anaerobic conditions. The average of the reported range was used as the input. Original Source: NA	ATSDR, 1997a
Glycerin	Biomagnification Factor	1	ug/kg-lipid	off chart, Log Kow of -0.92	Armitage and Gobas, 2007

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Glycerin	Dermal Absorption Factor	1	unitless	No specific DAF is available for glycerin. Thus a default of 100% is used.	USEPA, 1997i
Glycerin	Foliar Half-Life	0.63	days	The foliar half-life was derived by multiplying the aerobic soil half-life by 0.25.	Juraske et al., 2008
Glycerin	Heat of Henry	66512	J/mol	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Glycerin	Hydrolysis Half-life	Stable	days	Stable; Glycerin is not susceptible to hydrolysis.	UNEP, 2002b
Glycerin	Hydrolysis Half-life	Stable	days	Not expected to undergo hydrolysis in the environment	HSDB, 2012k
Glycerin	Koc	4.5	L/kg	From the measured log(Kow) of -1.76, the log(Koc) was estimated to be 0.65. Original Source: EU Technical Guidance Document QSAR for alcohols, chapter 4 section 4.3	UNEP, 2002b
Glycerin	Koc	1	L/kg	Estimated value estimated from a structure estimation method	HSDB, 2012k
Glycerin	Log Koa	4.39	unitless	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Glycerin	log Kow	0.0174	unitless	log(Kow) = -1.76 Original Source: Hansch, C., Leo, A., D. Hoekman. Exploring QSAR - Hydrophobic, Electronic, and Steric Constants. Washington, DC: American Chemical Society., 1995., p. 7	HSDB, 2012k
Glycerin	Molecular Weight	92.1	g/mol	The molecular weight was derived from the molecular formula. Molecular Formula: C3-H8-O3	HSDB, 2012k
Glycerin	Vapor Pressure	1.68E-04	mmHg	@25 deg C. Original Source: Daubert, T.E., R.P. Danner. Physical and Thermodynamic Properties of Pure Chemicals Data Compilation. Washington, D.C.: Taylor and Francis, 1989.	HSDB, 2012k
Glycerin	Water Photodegradation Half-life	Stable	days	Stable; Glycerin does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight. Original Source: Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990)	HSDB, 2012k

Chemical	Property	Value	Unit	Note	Source
Glycerin	Water Solubility	5.30E+06	mg/L	@25 deg C. Original Source: Yalkowsky SH et al; Handbook of Aqueous Solubility Data: An Extensive Compilation of Aqueous Solubility Data for Organic Compounds Extracted from AQUASOL Database. CRC Press LLC, Boca Raton, FL. 2003., p. 79	HSDB, 2012k
Imidacloprid	Aerobic Limnetic Half-life	18.2	days	Water phase in Ijzendoorn water/sediment system. Water: pH 7.9 – 8.4. Sediment: loamy silt, 4.1% OC. 22 deg C, darkness.	Health Canada, 2016b
Imidacloprid	Aerobic Limnetic Half-life	138	days	Water phase. Lienden (Netherlands) water/sediment system. Water: pH 8.1 – 8.9. Sediment: loamy sand, 0.8% OC. 22 deg C, darkness.	Health Canada, 2016b
Imidacloprid	Aerobic Limnetic Half-life	331	days	Water phase. No sediment present in testing. Pondwater (Norfolk County, Ontario). Water pH: 7.73 – 9.01. 22 deg C, darkness.	Health Canada, 2016b
Imidacloprid	Aerobic Limnetic Half-life	160	days	Water phase half-life.Kansas water/sediment system. pH 8.6, TOC = 4.3 mg/L, Sediment: Silty clay, pH 7.62, 3.1% OC, 22 deg C, darkness	Health Canada, 2016b
Imidacloprid	Aerobic Limnetic Half-life	4.2	days	Water phase half-life. Pondwater (Norfolk County, Ontario). Water pH: 7.71-9.30. 22 deg C, exposed to artifical light (12 hour light/dark cycle).	Health Canada, 2016b
Imidacloprid	Aerobic Soil Half-life	34	days	Field experiment using soil (pH = 7.9, 0.52% organic carbon, 16.6% clay, 31.3%, silt, 52.1% sand) where citrus products are grown extensively. Original article not available online.	HSDB, 2016a
Imidacloprid	Aerobic Soil Half-life	48	days	With vegetation. Original source: Scholz K, Spiteller M; Pests Diseases 2: 883-8 (1992)	HSDB, 2016a
Imidacloprid	Aerobic Soil Half-life	190	days	Without vegetation. Original source: Scholz K, Spiteller M; Pests Diseases 2: 883-8 (1992)	HSDB, 2016a
Imidacloprid	Aerobic Soil Half-life	16	days	German Hofchen soil. % clay = 9.6; % silt = 84.1, % sand =6.3; % OC = 2.5; pH = 6.6. Original source Dalkmann P et al; Environ Toxicol Chem 31(3): 556-565 (2012)	HSDB, 2016a
Imidacloprid	Aerobic Soil Half-life	12	days	German Frankenforst soil. % clay = 3.2; % silt = 80.6; % sand = 16.2; %OC = 2.1; pH = 7.2. Original source Dalkmann P et al; Environ Toxicol Chem 31(3): 556-565 (2012)	HSDB, 2016a

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Imidacloprid	Aerobic Soil Half-life	51	days	German Ippendorf soil. % clay = 16.0; % silt = 75.8; % sand = 8.2; %OC = 2.3; pH = 5.2. Original source Dalkmann P et al; Environ Toxicol Chem 31(3): 556-565 (2012)	HSDB, 2016a
Imidacloprid	Aerobic Soil Half-life	42	days	German Westerwald soil. % clay = 17.4; % silt = 74.3; % sand = 8.3; %OC = 1.8; pH = 5.2. Original source Dalkmann P et al; Environ Toxicol Chem 31(3): 556-565 (2012)	HSDB, 2016a
Imidacloprid	Aerobic Soil Half-life	36	days	German Hanscheider soil. % clay = 18.1; % silt = 67.5; % sand = 14.4; %OC = 2.1; pH = 5.8. Original source Dalkmann P et al; Environ Toxicol Chem 31(3): 556-565 (2012)	HSDB, 2016a
Imidacloprid	Aerobic Soil Half-life	42	days	German Dikopshof SiL soil. % clay = 5.6; % silt = 76.2; % sand = 18.2; %OC = 1.2; pH = 7.2. Original source Dalkmann P et al; Environ Toxicol Chem 31(3): 556-565 (2012)	HSDB, 2016a
Imidacloprid	Aerobic Soil Half-life	83	days	German Dikopshof SL soil. % clay = 8.6; % silt = 25.7; % sand = 65.7; %OC = 1.1; pH = 6.1. Original source Dalkmann P et al; Environ Toxicol Chem 31(3): 556-565 (2012)	HSDB, 2016a
Imidacloprid	Anaerobic Benthic Half-life	27.1	days	Anaerobic metabolism in microbially active water and accompanying sediment. Original source is Fritz, R. and Hellpointer, E. 1991. Degradation of pesticides under anaerobic conditions in the system water/sediment: Imidacloprid, NTN 33893.	DPR, 2016c
Imidacloprid	Biomagnification Factor	1	ug/kg-lipid	off chart, Log Kow <1	Armitage and Gobas, 2007
Imidacloprid	Dermal Absorption Factor	0.05	unitless	From an imidacloprid based in vivo rat dermal absorption study.	Health Canada, 2016b
Imidacloprid	Foliar Half-Life	3.7	days	Extraction of cabbage leaves treated with imidacloprid (Tier 1)	Mukherjee and Gopal, 2000
Imidacloprid	Foliar Half-Life	4.3	days	Extraction of mustard treated with imidacloprid (Tier 1)	Mukherjee and Gopal, 2000
Imidacloprid	Foliar Half-Life	3	days	Extraction of eggplant leaves treated with imidacloprid (Tier 1)	Mukherjee and Gopal, 2000
Imidacloprid	Foliar Half-Life	3.5	days	Extraction of eggplant leaves treated with imidacloprid (Tier 2)	Mukherjee and Gopal, 2000
Imidacloprid	Foliar Half-Life	4.3	days	Extraction of cabbage leaves treated with imidacloprid (Tier 2)	Mukherjee and Gopal, 2000

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Imidacloprid	Foliar Half-Life	3.4	days	Extraction of cabbage curd treated with imidacloprid (Tier 1)	Mukherjee and Gopal, 2000
Imidacloprid	Foliar Half-Life	3.4	days	Extraction of cabbage curd treated with imidacloprid (Tier 2)	Mukherjee and Gopal, 2000
Imidacloprid	Foliar Half-Life	5	days	Extraction of mustard leaves treated with imidacloprid (Tier 2)	Mukherjee and Gopal, 2000
Imidacloprid	Foliar Half-Life	4.5	days	Residues on turf. Original source Lin J. 1992a. Evaluation of the Foliar Half-life and Distribution of NTN-33893 in Turf: Lab Project Number: N3022701: 102605. Unpublished study prepared by Miles Inc. 164 p. MRID 42256307.	USDA, 2005a
Imidacloprid	Foliar Half-Life	1.17	days	For potato foliage applied imidacloprid. Original source Lin J. 1992d. Evaluation of the Foliar Half-life and Distribution of NTN 33893 in Potatoes: Lab Project Number: N319P003: 103233. Unpublished study prepared by Miles Inc. and ABC Labs. 166 p. MRID 42556101.	USDA, 2005a
Imidacloprid	Foliar Half-Life	9.8	days	Turf. Original sources Lin J., 1992a. Evaluation of the Foliar Half-life and Distribution of NTN-33893 in Turf: Lab Project Number: N3022701: 102605. Unpublished study prepared by Miles Inc. 164 p. MRID 42256307 and Lin J. 1992d. Evaluation of the Foliar Half-life and Distribution of NTN 33893 in Potatoes: Lab Project Number: N319P003: 103233. Unpublished study prepared by Miles Inc. and ABC Labs. 166 p. MRID 42556101.	USDA, 2005a
Imidacloprid	Heat of Henry	54041	J/mol	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Imidacloprid	Hydrolysis Half-life	Stable	days	Stable. pH = 5 to 11. Temperature not given. Original source is MacBean C, ed; e-Pesticide Manual. 15th ed., ver. 5.1, Alton, UK: British Crop Protection Council. Imidacloprid (138261-41-3) (2008-2010).	HSDB, 2016a
Imidacloprid	Hydrolysis Half-life	Stable	days	Stable; At 25 deg C, pH 7. Original source is Yoshida, H. 1989. Hydrolysis of NTN 33898. Miles Inc. (Mobay) Premise Termiticide. Study No. 99708. DPR Vol. 51950-0027 # 119533.	DPR, 2006b
Imidacloprid	Koc	779	L/kg	Clay texture from Capinopolis. Contains 42% clay, 17% silt, 1.45% oc and 41% sand.	Oliveira et al., 2000

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Imidacloprid	Koc	210	L/kg	In Hungarian agricultural soil. Original source is Nemeth-Konda L et al; Chemosphere 48: 545-552 (2002)	Nemeth-Konda et al., 2002
Imidacloprid	Koc	158	L/kg	Loamy sand from Mocambinho. Contains 10% clay, 3% silt, 87% sand and 0.35% oc.	Oliveira et al., 2000
Imidacloprid	Koc	620	L/kg	Sandy clay loam from Vicosa. Contains 34% clay, 7% silt, 59% sand, and 1.74% oc.	Oliveira et al., 2000
Imidacloprid	Koc	227	L/kg	Sandy loam from Venda-Nova. Contains 14% clay, 15% silt, 71% sand and 7.45% oc.	Oliveira et al., 2000
Imidacloprid	Koc	249	L/kg	Silt Loam 36.9% sand, 51.1% silt, 12% clay soil at day 0.	Oi, 1999
Imidacloprid	Koc	268	L/kg	Sandy loam 72.6% sand, 22.6% salt, 5% clay soil at day 0.	Oi, 1999
Imidacloprid	Koc	186	L/kg	Soil profile from Londrina, PR. pH = 6.3, %OC = 2.78, 75% Clay, 21% Silt, 4% sand	Oliveira et al., 2000
Imidacloprid	Koc	203	L/kg	Soil profile 6% clay, 10% silt, 84% sand	Oliveira et al., 2000
Imidacloprid	Log Koa	13.74	unitless	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Imidacloprid	log Kow	3.7	unitless	Converted from log Kow of 0.57 at 21 deg C. Original source is Tomlin CDS, ed; The e-Pesticide Manual: a world compendium. Imidacloprid. 13th ed. PC CD-ROM, Version 3.0, 2003-04. Surrey, UK: British Crop Protection Council, (2003)	HSDB, 2016a
Imidacloprid	Molecular Weight	255.7	g/mol	The molecular weight was derived from the empirical formula. Empirical formula is C9H10ClN5O2.	HSDB, 2006c
Imidacloprid	Vapor Pressure	7E-12	mmHg	25 deg C. Original source: MacBean C, ed; e-Pesticide Manual. 15th ed., ver. 5.1, Alton, UK: British Crop Protection Council. Imidacloprid (138261-41-3) (2008-2010).	HSDB, 2016a
Imidacloprid	Water Photodegradation Half-life	0.18	days	Estimated environmental half-life based on results of a water photolysis laboratory study. Original source is Anderson, C. 1991. Photodegradadation of NTN 33893 in water. Miles Inc. Study No. 99708. DPR Vol. 51950-0027# 119534	DPR, 2006b
Imidacloprid	Water Photodegradation Half-life	0.03	days	Half-life in HPLC grade water	DPR, 2016c
Imidacloprid	Water Photodegradation Half-life	0.05	days	Half-life in aqueous solution (deionized water) after being irradiated (290 nm) for 4 hours	DPR, 2016c
Imidacloprid	Water Solubility	514	mg/L	At 20 deg C, pH 7. From Pesticide Chemistry Database (DPR, internal database).	DPR, 2016c

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Imidacloprid	Water Solubility	610	mg/L	At 20 deg C. Original source MacBean C, ed; e-Pesticide Manual. 15th ed., ver. 5.1, Alton, UK: British Crop Protection Council. Imidacloprid (138261-41-3) (2008-2010)	HSDB, 2016a
Isopropyl alcohol	Aerobic Limnetic Half-life	4	days	The aerobic biodegradation of isopropanol in surface water proceeds with half-lives ranging from 26 hours to seven days. Value is mean of range. Original source is Howard, PH; Boethling RS; Jarvis WF; Meylan WM; Michalenko W. 1991. Handbook of Environmental 756 Degradation Rates. Chelsea, MI: Lewis Publishers, Inc.	USDA, 2014a
Isopropyl alcohol	Aerobic Soil Half-life	4	days	Literature suggests DT50 is 1-7 days. Value used is mean of range. Original source is Howard, PH; Boethling RS; Jarvis WF; Meylan WM; Michalenko W. 1991. Handbook of Environmental 756 Degradation Rates. Chelsea, MI: Lewis Publishers, Inc.	USDA, 2014a
Isopropyl alcohol	Anaerobic Benthic Half-life	4	days	1,2-Propanediol was used as a surrogate. The half-life of 1,2-Propanediol in water is estimated to be 3-5 days under anaerobic conditions. The average of the reported range was used as the input. Original Source: NA	ATSDR, 1997a
Isopropyl alcohol	Biomagnification Factor	1	ug/kg-lipid	off chart, Log Kow <1	Armitage and Gobas, 2007
Isopropyl alcohol	Dermal Absorption Factor	0.91	unitless	The total recovery of radioacitivity from male F-344 rats dosed dermally with [14C] isopropyl alcohol was 91% (DAF = 0.91)	Boatman et al., 1998
Isopropyl alcohol	Foliar Half-Life	1	days	The foliar half-life was derived by multiplying the aerobic soil degradation half-life by 0.25.	Juraske et al., 2008
Isopropyl alcohol	Heat of Henry	4.43E+04	J/mol	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Isopropyl alcohol	Hydrolysis Half-life	Stable	days	Stable; Isopropanol is not expected to undergo hydrolysis in the environment due to the lack of hydrolyzable functional groups. Original Source: Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 4-9, 15-1 to 15-29 (1990)	HSDB, 2012c
Isopropyl alcohol	Hydrolysis Half-life	Stable	days	Stable; Isopropyl alcohol is not subject to hydrolysis	UNEP, 1997b

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Isopropyl alcohol	Hydrolysis Half-life	Stable	days	Stable; Hydrolysis is not considered a significant degradation process for isopropyl alcohol.	USEPA, 2004n
Isopropyl alcohol	Hydrolysis Half-life	Stable	days	Stable to hydrolysis	USDA, 2014a
Isopropyl alcohol	Koc	1.5	L/kg	Based on a classification scheme(1), an estimated Koc value of 1.5 (SRC) was determined from a structure estimation method(2) Original Sources: (1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992)	HSDB, 2012c
Isopropyl alcohol	Log Koa	3.53	unitless	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Isopropyl alcohol	log Kow	1.1	unitless	@25 deg C	UNEP, 1997b
Isopropyl alcohol	log Kow	1.1	unitless	log(Kow) = 0.05 Original Source: Hansch, C., Leo, A., D. Hoekman. Exploring QSAR - Hydrophobic, Electronic, and Steric Constants. Washington, DC: American Chemical Society., 1995., p. 7	HSDB, 2012c
Isopropyl alcohol	log Kow	1.12	unitless	Original source not specified	USDA, 2014a
Isopropyl alcohol	Molecular Weight	60.1	g/mol	The molecular weight was derived from the molecular formula. Molecular Formula: C3-H8-O	USDA, 2014a
Isopropyl alcohol	Vapor Pressure	45.4	mmHg	@25 deg C. Original Source: Daubert, T.E., R.P. Danner. Physical and Thermodynamic Properties of Pure Chemicals Data Compilation. Washington, D.C.: Taylor and Francis, 1989.	HSDB, 2012c
Isopropyl alcohol	Water Photodegradation Half-life	Stable	days	Stable; Not subject to photolysis	UNEP, 1997b
Isopropyl alcohol	Water Photodegradation Half-life	Stable	days	Stable; Direct photolysis is not expected to be an important process for the degradation of isopropyl alcohol.	USEPA, 2004n
Isopropyl alcohol	Water Solubility	1.00E+06	mg/L	@25 deg C. Infinitely soluble (10^6 mg/L) Original Source: Riddick, J.A., W.B. Bunger, Sakano T.K. Techniques of Chemistry 4th ed., Volume II. Organic Solvents. New York, NY: John Wiley and Sons., 1985., p. 196	HSDB, 2012c

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
POE Nonylphenol	Aerobic Limnetic Half-life	2.5	days	Biodegradation of NPnE (n=1-18) at 22.5 deg C using autochthonous bacterial cultures originating from the Krka River estuary in Croatia resulted in half-lives estimated to range from 2.5-4 and 14-35 days for the mixed bacterial cultures from the brackish water layer and the saline water layers, respectively.	Kvestak and Ahel, 1995
POE Nonylphenol	Aerobic Limnetic Half-life	4	days	Biodegradation of NPnE (n=1-18) at 22.5 deg C using autochthonous bacterial cultures originating from the Krka River estuary in Croatia resulted in half-lives estimated to range from 2.5-4 and 14-35 days for the mixed bacterial cultures from the brackish water layer and the saline water layers, respectively.	Kvestak and Ahel, 1995
POE Nonylphenol	Aerobic Limnetic Half-life	14	days	Biodegradation of NPnE (n=1-18) at 22.5 deg C using autochthonous bacterial cultures originating from the Krka River estuary in Croatia resulted in half-lives estimated to range from 2.5-4 and 14-35 days for the mixed bacterial cultures from the brackish water layer and the saline water layers, respectively.	Kvestak and Ahel, 1995
POE Nonylphenol	Aerobic Limnetic Half-life	35	days	Biodegradation of NPnE (n=1-18) at 22.5 deg C using autochthonous bacterial cultures originating from the Krka River estuary in Croatia resulted in half-lives estimated to range from 2.5-4 and 14-35 days for the mixed bacterial cultures from the brackish water layer and the saline water layers, respectively.	Kvestak and Ahel, 1995
POE Nonylphenol	Aerobic Soil Half-life	30	days	The U.K. Environment Agency (1997) estimated a half-life of about 30 days for primary biodegradation of nonylphenol in soil. Original Source: U.K. Environment Agency. 1997. Draft comprehensive risk assessment report for nonylphenol. National Centre for Ecotoxicity and Hazardous Substances, London, U.K.	Environment Canada, 1999
POE Nonylphenol	Anaerobic Benthic Half-life	301	days	Biodegradation half-life of NP9E in anaerobic sediment slurry from Grassy Bay, New York	Ferguson and Brownawell, 2003
POE Nonylphenol	Biomagnification Factor	6	ug/kg-lipid	off chart, but log kow value would fall between 5-6 if extrapolated to log koa of 16.89	Armitage and Gobas, 2007

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
POE Nonylphenol	Dermal Absorption Factor	8.60E-03	unitless	The absorption of 0.1% NPE-9, 1% NPE-9, and 10% NPE-9 across human skin was 0.86%, 0.08%, and 0.009%, respectively. This suggests that only a certain mass quantity may pass through the skin per unit time. Because this risk assessment will be assessing trace amount exposures, the absorption for 0.1% NPE-9 (0.86% DAF) was used.	Monteiro-Riviere et al., 2000
POE Nonylphenol	Foliar Half-Life	7.5	days	The foliar half-life was derived by multiplying the aerobic soil degradation half-life by 0.25.	Juraske et al., 2008
POE Nonylphenol	Heat of Henry	4.99E+04	J/mol	Estimated using EPI Suite v. 4.1. Value is for nonoxynol-4	USEPA, 2011f
POE Nonylphenol	Hydrolysis Half-life	Stable	days	Stable; Nonoxynol-9 is not expected to undergo hydrolysis in the environment due to the lack of functional groups that hydrolyze under environmental conditions. Original Source: Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990)	HSDB, 2013a
POE Nonylphenol	Koc	1300	L/kg	The Koc of nonoxynol is estimated to be 1300 (based upon 5 ethoxylates). Original data from: Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992)	HSDB, 2013b
POE Nonylphenol	Koc	4300	L/kg	Estimated for nonoxynol-9 using a structure estimation method. Original sources: Swann RL et al; Res Rev 85: 17-28 (1983) and Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992)	HSDB, 2013a
POE Nonylphenol	Log Koa	16.89	unitless	Estimated using EPI Suite v. 4.1. Value is for POE Nonylphenol CAS#: 26027-38-3	USEPA, 2011f
POE Nonylphenol	log Kow	3.89E+03	unitless	For nonoxynol-9, log(Kow) = 3.59. Original Source: Ahel, M. and W. Giger. 1993b. Partitioning of alkylphenols and alkylphenol polyethoxylates between water and organic solvents. Chemosphere 26: 1471–1478.	Environment Canada, 1999
POE Nonylphenol	log Kow	17378	unitless	For nonoxynol-4, log(Kow) = 4.24. Original Source: Ahel, M. and W. Giger. 1993b. Partitioning of alkylphenols and alkylphenol polyethoxylates between water and organic solvents. Chemosphere 26: 1471–1478.	Environment Canada, 1999
POE Nonylphenol	Molecular Weight	616.8	g/mol	The molecular weight of nonoxynol-9 was derived from the empirical formula C15H24O-[C2H4O]9.	Environment Canada, 1999

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
POE Nonylphenol	Vapor Pressure	6.69E-13	mmHg	Vapor pressure of nonoxynol at 25 deg C (estimated physical properties based upon 5 ethoxylates). Original Source: US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Jan, 2011.	HSDB, 2013b
POE Nonylphenol	Vapor Pressure	9.7E-13	mmHg	Estimated vapor pressure of commercial nonoxynol at 25 deg C. Original Source: US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Jan, 2011.	HSDB, 2013b
POE Nonylphenol	Vapor Pressure	4.61E-18	mmHg	Vapor pressure of nonoxynol-9 at 25 deg C (estimated). Original source: US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Jan, 2011.	HSDB, 2013a
POE Nonylphenol	Water Photodegradation Half-life	Stable	days	Stable; Nonoxynol-9 does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight. Laboratory biodegradation experiments using filtered and nonoxylnol spiked river water from Tokyo, Japan suggested that cleavage of the ethylene oxide chain was due to bacterial action, rather than photolysis. Original Sources: Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990) and Maruyama K et al; Environ Sci Technol 34: 343-8 (2000)	HSDB, 2013a
POE Nonylphenol	Water Photodegradation Half-life	Stable	days	Stable; Nonoxynol absorbs light at wavelengths of 275 nm and therefore is not expected to be susceptible to direct photolysis by sunlight. Laboratory biodegradation experiments using filtered and nonoxylnol spiked river water from Tokyo, Japan suggested that cleavage of the ethylene oxide chain was due to bacterial action, rather than photolysis. Original Sources: Hidaka H et al; J Photochem Photobiol 42: 375-81 (1988) and Maruyama K et al; Environ Sci Technol 34: 343-8 (2000)	HSDB, 2013b

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
POE Nonylphenol	Water Solubility	1.00E+03	mg/L	Solubility of poly (degree of polymerization=10) oxyethylene para-nonylphenyl in water > 1,000 mg/L. Temperature not specified. Original Source: Chemicals Inspection and Testing Institute; Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan_ Japan Chemical Industry Ecology - Toxicology and Information Center_ ISBN 4-89074-101-1 P- 7-3 (1992)	HSDB, 2013b
POE Nonylphenol	Water Solubility	0.522	mg/L	Solubility of nonoxynol-9 in water at 25 deg C (estimated). Original Source: US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Jan, 2011.	HSDB, 2013a
POE Nonylphenol	Water Solubility	7.65	mg/L	Solubility of nonoxynol-4. Temperature not specified. Original source: Ahel, M. and W. Giger. 1993a. Aqueous solubility of alkylphenols and alkylphenol polyethoxylates. Chemosphere 26: 1461–1470.	Environment Canada, 1999
Sodium dodecylbenzene sulfonate	Aerobic Limnetic Half-life	1.5	days	Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Halflives in aquatic and benthic compartments, where the RT can vary from days to weeks, are one day or less.	Larson et al., 1993
Sodium dodecylbenzene sulfonate	Aerobic Soil Half-life	13	days	Soil Location: Germany Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Original Source: Figge K, Scho¨ berl P. LAS and the application of sewage sludge in agriculture. Tenside Surfactants Deterg 1989;26:122–8.	Ying, 2006
Sodium dodecylbenzene sulfonate	Aerobic Soil Half-life	26	days	Soil Location: Spain Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Original Source: Berna JL, Ferrer J, Moreno A, Prats D, Bevia FR. The fate of LAS in the environment. Tenside Surfactants Deterg 1989;26:101– 7.	Ying, 2006

Chemical	Property	Value	Unit	Note	Source
Sodium dodecylbenzene sulfonate	Aerobic Soil Half-life	33	days	Soil Location: Spain Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Original Source: Berna JL, Ferrer J, Moreno A, Prats D, Bevia FR. The fate of LAS in the environment. Tenside Surfactants Deterg 1989;26:101– 7.	Ying, 2006
Sodium dodecylbenzene sulfonate	Aerobic Soil Half-life	9	days	Soil Location: Switzerland Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Original Source: Marcomini A, Capel PD, Lichtenseiger TH, Brunner PH, Giger W. Behaviour of aromatic surfactants and PCBs in sludge-treated soil and landfills. J Environ Qual 1989;18:523– 8.	Ying, 2006
Sodium dodecylbenzene sulfonate	Anaerobic Benthic Half-life	1	days	Value is for linear alkylbenzene sulphonates (LAS). Dodecylbenzene sulfonate is included in this group. Halflives in aquatic and benthic compartments, where the RT can vary from days to weeks, are one day or less.	Larson et al., 1993
Sodium dodecylbenzene sulfonate	Biomagnification Factor	1	ug/kg-lipid	0-1	Armitage and Gobas, 2007
Sodium dodecylbenzene sulfonate	Dermal Absorption Factor	1	unitless	No specific DAF is available. Thus a default of 100% is used.	USEPA, 1997i
Sodium dodecylbenzene sulfonate	Foliar Half-Life	7.4	days	The foliar half-life was derived by multiplying the aerobic soil degradation half-life by 0.25.	Juraske et al., 2008
Sodium dodecylbenzene sulfonate	Heat of Henry	4.57E+04	J/mol	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Sodium dodecylbenzene sulfonate	Hydrolysis Half-life	Stable	days	Stable at pH 7 buffers (monobasic/dibasic potassium phosphate buffers) at 25 C. Original Studies MRID 40548801, 40970701, and 40970701, Korsch 1988a; Korsch 1988b, Keene 1990 respectively.	USEPA, 2013f

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Sodium dodecylbenzene sulfonate	Hydrolysis Half-life	Stable	days	Stable; Sulfonic acids are generally resistant to aqueous hydrolysis (1); therefore, sodium dodecylbenzenesulfonate is not expected to hydrolyze in environmental media. (1) Meylan WM, Howard PH; Chemosphere 26: 2293-9 (1993)	HSDB, 2002b
Sodium dodecylbenzene sulfonate	Koc	278	L/kg	Based on an experimental log Kow value of 1.96 (1), the Koc for sodium dodecylbenzenesulfonate can also be estimated to be 278(SRC) using a regression derived equation (2) Original Source: (1) Hand VC, Williams GK; Environ Sci Technol 21: 370-3 (1987); (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington DC: Amer Chem Soc pp. 4-9 (1990)	HSDB, 2002b
Sodium dodecylbenzene sulfonate	Koc	1400	L/kg	Silt Clay Loam Soil. This value is from MRID 40655201 and 94032011; Korsch and Kapostasy, 1988 and Keene, 1990. Not available online	USEPA, 2013f
Sodium dodecylbenzene sulfonate	Koc	2280	L/kg	Sily Loam Soil. This value is from MRID 40655201 and 94032011; Korsch and Kapostasy, 1988 and Keene, 1990. Not available online	USEPA, 2013f
Sodium dodecylbenzene sulfonate	Koc	390	L/kg	Sandy Loam Soil. This value is from MRID 40655201 and 94032011; Korsch and Kapostasy, 1988 and Keene, 1990. Not available online	USEPA, 2013f
Sodium dodecylbenzene sulfonate	Koc	280	L/kg	Sandy Soil. This value is from MRID 40655201 and 94032011; Korsch and Kapostasy, 1988 and Keene, 1990. Not available online	USEPA, 2013f
Sodium dodecylbenzene sulfonate	Log Koa	9.45	unitless	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Sodium dodecylbenzene sulfonate	log Kow	9.12E+01	unitless	log(Kow) = 1.96 Original Source: Hand VC, Williams G; Environ Sci Technol 21: 370-3 (1987)	HSDB, 2002b
Sodium dodecylbenzene sulfonate	log Kow	2.82	unitless	log(Kow) = 0.45 Original Source: Hansch, C., A. Leo. Substituent Constants for Correlation Analysis in Chemistry and Biology. New York, NY: John Wiley and Sons, 1979., p. 300	HSDB, 2002b
Sodium dodecylbenzene sulfonate	Molecular Weight	348.5	g/mol	The molecular weight was derived from the molecular formula. Molecular Formula: C18-H30-O3-S.Na	HSDB, 2002b

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Sodium dodecylbenzene sulfonate	Vapor Pressure	2.30E-15	mmHg	@25 deg C Original Source: (1) Lyman WJ; pg. 31 in Environmental Exposure From Chemicals Vol I, Neely WB, Blau GE (eds), Boca Raton, FL; CRC Press (1985)	HSDB, 2002b
Sodium dodecylbenzene sulfonate	Water Photodegradation Half-life	Stable	days	Stable; Linear alkylbenzene sulfonates, which includes dodecylbenzene sulfonate, do not undergo significant degradation by photolysis as photolyzable groups are absent from the chemical structure.	UNEP, 2005b
Sodium dodecylbenzene sulfonate	Water Solubility	800	mg/L	25 deg C. 8E+5 ug/L Original Source: Geyer H et al; Chemosphere 10: 1307-13 (1981)	HSDB, 2002b
Sodium xylene sulfonate	Aerobic Limnetic Half-life	15.4	days	The water column aerobic metabolism half-life was derived by multiplying the aerobic soil half-life by 2.	USEPA, 2009i
Sodium xylene sulfonate	Aerobic Soil Half-life	7.72	days	74% degraded in 15 days in activated sludge. A first-order degradation half-life was estimated based on these data: t1/2 = (-ln(2))*(15 day)/(ln(1-0.74)) Original Source: Ruetgers-Nease Chemical, Inc., State College, Pennsylvania, USA. Evaluation for biodegrability in the Modified Sturm Test of Sodium xylenesulfonate [1300-72-7]. 1992c	UNEP, 2005a
Sodium xylene sulfonate	Anaerobic Benthic Half-life	Stable	days	NDA; assumed stable	No Data Available
Sodium xylene sulfonate	Biomagnification Factor	1	ug/kg-lipid	off chart, log kow <1	Armitage and Gobas, 2007
Sodium xylene sulfonate	Dermal Absorption Factor	1	unitless	No specific DAF is available. Thus a default of 100% is used. (NOTE: Using the default of 100% DAF will likely greatly overestimate exposure as dermal absorption of ionic substances is generally very low.)	USEPA, 1997i
Sodium xylene sulfonate	Foliar Half-Life	1.9	days	The foliar half-life was derived by multiplying the aerobic soil degradation half-life by 0.25.	Juraske et al., 2008
Sodium xylene sulfonate	Heat of Henry	4.57E+04	J/mol	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Sodium xylene sulfonate	Hydrolysis Half-life	Stable	days	Hydrotropes are not subject to hydrolysis.	UNEP, 2005a

Appendix 3A

Chemical	Property	Value	Unit	Note	Source
Sodium xylene sulfonate	Koc	26.3	L/kg	Koc = 26.3 L/kg; EPISuite was used to estimate the Koc via the MCI method	USEPA, 2011f
Sodium xylene sulfonate	Log Koa	5.04	unitless	Estimated using EPI Suite v. 4.1.	USEPA, 2011f
Sodium xylene sulfonate	log Kow	0.0138	unitless	log(Kow) = -1.86; modeled using EPISuite. Consistent with measured and estimated range (-2.4 to -1.5) of sodium xylene, toluene and cumene sulfonates.	USEPA, 2011f
Sodium xylene sulfonate	Molecular Weight	209.2	g/mol	The molecular weight was derived from the molecular formula. Molecular Formula: C8-H10-O3-S.Na.	HSDB, 2002c
Sodium xylene sulfonate	Vapor Pressure	1.50E-07	mmHg	<2.0E-5 Pa (1.5E-7 mmHg) @25 deg C; vapor pressure was measured at 240-250 deg C and extrapolated to 25 deg C.	UNEP, 2005a
Sodium xylene sulfonate	Water Photodegradation Half-life	Stable	days	NDA; assumed stable	No Data Available
Sodium xylene sulfonate	Water Solubility	4.00E+05	mg/L	@20 deg C. Original Source: Albright & Wilson, Ltd. France IUCLID Data Sheet Sodium Xylenesulphonate. 2000	UNEP, 2005a

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Appendix D: PWC Concentrations and Surfacewater Ingestion Risk Estimates

Table D-1: PWC Concentrations and Surfacewater Ingestion Risk Estimates

Application Scenario	Chemical	Concentration Category	Limnetic Concentration (ug/L)	Index Life Stage	Exposure (mg/kg-day)	Oral NOAEL (mg/kg-day)	MOE (unitless)
PDCP-64	Dodecylbenzene sulfonate	Peak	0.218	0-<6 y.o.	1.13E-05	N/A	N/A
PDCP-64	Dodecylbenzene sulfonate	4-Day Average	0.175	0-<6 y.o.	9.10E-06	N/A	N/A
PDCP-64	Dodecylbenzene sulfonate	21-Day Average	0.165	0-<6 y.o.	8.58E-06	40	4.66E+06
PDCP-64	Dodecylbenzene sulfonate	60-Day Average	0.158	0-<6 y.o.	8.22E-06	40	4.87E+06
PDCP-64	Dodecylbenzene sulfonate	90-Day Average	0.155	0-<6 y.o.	8.06E-06	40	4.96E+06
PDCP-64	Dodecylbenzene sulfonate	365-Day Average	0.102	0-<6 y.o.	5.30E-06	40	7.54E+06
PDCP-64	Dodecylbenzene sulfonate	Peak	0.218	Adult	6.81E-06	N/A	N/A
PDCP-64	Dodecylbenzene sulfonate	4-Day Average	0.175	Adult	5.47E-06	N/A	N/A
PDCP-64	Dodecylbenzene sulfonate	21-Day Average	0.165	Adult	5.16E-06	40	7.76E+06
PDCP-64	Dodecylbenzene sulfonate	60-Day Average	0.158	Adult	4.94E-06	40	8.10E+06
PDCP-64	Dodecylbenzene sulfonate	90-Day Average	0.155	Adult	4.84E-06	40	8.26E+06
PDCP-64	Dodecylbenzene sulfonate	365-Day Average	0.102	Adult	3.19E-06	40	1.25E+07
PDCP-64	Ethanolamine	Peak	0.105	0-<6 y.o.	5.46E-06	N/A	N/A
PDCP-64	Ethanolamine	4-Day Average	0.0508	0-<6 y.o.	2.64E-06	N/A	N/A
PDCP-64	Ethanolamine	21-Day Average	0.0494	0-<6 y.o.	2.57E-06	300	1.17E+08
PDCP-64	Ethanolamine	60-Day Average	0.047	0-<6 y.o.	2.44E-06	300	1.23E+08
PDCP-64	Ethanolamine	90-Day Average	0.0463	0-<6 y.o.	2.41E-06	300	1.25E+08
PDCP-64	Ethanolamine	365-Day Average	0.0304	0-<6 y.o.	1.58E-06	300	1.90E+08
PDCP-64	Ethanolamine	Peak	0.105	Adult	3.28E-06	N/A	N/A
PDCP-64	Ethanolamine	4-Day Average	0.0508	Adult	1.59E-06	N/A	N/A
PDCP-64	Ethanolamine	21-Day Average	0.0494	Adult	1.54E-06	300	1.94E+08
PDCP-64	Ethanolamine	60-Day Average	0.047	Adult	1.47E-06	300	2.04E+08
PDCP-64	Ethanolamine	90-Day Average	0.0463	Adult	1.45E-06	300	2.07E+08
PDCP-64	Ethanolamine	365-Day Average	0.0304	Adult	9.50E-07	300	3.16E+08
PDCP-64	Isopropyl alcohol	Peak	0.165	0-<6 y.o.	8.58E-06	240	2.80E+07
PDCP-64	Isopropyl alcohol	4-Day Average	0.152	0-<6 y.o.	7.90E-06	240	3.04E+07
PDCP-64	Isopropyl alcohol	21-Day Average	0.151	0-<6 y.o.	7.85E-06	240	3.06E+07
PDCP-64	Isopropyl alcohol	60-Day Average	0.147	0-<6 y.o.	7.64E-06	240	3.14E+07
PDCP-64	Isopropyl alcohol	90-Day Average	0.143	0-<6 y.o.	7.44E-06	24	3.23E+06
PDCP-64	Isopropyl alcohol	365-Day Average	0.0958	0-<6 y.o.	4.98E-06	24	4.82E+06
PDCP-64	Isopropyl alcohol	Peak	0.165	Adult	5.16E-06	240	4.65E+07
PDCP-64	Isopropyl alcohol	4-Day Average	0.152	Adult	4.75E-06	240	5.05E+07
PDCP-64	Isopropyl alcohol	21-Day Average	0.151	Adult	4.72E-06	240	5.09E+07
PDCP-64	Isopropyl alcohol	60-Day Average	0.147	Adult	4.59E-06	240	5.22E+07
PDCP-64	Isopropyl alcohol	90-Day Average	0.143	Adult	4.47E-06	24	5.37E+06
PDCP-64	Isopropyl alcohol	365-Day Average	0.0958	Adult	2.99E-06	24	8.02E+06
PDCP-64	POE Nonylphenol	Peak	3.6	0-<6 y.o.	1.87E-04	50	2.67E+05
PDCP-64	POE Nonylphenol	4-Day Average	3.52	0-<6 y.o.	1.83E-04	50	2.73E+05
PDCP-64	POE Nonylphenol	21-Day Average	3.52	0-<6 y.o.	1.83E-04	40	2.19E+05
PDCP-64	POE Nonylphenol	60-Day Average	3.5	0-<6 y.o.	1.82E-04	40	2.20E+05
PDCP-64	POE Nonylphenol	90-Day Average	3.49	0-<6 y.o.	1.81E-04	28	1.54E+05
PDCP-64	POE Nonylphenol	365-Day Average	3.15	0-<6 y.o.	1.64E-04	28	1.71E+05
PDCP-64	POE Nonylphenol	Peak	3.6	Adult	1.13E-04	50	4.44E+05
PDCP-64	POE Nonylphenol	4-Day Average	3.52	Adult	1.10E-04	50	4.55E+05
PDCP-64	POE Nonylphenol	21-Day Average	3.52	Adult	1.10E-04	40	3.64E+05
PDCP-64	POE Nonylphenol	60-Day Average	3.5	Adult	1.09E-04	40	3.66E+05
PDCP-64	POE Nonylphenol	90-Day Average	3.49	Adult	1.09E-04	28	2.57E+05
PDCP-64	POE Nonylphenol	365-Day Average	3.15	Adult	9.84E-05	28	2.84E+05
PDCP-64	Sodium xylene sulfonate	Peak	0.274	0-<6 y.o.	1.42E-05	763	5.36E+07
PDCP-64	Sodium xylene sulfonate	4-Day Average	0.267	0-<6 y.o.	1.39E-05	763	5.50E+07
PDCP-64	Sodium xylene sulfonate	21-Day Average	0.267	0-<6 y.o.	1.39E-05	763	5.50E+07
PDCP-64	Sodium xylene sulfonate	60-Day Average	0.264	0-<6 y.o.	1.37E-05	763	5.56E+07
PDCP-64	Sodium xylene sulfonate	90-Day Average	0.26	0-<6 y.o.	1.35E-05	40	2.96E+06
PDCP-64	Sodium xylene sulfonate	365-Day Average	0.194	0-<6 y.o.	1.01E-05	40	3.97E+06
PDCP-64	Sodium xylene sulfonate	Peak	0.274	Adult	8.56E-06	763	8.91E+07
PDCP-64	Sodium xylene sulfonate	4-Day Average	0.267	Adult	8.34E-06	763	9.14E+07

Table D-1: PWC Concentrations and Surfacewater Ingestion Risk Estimates

Application Scenario	Chemical	Concentration Category	Limnetic Concentration (ug/L)	Index Life Stage	Exposure (mg/kg-day)	Oral NOAEL (mg/kg-day)	MOE (unitless)
PDCP-64	Sodium xylene sulfonate	21-Day Average	0.267	Adult	8.34E-06	763	9.14E+07
PDCP-64	Sodium xylene sulfonate	60-Day Average	0.264	Adult	8.25E-06	763	9.25E+07
PDCP-64	Sodium xylene sulfonate	90-Day Average	0.26	Adult	8.13E-06	40	4.92E+06
PDCP-64	Sodium xylene sulfonate	365-Day Average	0.194	Adult	6.06E-06	40	6.60E+06
PDCP-64	dinotefuran	Peak	3.86	0-<6 y.o.	2.01E-04	125	6.23E+05
PDCP-64	dinotefuran	4-Day Average	3.81	0-<6 y.o.	1.98E-04	125	6.31E+05
PDCP-64	dinotefuran	21-Day Average	3.81	0-<6 y.o.	1.98E-04	99.7	5.03E+05
PDCP-64	dinotefuran	60-Day Average	3.79	0-<6 y.o.	1.97E-04	99.7	5.06E+05
PDCP-64	dinotefuran	90-Day Average	3.77	0-<6 y.o.	1.96E-04	99.7	5.09E+05
PDCP-64	dinotefuran	365-Day Average	3.18	0-<6 y.o.	1.65E-04	99.7	6.03E+05
PDCP-64	dinotefuran	Peak	3.86	Adult	1.21E-04	125	1.04E+06
PDCP-64	dinotefuran	4-Day Average	3.81	Adult	1.19E-04	125	1.05E+06
PDCP-64	dinotefuran	21-Day Average	3.81	Adult	1.19E-04	99.7	8.37E+05
PDCP-64	dinotefuran	60-Day Average	3.79	Adult	1.18E-04	99.7	8.42E+05
PDCP-64	dinotefuran	90-Day Average	3.77	Adult	1.18E-04	99.7	8.46E+05
PDCP-64	dinotefuran	365-Day Average	3.18	Adult	9.94E-05	99.7	1.00E+06
PDCP-64	Sodium dodecylbenzene sulfonate	Peak	0.0875	0-<6 y.o.	4.55E-06	N/A	N/A
PDCP-64	Sodium dodecylbenzene sulfonate	4-Day Average	0.0702	0-<6 y.o.	3.65E-06	N/A	N/A
PDCP-64	Sodium dodecylbenzene sulfonate	21-Day Average	0.0662	0-<6 y.o.	3.44E-06	40	1.16E+07
PDCP-64	Sodium dodecylbenzene sulfonate	60-Day Average	0.0635	0-<6 y.o.	3.30E-06	40	1.21E+07
PDCP-64	Sodium dodecylbenzene sulfonate	90-Day Average	0.0622	0-<6 y.o.	3.23E-06	40	1.24E+07
PDCP-64	Sodium dodecylbenzene sulfonate	365-Day Average	0.0409	0-<6 y.o.	2.13E-06	40	1.88E+07
PDCP-64	Sodium dodecylbenzene sulfonate	Peak	0.0875	Adult	2.73E-06	N/A	N/A
PDCP-64	Sodium dodecylbenzene sulfonate	4-Day Average	0.0702	Adult	2.19E-06	N/A	N/A
PDCP-64	Sodium dodecylbenzene sulfonate	21-Day Average	0.0662	Adult	2.07E-06	40	1.93E+07
PDCP-64	Sodium dodecylbenzene sulfonate	60-Day Average	0.0635	Adult	1.98E-06	40	2.02E+07
PDCP-64	Sodium dodecylbenzene sulfonate	90-Day Average	0.0622	Adult	1.94E-06	40	2.06E+07
PDCP-64	Sodium dodecylbenzene sulfonate	365-Day Average	0.0409	Adult	1.28E-06	40	3.13E+07
PDCP-65	Dodecylbenzene sulfonate	Peak	0.0683	0-<6 y.o.	3.55E-06	N/A	N/A
PDCP-65	Dodecylbenzene sulfonate	4-Day Average	0.0463	0-<6 y.o.	2.41E-06	N/A	N/A
PDCP-65	Dodecylbenzene sulfonate	21-Day Average	0.0192	0-<6 y.o.	9.98E-07	40	4.01E+07
PDCP-65	Dodecylbenzene sulfonate	60-Day Average	0.0074	0-<6 y.o.	3.85E-07	40	1.04E+08
PDCP-65	Dodecylbenzene sulfonate	90-Day Average	0.00493	0-<6 y.o.	2.56E-07	40	1.56E+08
PDCP-65	Dodecylbenzene sulfonate	365-Day Average	0.00189	0-<6 y.o.	9.83E-08	40	4.07E+08
PDCP-65	Dodecylbenzene sulfonate	Peak	0.0683	Adult	2.13E-06	N/A	N/A
PDCP-65	Dodecylbenzene sulfonate	4-Day Average	0.0463	Adult	1.45E-06	N/A	N/A
PDCP-65	Dodecylbenzene sulfonate	21-Day Average	0.0192	Adult	6.00E-07	40	6.67E+07
PDCP-65	Dodecylbenzene sulfonate	60-Day Average	0.0074	Adult	2.31E-07	40	1.73E+08
PDCP-65	Dodecylbenzene sulfonate	90-Day Average	0.00493	Adult	1.54E-07	40	2.60E+08
PDCP-65	Dodecylbenzene sulfonate	365-Day Average	0.00189	Adult	5.91E-08	40	6.77E+08
PDCP-65	Ethanolamine	Peak	0.0654	0-<6 y.o.	3.40E-06	N/A	N/A
PDCP-65	Ethanolamine	4-Day Average	0.0214	0-<6 y.o.	1.11E-06	N/A	N/A
PDCP-65	Ethanolamine	21-Day Average	0.00528	0-<6 y.o.	2.75E-07	300	1.09E+09
PDCP-65	Ethanolamine	60-Day Average	0.00201	0-<6 y.o.	1.05E-07	300	2.87E+09
PDCP-65	Ethanolamine	90-Day Average	0.00136	0-<6 y.o.	7.07E-08	300	4.24E+09
PDCP-65	Ethanolamine	365-Day Average	0.000543	0-<6 y.o.	2.82E-08	300	1.06E+10
PDCP-65	Ethanolamine	Peak	0.0654	Adult	2.04E-06	N/A	N/A
PDCP-65	Ethanolamine	4-Day Average	0.0214	Adult	6.69E-07	N/A	N/A
PDCP-65	Ethanolamine	21-Day Average	0.00528	Adult	1.65E-07	300	1.82E+09
PDCP-65	Ethanolamine	60-Day Average	0.00201	Adult	6.28E-08	300	4.78E+09
PDCP-65	Ethanolamine	90-Day Average	0.00136	Adult	4.25E-08	300	7.06E+09
PDCP-65	Ethanolamine	365-Day Average	0.000543	Adult	1.70E-08	300	1.77E+10
PDCP-65	Isopropyl alcohol	Peak	0.0252	0-<6 y.o.	1.31E-06	240	1.83E+08
PDCP-65	Isopropyl alcohol	4-Day Average	0.022	0-<6 y.o.	1.14E-06	240	2.10E+08
PDCP-65	Isopropyl alcohol	21-Day Average	0.0132	0-<6 y.o.	6.86E-07	240	3.50E+08
PDCP-65	Isopropyl alcohol	60-Day Average	0.00547	0-<6 y.o.	2.84E-07	240	8.44E+08

Appendix 3A

Table D-1: PWC Concentrations and Surfacewater Ingestion Risk Estimates

Application Scenario	Chemical	Concentration Category	Limnetic Concentration (ug/L)	Index Life Stage	Exposure (mg/kg-day)	Oral NOAEL (mg/kg-day)	MOE (unitless)
PDCP-65	Isopropyl alcohol	90-Day Average	0.00366	0-<6 y.o.	1.90E-07	24	1.26E+08
PDCP-65	Isopropyl alcohol	365-Day Average	0.0016	0-<6 y.o.	8.32E-08	24	2.88E+08
PDCP-65	Isopropyl alcohol	Peak	0.0252	Adult	7.88E-07	240	3.05E+08
PDCP-65	Isopropyl alcohol	4-Day Average	0.022	Adult	6.88E-07	240	3.49E+08
PDCP-65	Isopropyl alcohol	21-Day Average	0.0132	Adult	4.13E-07	240	5.82E+08
PDCP-65	Isopropyl alcohol	60-Day Average	0.00547	Adult	1.71E-07	240	1.40E+09
PDCP-65	Isopropyl alcohol	90-Day Average	0.00366	Adult	1.14E-07	24	2.10E+08
PDCP-65	Isopropyl alcohol	365-Day Average	0.0016	Adult	5.00E-08	24	4.80E+08
PDCP-65	POE Nonylphenol	Peak	0.196	0-<6 y.o.	1.02E-05	50	4.91E+06
PDCP-65	POE Nonylphenol	4-Day Average	0.173	0-<6 y.o.	9.00E-06	50	5.56E+06
PDCP-65	POE Nonylphenol	21-Day Average	0.124	0-<6 y.o.	6.45E-06	40	6.20E+06
PDCP-65	POE Nonylphenol	60-Day Average	0.0843	0-<6 y.o.	4.38E-06	40	9.12E+06
PDCP-65	POE Nonylphenol	90-Day Average	0.0728	0-<6 y.o.	3.79E-06	28	7.40E+06
PDCP-65	POE Nonylphenol	365-Day Average	0.0487	0-<6 y.o.	2.53E-06	28	1.11E+07
PDCP-65	POE Nonylphenol	Peak	0.196	Adult	6.13E-06	50	8.16E+06
PDCP-65	POE Nonylphenol	4-Day Average	0.173	Adult	5.41E-06	50	9.25E+06
PDCP-65	POE Nonylphenol	21-Day Average	0.124	Adult	3.88E-06	40	1.03E+07
PDCP-65	POE Nonylphenol	60-Day Average	0.0843	Adult	2.63E-06	40	1.52E+07
PDCP-65	POE Nonylphenol	90-Day Average	0.0728	Adult	2.28E-06	28	1.23E+07
PDCP-65	POE Nonylphenol	365-Day Average	0.0487	Adult	1.52E-06	28	1.84E+07
PDCP-65	Sodium xylene sulfonate	Peak	0.0145	0-<6 y.o.	7.54E-07	763	1.01E+09
PDCP-65	Sodium xylene sulfonate	4-Day Average	0.014	0-<6 y.o.	7.28E-07	763	1.05E+09
PDCP-65	Sodium xylene sulfonate	21-Day Average	0.0119	0-<6 y.o.	6.19E-07	763	1.23E+09
PDCP-65	Sodium xylene sulfonate	60-Day Average	0.0085	0-<6 y.o.	4.42E-07	763	1.73E+09
PDCP-65	Sodium xylene sulfonate	90-Day Average	0.693	0-<6 y.o.	3.60E-05	40	1.11E+06
PDCP-65	Sodium xylene sulfonate	365-Day Average	0.00324	0-<6 y.o.	1.68E-07	40	2.37E+08
PDCP-65	Sodium xylene sulfonate	Peak	0.0145	Adult	4.53E-07	763	1.68E+09
PDCP-65	Sodium xylene sulfonate	4-Day Average	0.014	Adult	4.38E-07	763	1.74E+09
PDCP-65	Sodium xylene sulfonate	21-Day Average	0.0119	Adult	3.72E-07	763	2.05E+09
PDCP-65	Sodium xylene sulfonate	60-Day Average	0.0085	Adult	2.66E-07	763	2.87E+09
PDCP-65	Sodium xylene sulfonate	90-Day Average	0.693	Adult	2.17E-05	40	1.85E+06
PDCP-65	Sodium xylene sulfonate	365-Day Average	0.00324	Adult	1.01E-07	40	3.95E+08
PDCP-65	dinotefuran	Peak	0.162	0-<6 y.o.	8.42E-06	125	1.48E+07
PDCP-65	dinotefuran	4-Day Average	0.157	0-<6 y.o.	8.16E-06	125	1.53E+07
PDCP-65	dinotefuran	21-Day Average	0.143	0-<6 y.o.	7.44E-06	99.7	1.34E+07
PDCP-65	dinotefuran	60-Day Average	0.112	0-<6 y.o.	5.82E-06	99.7	1.71E+07
PDCP-65	dinotefuran	90-Day Average	0.108	0-<6 y.o.	5.62E-06	99.7	1.78E+07
PDCP-65	dinotefuran	365-Day Average	0.0516	0-<6 y.o.	2.68E-06	99.7	3.72E+07
PDCP-65	dinotefuran	Peak	0.162	Adult	5.06E-06	125	2.47E+07
PDCP-65	dinotefuran	4-Day Average	0.157	Adult	4.91E-06	125	2.55E+07
PDCP-65	dinotefuran	21-Day Average	0.143	Adult	4.47E-06	99.7	2.23E+07
PDCP-65	dinotefuran	60-Day Average	0.112	Adult	3.50E-06	99.7	2.85E+07
PDCP-65	dinotefuran	90-Day Average	0.108	Adult	3.38E-06	99.7	2.95E+07
PDCP-65	dinotefuran	365-Day Average	0.0516	Adult	1.61E-06	99.7	6.18E+07
PDCP-65	Sodium dodecylbenzene sulfonate	Peak	0.0274	0-<6 y.o.	1.42E-06	N/A	N/A
PDCP-65	Sodium dodecylbenzene sulfonate	4-Day Average	0.0186	0-<6 y.o.	9.67E-07	N/A	N/A
PDCP-65	Sodium dodecylbenzene sulfonate	21-Day Average	0.00772	0-<6 y.o.	4.01E-07	40	9.96E+07
PDCP-65	Sodium dodecylbenzene sulfonate	60-Day Average	0.00297	0-<6 y.o.	1.54E-07	40	2.59E+08
PDCP-65	Sodium dodecylbenzene sulfonate	90-Day Average	0.00198	0-<6 y.o.	1.03E-07	40	3.89E+08
PDCP-65	Sodium dodecylbenzene sulfonate	365-Day Average	0.000757	0-<6 y.o.	3.94E-08	40	1.02E+09
PDCP-65	Sodium dodecylbenzene sulfonate	Peak	0.0274	Adult	8.56E-07	N/A	N/A
PDCP-65	Sodium dodecylbenzene sulfonate	4-Day Average	0.0186	Adult	5.81E-07	N/A	N/A
PDCP-65	Sodium dodecylbenzene sulfonate	21-Day Average	0.00772	Adult	2.41E-07	40	1.66E+08
PDCP-65	Sodium dodecylbenzene sulfonate	60-Day Average	0.00297	Adult	9.28E-08	40	4.31E+08
PDCP-65	Sodium dodecylbenzene sulfonate	90-Day Average	0.00198	Adult	6.19E-08	40	6.46E+08
PDCP-65	Sodium dodecylbenzene sulfonate	365-Day Average	0.000757	Adult	2.37E-08	40	1.69E+09

Table D-1: PWC Concentrations and Surfacewater Ingestion Risk Estimates

Application Scenario	Chemical	Concentration Category	Limnetic Concentration (ug/L)	Index Life Stage	Exposure (mg/kg-day)	Oral NOAEL (mg/kg-day)	MOE (unitless)
PDCP-66	dinotefuran	Peak	7.99	0-<6 y.o.	4.15E-04	125	3.01E+05
PDCP-66	dinotefuran	4-Day Average	7.83	0-<6 y.o.	4.07E-04	125	3.07E+05
PDCP-66	dinotefuran	21-Day Average	7.02	0-<6 y.o.	3.65E-04	99.7	2.73E+05
PDCP-66	dinotefuran	60-Day Average	5.52	0-<6 y.o.	2.87E-04	99.7	3.47E+05
PDCP-66	dinotefuran	90-Day Average	4.66	0-<6 y.o.	2.42E-04	99.7	4.11E+05
PDCP-66	dinotefuran	365-Day Average	1.57	0-<6 y.o.	8.16E-05	99.7	1.22E+06
PDCP-66	dinotefuran	Peak	7.99	Adult	2.50E-04	125	5.01E+05
PDCP-66	dinotefuran	4-Day Average	7.83	Adult	2.45E-04	125	5.11E+05
PDCP-66	dinotefuran	21-Day Average	7.02	Adult	2.19E-04	99.7	4.54E+05
PDCP-66	dinotefuran	60-Day Average	5.52	Adult	1.73E-04	99.7	5.78E+05
PDCP-66	dinotefuran	90-Day Average	4.66	Adult	1.46E-04	99.7	6.85E+05
PDCP-66	dinotefuran	365-Day Average	1.57	Adult	4.91E-05	99.7	2.03E+06
PDCP-66	Sodium dodecylbenzene sulfonate	Peak	1.54	0-<6 y.o.	8.01E-05	N/A	N/A
PDCP-66	Sodium dodecylbenzene sulfonate	4-Day Average	1.01	0-<6 y.o.	5.25E-05	N/A	N/A
PDCP-66	Sodium dodecylbenzene sulfonate	21-Day Average	0.34	0-<6 y.o.	1.77E-05	40	2.26E+06
PDCP-66	Sodium dodecylbenzene sulfonate	60-Day Average	0.155	0-<6 y.o.	8.06E-06	40	4.96E+06
PDCP-66	Sodium dodecylbenzene sulfonate	90-Day Average	0.103	0-<6 y.o.	5.36E-06	40	7.47E+06
PDCP-66	Sodium dodecylbenzene sulfonate	365-Day Average	0.0254	0-<6 y.o.	1.32E-06	40	3.03E+07
PDCP-66	Sodium dodecylbenzene sulfonate	Peak	1.54	Adult	4.81E-05	N/A	N/A
PDCP-66	Sodium dodecylbenzene sulfonate	4-Day Average	1.01	Adult	3.16E-05	N/A	N/A
PDCP-66	Sodium dodecylbenzene sulfonate	21-Day Average	0.34	Adult	1.06E-05	40	3.76E+06
PDCP-66	Sodium dodecylbenzene sulfonate	60-Day Average	0.155	Adult	4.84E-06	40	8.26E+06
PDCP-66	Sodium dodecylbenzene sulfonate	90-Day Average	0.103	Adult	3.22E-06	40	1.24E+07
PDCP-66	Sodium dodecylbenzene sulfonate	365-Day Average	0.0254	Adult	7.94E-07	40	5.04E+07
PDCP-66 Aerial	dinotefuran	Peak	8.16	0-<6 y.o.	4.24E-04	125	2.95E+05
PDCP-66 Aerial	dinotefuran	4-Day Average	8	0-<6 y.o.	4.16E-04	125	3.00E+05
PDCP-66 Aerial	dinotefuran	21-Day Average	7.17	0-<6 y.o.	3.73E-04	99.7	2.67E+05
PDCP-66 Aerial	dinotefuran	60-Day Average	5.64	0-<6 y.o.	2.93E-04	99.7	3.40E+05
PDCP-66 Aerial	dinotefuran	90-Day Average	4.76	0-<6 y.o.	2.48E-04	99.7	4.03E+05
PDCP-66 Aerial	dinotefuran	365-Day Average	1.61	0-<6 y.o.	8.37E-05	99.7	1.19E+06
PDCP-66 Aerial	dinotefuran	Peak	8.16	Adult	2.55E-04	125	4.90E+05
PDCP-66 Aerial	dinotefuran	4-Day Average	8	Adult	2.50E-04	125	5.00E+05
PDCP-66 Aerial	dinotefuran	21-Day Average	7.17	Adult	2.24E-04	99.7	4.45E+05
PDCP-66 Aerial	dinotefuran	60-Day Average	5.64	Adult	1.76E-04	99.7	5.66E+05
PDCP-66 Aerial	dinotefuran	90-Day Average	4.76	Adult	1.49E-04	99.7	6.70E+05
PDCP-66 Aerial	dinotefuran	365-Day Average	1.61	Adult	5.03E-05	99.7	1.98E+06
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	Peak	1.51	0-<6 y.o.	7.85E-05	N/A	N/A
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	4-Day Average	0.991	0-<6 y.o.	5.15E-05	N/A	N/A
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	21-Day Average	0.351	0-<6 y.o.	1.83E-05	40	2.19E+06
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	60-Day Average	0.158	0-<6 y.o.	8.22E-06	40	4.87E+06
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	90-Day Average	0.112	0-<6 y.o.	5.82E-06	40	6.87E+06
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	365-Day Average	0.0255	0-<6 y.o.	1.33E-06	40	3.02E+07
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	Peak	1.51	Adult	4.72E-05	N/A	N/A
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	4-Day Average	0.991	Adult	3.10E-05	N/A	N/A
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	21-Day Average	0.351	Adult	1.10E-05	40	3.65E+06
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	60-Day Average	0.158	Adult	4.94E-06	40	8.10E+06
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	90-Day Average	0.112	Adult	3.50E-06	40	1.14E+07
PDCP-66 Aerial	Sodium dodecylbenzene sulfonate	365-Day Average	0.0255	Adult	7.97E-07	40	5.02E+07
PDCP-70	Glycerin	Peak	0.00806	0-<6 y.o.	4.19E-07	10000	2.39E+10
PDCP-70	Glycerin	4-Day Average	0.00485	0-<6 y.o.	2.52E-07	10000	3.97E+10
PDCP-70	Glycerin	21-Day Average	0.00137	0-<6 y.o.	7.12E-08	10000	1.40E+11
PDCP-70	Glycerin	60-Day Average	0.000482	0-<6 y.o.	2.51E-08	10000	3.99E+11
PDCP-70	Glycerin	90-Day Average	0.000321	0-<6 y.o.	1.67E-08	10000	5.99E+11
PDCP-70	Glycerin	365-Day Average	0.0000792	0-<6 y.o.	4.12E-09	10000	2.43E+12
PDCP-70	Glycerin	Peak	0.00806	Adult	2.52E-07	10000	3.97E+10
PDCP-70	Glycerin	4-Day Average	0.00485	Adult	1.52E-07	10000	6.60E+10

Application Scenario	Chemical	Concentration Category	Limnetic Concentration (ug/L)	Index Life Stage	Exposure (mg/kg-day)	Oral NOAEL (mg/kg-day)	MOE (unitless)
PDCP-70	Glycerin	21-Day Average	0.00137	Adult	4.28E-08	10000	2.34E+11
PDCP-70	Glycerin	60-Day Average	0.000482	Adult	1.51E-08	10000	6.64E+11
PDCP-70	Glycerin	90-Day Average	0.000321	Adult	1.00E-08	10000	9.97E+11
PDCP-70	Glycerin	365-Day Average	0.0000792	Adult	2.48E-09	10000	4.04E+12
PDCP-70	Imidacloprid	Peak	0.019	0-<6 y.o.	9.88E-07	9	9.11E+06
PDCP-70	Imidacloprid	4-Day Average	0.0172	0-<6 y.o.	8.94E-07	9	1.01E+07
PDCP-70	Imidacloprid	21-Day Average	0.0125	0-<6 y.o.	6.50E-07	7.3	1.12E+07
PDCP-70	Imidacloprid	60-Day Average	0.00707	0-<6 y.o.	3.68E-07	7.3	1.99E+07
PDCP-70	Imidacloprid	90-Day Average	0.00505	0-<6 y.o.	2.63E-07	5.7	2.17E+07
PDCP-70	Imidacloprid	365-Day Average	0.00129	0-<6 y.o.	6.71E-08	5.7	8.50E+07
PDCP-70	Imidacloprid	Peak	0.019	Adult	5.94E-07	9	1.52E+07
PDCP-70	Imidacloprid	4-Day Average	0.0172	Adult	5.38E-07	9	1.67E+07
PDCP-70	Imidacloprid	21-Day Average	0.0125	Adult	3.91E-07	7.3	1.87E+07
PDCP-70	Imidacloprid	60-Day Average	0.00707	Adult	2.21E-07	7.3	3.30E+07
PDCP-70	Imidacloprid	90-Day Average	0.00505	Adult	1.58E-07	5.7	3.61E+07
PDCP-70	Imidacloprid	365-Day Average	0.00129	Adult	4.03E-08	5.7	1.41E+08
PDCP-71	Glycerin	Peak	0.0659	0-<6 y.o.	3.43E-06	10000	2.92E+09
PDCP-71	Glycerin	4-Day Average	0.0397	0-<6 y.o.	2.06E-06	10000	4.84E+09
PDCP-71	Glycerin	21-Day Average	0.0111	0-<6 y.o.	5.77E-07	10000	1.73E+10
PDCP-71	Glycerin	60-Day Average	0.0039	0-<6 y.o.	2.03E-07	10000	4.93E+10
PDCP-71	Glycerin	90-Day Average	0.0026	0-<6 y.o.	1.35E-07	10000	7.40E+10
PDCP-71	Glycerin	365-Day Average	0.000641	0-<6 y.o.	3.33E-08	10000	3.00E+11
PDCP-71	Glycerin	Peak	0.0659	Adult	2.06E-06	10000	4.86E+09
PDCP-71	Glycerin	4-Day Average	0.0397	Adult	1.24E-06	10000	8.06E+09
PDCP-71	Glycerin	21-Day Average	0.0111	Adult	3.47E-07	10000	2.88E+10
PDCP-71	Glycerin	60-Day Average	0.0039	Adult	1.22E-07	10000	8.21E+10
PDCP-71	Glycerin	90-Day Average	0.0026	Adult	8.13E-08	10000	1.23E+11
PDCP-71	Glycerin	365-Day Average	0.000641	Adult	2.00E-08	10000	4.99E+11
PDCP-71	Imidacloprid	Peak	0.207	0-<6 y.o.	1.08E-05	9	8.36E+05
PDCP-71	Imidacloprid	4-Day Average	0.188	0-<6 y.o.	9.78E-06	9	9.21E+05
PDCP-71	Imidacloprid	21-Day Average	0.137	0-<6 y.o.	7.12E-06	7.3	1.02E+06
PDCP-71	Imidacloprid	60-Day Average	0.0753	0-<6 y.o.	3.92E-06	7.3	1.86E+06
PDCP-71	Imidacloprid	90-Day Average	0.0538	0-<6 y.o.	2.80E-06	5.7	2.04E+06
PDCP-71	Imidacloprid	365-Day Average	0.0138	0-<6 y.o.	7.18E-07	5.7	7.94E+06
PDCP-71	Imidacloprid	Peak	0.207	Adult	6.47E-06	9	1.39E+06
PDCP-71	Imidacloprid	4-Day Average	0.188	Adult	5.88E-06	9	1.53E+06
PDCP-71	Imidacloprid	21-Day Average	0.137	Adult	4.28E-06	7.3	1.71E+06
PDCP-71	Imidacloprid	60-Day Average	0.0753	Adult	2.35E-06	7.3	3.10E+06
PDCP-71	Imidacloprid	90-Day Average	0.0538	Adult	1.68E-06	5.7	3.39E+06
PDCP-71	Imidacloprid	365-Day Average	0.0138	Adult	4.31E-07	5.7	1.32E+07
PDCP-77	Dodecylbenzene sulfonate	Peak	0.0992	0-<6 y.o.	5.16E-06	N/A	N/A
PDCP-77	Dodecylbenzene sulfonate	4-Day Average	0.0795	0-<6 y.o.	4.13E-06	N/A	N/A
PDCP-77	Dodecylbenzene sulfonate	21-Day Average	0.0748	0-<6 y.o.	3.89E-06	40	1.03E+07
PDCP-77	Dodecylbenzene sulfonate	60-Day Average	0.0718	0-<6 y.o.	3.73E-06	40	1.07E+07
PDCP-77	Dodecylbenzene sulfonate	90-Day Average	0.0704	0-<6 y.o.	3.66E-06	40	1.09E+07
PDCP-77	Dodecylbenzene sulfonate	365-Day Average	0.0463	0-<6 y.o.	2.41E-06	40	1.66E+07
PDCP-77	Dodecylbenzene sulfonate	Peak	0.0992	Adult	3.10E-06	N/A	N/A
PDCP-77	Dodecylbenzene sulfonate	4-Day Average	0.0795	Adult	2.48E-06	N/A	N/A
PDCP-77	Dodecylbenzene sulfonate	21-Day Average	0.0748	Adult	2.34E-06	40	1.71E+07
PDCP-77	Dodecylbenzene sulfonate	60-Day Average	0.0718	Adult	2.24E-06	40	1.78E+07
PDCP-77	Dodecylbenzene sulfonate	90-Day Average	0.0704	Adult	2.20E-06	40	1.82E+07
PDCP-77	Dodecylbenzene sulfonate	365-Day Average	0.0463	Adult	1.45E-06	40	2.76E+07
PDCP-77	Ethanolamine	Peak	0.0482	0-<6 y.o.	2.51E-06	N/A	N/A
PDCP-77	Ethanolamine	4-Day Average	0.0233	0-<6 y.o.	1.21E-06	N/A	N/A
PDCP-77	Ethanolamine	21-Day Average	0.0226	0-<6 y.o.	1.18E-06	300	2.55E+08
PDCP-77	Ethanolamine	60-Day Average	0.0216	0-<6 y.o.	1.12E-06	300	2.67E+08

Table D-1: PWC Concentrations and Surfacewater Ingestion Risk Estimates

Application Scenario	Chemical	Concentration Category	Limnetic Concentration (ug/L)	Index Life Stage	Exposure (mg/kg-day)	Oral NOAEL (mg/kg-day)	MOE (unitless)
PDCP-77	Ethanolamine	90-Day Average	0.0213	0-<6 y.o.	1.11E-06	300	2.71E+08
PDCP-77	Ethanolamine	365-Day Average	0.014	0-<6 y.o.	7.28E-07	300	4.12E+08
PDCP-77	Ethanolamine	Peak	0.0482	Adult	1.51E-06	N/A	N/A
PDCP-77	Ethanolamine	4-Day Average	0.0233	Adult	7.28E-07	N/A	N/A
PDCP-77	Ethanolamine	21-Day Average	0.0226	Adult	7.06E-07	300	4.25E+08
PDCP-77	Ethanolamine	60-Day Average	0.0216	Adult	6.75E-07	300	4.44E+08
PDCP-77	Ethanolamine	90-Day Average	0.0213	Adult	6.66E-07	300	4.51E+08
PDCP-77	Ethanolamine	365-Day Average	0.014	Adult	4.38E-07	300	6.86E+08
PDCP-77	Isopropyl alcohol	Peak	0.0765	0-<6 y.o.	3.98E-06	240	6.03E+07
PDCP-77	Isopropyl alcohol	4-Day Average	0.0705	0-<6 y.o.	3.67E-06	240	6.55E+07
PDCP-77	Isopropyl alcohol	21-Day Average	0.0699	0-<6 y.o.	3.63E-06	240	6.60E+07
PDCP-77	Isopropyl alcohol	60-Day Average	0.0681	0-<6 y.o.	3.54E-06	240	6.78E+07
PDCP-77	Isopropyl alcohol	90-Day Average	0.0665	0-<6 y.o.	3.46E-06	24	6.94E+06
PDCP-77	Isopropyl alcohol	365-Day Average	0.0445	0-<6 y.o.	2.31E-06	24	1.04E+07
PDCP-77	Isopropyl alcohol	Peak	0.0765	Adult	2.39E-06	240	1.00E+08
PDCP-77	Isopropyl alcohol	4-Day Average	0.0705	Adult	2.20E-06	240	1.09E+08
PDCP-77	Isopropyl alcohol	21-Day Average	0.0699	Adult	2.18E-06	240	1.10E+08
PDCP-77	Isopropyl alcohol	60-Day Average	0.0681	Adult	2.13E-06	240	1.13E+08
PDCP-77	Isopropyl alcohol	90-Day Average	0.0665	Adult	2.08E-06	24	1.15E+07
PDCP-77	Isopropyl alcohol	365-Day Average	0.0445	Adult	1.39E-06	24	1.73E+07
PDCP-77	POE Nonylphenol	Peak	1.65	0-<6 y.o.	8.58E-05	50	5.83E+05
PDCP-77	POE Nonylphenol	4-Day Average	1.62	0-<6 y.o.	8.42E-05	50	5.94E+05
PDCP-77	POE Nonylphenol	21-Day Average	1.62	0-<6 y.o.	8.42E-05	40	4.75E+05
PDCP-77	POE Nonylphenol	60-Day Average	1.61	0-<6 y.o.	8.37E-05	40	4.78E+05
PDCP-77	POE Nonylphenol	90-Day Average	1.6	0-<6 y.o.	8.32E-05	28	3.37E+05
PDCP-77	POE Nonylphenol	365-Day Average	1.45	0-<6 y.o.	7.54E-05	28	3.71E+05
PDCP-77	POE Nonylphenol	Peak	1.65	Adult	5.16E-05	50	9.70E+05
PDCP-77	POE Nonylphenol	4-Day Average	1.62	Adult	5.06E-05	50	9.88E+05
PDCP-77	POE Nonylphenol	21-Day Average	1.62	Adult	5.06E-05	40	7.90E+05
PDCP-77	POE Nonylphenol	60-Day Average	1.61	Adult	5.03E-05	40	7.95E+05
PDCP-77	POE Nonylphenol	90-Day Average	1.6	Adult	5.00E-05	28	5.60E+05
PDCP-77	POE Nonylphenol	365-Day Average	1.45	Adult	4.53E-05	28	6.18E+05
PDCP-77	Sodium xylene sulfonate	Peak	0.122	0-<6 y.o.	6.34E-06	763	1.20E+08
PDCP-77	Sodium xylene sulfonate	4-Day Average	0.119	0-<6 y.o.	6.19E-06	763	1.23E+08
PDCP-77	Sodium xylene sulfonate	21-Day Average	0.119	0-<6 y.o.	6.19E-06	763	1.23E+08
PDCP-77	Sodium xylene sulfonate	60-Day Average	0.117	0-<6 y.o.	6.08E-06	763	1.25E+08
PDCP-77	Sodium xylene sulfonate	90-Day Average	0.116	0-<6 y.o.	6.03E-06	40	6.63E+06
PDCP-77	Sodium xylene sulfonate	365-Day Average	0.086	0-<6 y.o.	4.47E-06	40	8.94E+06
PDCP-77	Sodium xylene sulfonate	Peak	0.122	Adult	3.81E-06	763	2.00E+08
PDCP-77	Sodium xylene sulfonate	4-Day Average	0.119	Adult	3.72E-06	763	2.05E+08
PDCP-77	Sodium xylene sulfonate	21-Day Average	0.119	Adult	3.72E-06	763	2.05E+08
PDCP-77	Sodium xylene sulfonate	60-Day Average	0.117	Adult	3.66E-06	763	2.09E+08
PDCP-77	Sodium xylene sulfonate	90-Day Average	0.116	Adult	3.63E-06	40	1.10E+07
PDCP-77	Sodium xylene sulfonate	365-Day Average	0.086	Adult	2.69E-06	40	1.49E+07
PDCP-77	Imidacloprid	Peak	0.147	0-<6 y.o.	7.64E-06	9	1.18E+06
PDCP-77	Imidacloprid	4-Day Average	0.14	0-<6 y.o.	7.28E-06	9	1.24E+06
PDCP-77	Imidacloprid	21-Day Average	0.14	0-<6 y.o.	7.28E-06	7.3	1.00E+06
PDCP-77	Imidacloprid	60-Day Average	0.139	0-<6 y.o.	7.23E-06	7.3	1.01E+06
PDCP-77	Imidacloprid	90-Day Average	0.139	0-<6 y.o.	7.23E-06	5.7	7.89E+05
PDCP-77	Imidacloprid	365-Day Average	0.114	0-<6 y.o.	5.93E-06	5.7	9.62E+05
PDCP-77	Imidacloprid	Peak	0.147	Adult	4.59E-06	9	1.96E+06
PDCP-77	Imidacloprid	4-Day Average	0.14	Adult	4.38E-06	9	2.06E+06
PDCP-77	Imidacloprid	21-Day Average	0.14	Adult	4.38E-06	7.3	1.67E+06
PDCP-77	Imidacloprid	60-Day Average	0.139	Adult	4.34E-06	7.3	1.68E+06
PDCP-77	Imidacloprid	90-Day Average	0.139	Adult	4.34E-06	5.7	1.31E+06
PDCP-77	Imidacloprid	365-Day Average	0.114	Adult	3.56E-06	5.7	1.60E+06

Table D-1: PWC Concentrations and Surfacewater Ingestion Risk Estimates

Application Scenario	Chemical	Concentration Category	Limnetic Concentration (ug/L)	Index Life Stage	Exposure (mg/kg-day)	Oral NOAEL (mg/kg-day)	MOE (unitless)
PDCP-77	Glycerin	Peak	0.0282	0-<6 y.o.	1.47E-06	10000	6.82E+09
PDCP-77	Glycerin	4-Day Average	0.0252	0-<6 y.o.	1.31E-06	10000	7.63E+09
PDCP-77	Glycerin	21-Day Average	0.0251	0-<6 y.o.	1.31E-06	10000	7.66E+09
PDCP-77	Glycerin	60-Day Average	0.0243	0-<6 y.o.	1.26E-06	10000	7.91E+09
PDCP-77	Glycerin	90-Day Average	0.0238	0-<6 y.o.	1.24E-06	10000	8.08E+09
PDCP-77	Glycerin	365-Day Average	0.0157	0-<6 y.o.	8.16E-07	10000	1.22E+10
PDCP-77	Glycerin	Peak	0.0282	Adult	8.81E-07	10000	1.13E+10
PDCP-77	Glycerin	4-Day Average	0.0252	Adult	7.88E-07	10000	1.27E+10
PDCP-77	Glycerin	21-Day Average	0.0251	Adult	7.84E-07	10000	1.27E+10
PDCP-77	Glycerin	60-Day Average	0.0243	Adult	7.59E-07	10000	1.32E+10
PDCP-77	Glycerin	90-Day Average	0.0238	Adult	7.44E-07	10000	1.34E+10
PDCP-77	Glycerin	365-Day Average	0.0157	Adult	4.91E-07	10000	2.04E+10
PDCP-78	Dodecylbenzene sulfonate	Peak	0.0278	0-<6 y.o.	1.45E-06	N/A	N/A
PDCP-78	Dodecylbenzene sulfonate	4-Day Average	0.0189	0-<6 y.o.	9.83E-07	N/A	N/A
PDCP-78	Dodecylbenzene sulfonate	21-Day Average	0.00785	0-<6 y.o.	4.08E-07	40	9.80E+07
PDCP-78	Dodecylbenzene sulfonate	60-Day Average	0.00302	0-<6 y.o.	1.57E-07	40	2.55E+08
PDCP-78	Dodecylbenzene sulfonate	90-Day Average	0.00201	0-<6 y.o.	1.05E-07	40	3.83E+08
PDCP-78	Dodecylbenzene sulfonate	365-Day Average	0.000695	0-<6 y.o.	3.61E-08	40	1.11E+09
PDCP-78	Dodecylbenzene sulfonate	Peak	0.0278	Adult	8.69E-07	N/A	N/A
PDCP-78	Dodecylbenzene sulfonate	4-Day Average	0.0189	Adult	5.91E-07	N/A	N/A
PDCP-78	Dodecylbenzene sulfonate	21-Day Average	0.00785	Adult	2.45E-07	40	1.63E+08
PDCP-78	Dodecylbenzene sulfonate	60-Day Average	0.00302	Adult	9.44E-08	40	4.24E+08
PDCP-78	Dodecylbenzene sulfonate	90-Day Average	0.00201	Adult	6.28E-08	40	6.37E+08
PDCP-78	Dodecylbenzene sulfonate	365-Day Average	0.000695	Adult	2.17E-08	40	1.84E+09
PDCP-78	Ethanolamine	Peak	0.0269	0-<6 y.o.	1.40E-06	N/A	N/A
PDCP-78	Ethanolamine	4-Day Average	0.0088	0-<6 y.o.	4.58E-07	N/A	N/A
PDCP-78	Ethanolamine	21-Day Average	0.00217	0-<6 y.o.	1.13E-07	300	2.66E+09
PDCP-78	Ethanolamine	60-Day Average	0.000828	0-<6 y.o.	4.31E-08	300	6.97E+09
PDCP-78	Ethanolamine	90-Day Average	0.000561	0-<6 y.o.	2.92E-08	300	1.03E+10
PDCP-78	Ethanolamine	365-Day Average	0.000198	0-<6 y.o.	1.03E-08	300	2.91E+10
PDCP-78	Ethanolamine	Peak	0.0269	Adult	8.41E-07	N/A	N/A
PDCP-78	Ethanolamine	4-Day Average	0.0088	Adult	2.75E-07	N/A	N/A
PDCP-78	Ethanolamine	21-Day Average	0.00217	Adult	6.78E-08	300	4.42E+09
PDCP-78	Ethanolamine	60-Day Average	0.000828	Adult	2.59E-08	300	1.16E+10
PDCP-78	Ethanolamine	90-Day Average	0.000561	Adult	1.75E-08	300	1.71E+10
PDCP-78	Ethanolamine	365-Day Average	0.000198	Adult	6.19E-09	300	4.85E+10
PDCP-78	Isopropyl alcohol	Peak	0.0103	0-<6 y.o.	5.36E-07	240	4.48E+08
PDCP-78	Isopropyl alcohol	4-Day Average	0.00904	0-<6 y.o.	4.70E-07	240	5.11E+08
PDCP-78	Isopropyl alcohol	21-Day Average	0.00542	0-<6 y.o.	2.82E-07	240	8.52E+08
PDCP-78	Isopropyl alcohol	60-Day Average	0.00225	0-<6 y.o.	1.17E-07	240	2.05E+09
PDCP-78	Isopropyl alcohol	90-Day Average	0.0015	0-<6 y.o.	7.80E-08	24	3.08E+08
PDCP-78	Isopropyl alcohol	365-Day Average	0.000591	0-<6 y.o.	3.07E-08	24	7.81E+08
PDCP-78	Isopropyl alcohol	Peak	0.0103	Adult	3.22E-07	240	7.46E+08
PDCP-78	Isopropyl alcohol	4-Day Average	0.00904	Adult	2.83E-07	240	8.50E+08
PDCP-78	Isopropyl alcohol	21-Day Average	0.00542	Adult	1.69E-07	240	1.42E+09
PDCP-78	Isopropyl alcohol	60-Day Average	0.00225	Adult	7.03E-08	240	3.41E+09
PDCP-78	Isopropyl alcohol	90-Day Average	0.0015	Adult	4.69E-08	24	5.12E+08
PDCP-78	Isopropyl alcohol	365-Day Average	0.000591	Adult	1.85E-08	24	1.30E+09
PDCP-78	POE Nonylphenol	Peak	0.0756	0-<6 y.o.	3.93E-06	50	1.27E+07
PDCP-78	POE Nonylphenol	4-Day Average	0.0662	0-<6 y.o.	3.44E-06	50	1.45E+07
PDCP-78	POE Nonylphenol	21-Day Average	0.0501	0-<6 y.o.	2.61E-06	40	1.54E+07
PDCP-78	POE Nonylphenol	60-Day Average	0.0352	0-<6 y.o.	1.83E-06	40	2.19E+07
PDCP-78	POE Nonylphenol	90-Day Average	0.0303	0-<6 y.o.	1.58E-06	28	1.78E+07
PDCP-78	POE Nonylphenol	365-Day Average	0.0194	0-<6 y.o.	1.01E-06	28	2.78E+07
PDCP-78	POE Nonylphenol	Peak	0.0756	Adult	2.36E-06	50	2.12E+07
PDCP-78	POE Nonylphenol	4-Day Average	0.0662	Adult	2.07E-06	50	2.42E+07

Table D-1: PWC Concentrations and Surfacewater Ingestion Risk Estimates

Application Scenario	Chemical	Concentration Category	Limnetic Concentration (ug/L)	Index Life Stage	Exposure (mg/kg-day)	Oral NOAEL (mg/kg-day)	MOE (unitless)
PDCP-78	POE Nonylphenol	21-Day Average	0.0501	Adult	1.57E-06	40	2.55E+07
PDCP-78	POE Nonylphenol	60-Day Average	0.0352	Adult	1.10E-06	40	3.64E+07
PDCP-78	POE Nonylphenol	90-Day Average	0.0303	Adult	9.47E-07	28	2.96E+07
PDCP-78	POE Nonylphenol	365-Day Average	0.0194	Adult	6.06E-07	28	4.62E+07
PDCP-78	Sodium xylene sulfonate	Peak	0.00557	0-<6 y.o.	2.90E-07	763	2.63E+09
PDCP-78	Sodium xylene sulfonate	4-Day Average	0.00536	0-<6 y.o.	2.79E-07	763	2.74E+09
PDCP-78	Sodium xylene sulfonate	21-Day Average	0.00481	0-<6 y.o.	2.50E-07	763	3.05E+09
PDCP-78	Sodium xylene sulfonate	60-Day Average	0.00347	0-<6 y.o.	1.80E-07	763	4.23E+09
PDCP-78	Sodium xylene sulfonate	90-Day Average	0.00276	0-<6 y.o.	1.44E-07	40	2.79E+08
PDCP-78	Sodium xylene sulfonate	365-Day Average	0.00121	0-<6 y.o.	6.29E-08	40	6.36E+08
PDCP-78	Sodium xylene sulfonate	Peak	0.00557	Adult	1.74E-07	763	4.38E+09
PDCP-78	Sodium xylene sulfonate	4-Day Average	0.00536	Adult	1.68E-07	763	4.56E+09
PDCP-78	Sodium xylene sulfonate	21-Day Average	0.00481	Adult	1.50E-07	763	5.08E+09
PDCP-78	Sodium xylene sulfonate	60-Day Average	0.00347	Adult	1.08E-07	763	7.04E+09
PDCP-78	Sodium xylene sulfonate	90-Day Average	0.00276	Adult	8.63E-08	40	4.64E+08
PDCP-78	Sodium xylene sulfonate	365-Day Average	0.00121	Adult	3.78E-08	40	1.06E+09
PDCP-78	Imidacloprid	Peak	0.0145	0-<6 y.o.	7.54E-07	9	1.19E+07
PDCP-78	Imidacloprid	4-Day Average	0.0131	0-<6 y.o.	6.81E-07	9	1.32E+07
PDCP-78	Imidacloprid	21-Day Average	0.0102	0-<6 y.o.	5.30E-07	7.3	1.38E+07
PDCP-78	Imidacloprid	60-Day Average	0.00565	0-<6 y.o.	2.94E-07	7.3	2.48E+07
PDCP-78	Imidacloprid	90-Day Average	0.00403	0-<6 y.o.	2.10E-07	5.7	2.72E+07
PDCP-78	Imidacloprid	365-Day Average	0.00168	0-<6 y.o.	8.74E-08	5.7	6.52E+07
PDCP-78	Imidacloprid	Peak	0.0145	Adult	4.53E-07	9	1.99E+07
PDCP-78	Imidacloprid	4-Day Average	0.0131	Adult	4.09E-07	9	2.20E+07
PDCP-78	Imidacloprid	21-Day Average	0.0102	Adult	3.19E-07	7.3	2.29E+07
PDCP-78	Imidacloprid	60-Day Average	0.00565	Adult	1.77E-07	7.3	4.13E+07
PDCP-78	Imidacloprid	90-Day Average	0.00403	Adult	1.26E-07	5.7	4.53E+07
PDCP-78	Imidacloprid	365-Day Average	0.00168	Adult	5.25E-08	5.7	1.09E+08
PDCP-78	Glycerin	Peak	0.0054	0-<6 y.o.	2.81E-07	10000	3.56E+10
PDCP-78	Glycerin	4-Day Average	0.00435	0-<6 y.o.	2.26E-07	10000	4.42E+10
PDCP-78	Glycerin	21-Day Average	0.00213	0-<6 y.o.	1.11E-07	10000	9.03E+10
PDCP-78	Glycerin	60-Day Average	0.000807	0-<6 y.o.	4.20E-08	10000	2.38E+11
PDCP-78	Glycerin	90-Day Average	0.000538	0-<6 y.o.	2.80E-08	10000	3.57E+11
PDCP-78	Glycerin	365-Day Average	0.000216	0-<6 y.o.	1.12E-08	10000	8.90E+11
PDCP-78	Glycerin	Peak	0.0054	Adult	1.69E-07	10000	5.93E+10
PDCP-78	Glycerin	4-Day Average	0.00435	Adult	1.36E-07	10000	7.36E+10
PDCP-78	Glycerin	21-Day Average	0.00213	Adult	6.66E-08	10000	1.50E+11
PDCP-78	Glycerin	60-Day Average	0.000807	Adult	2.52E-08	10000	3.97E+11
PDCP-78	Glycerin	90-Day Average	0.000538	Adult	1.68E-08	10000	5.95E+11
PDCP-78	Glycerin	365-Day Average	0.000216	Adult	6.75E-09	10000	1.48E+12

Notes:
y.o. = year old
N/A indicates this chemical was not assessed for this concentration category due to the endpoint being not of concern or data was unavailable

Appendix E: Human Risk Results by Scenario

Appendix E: Risk Results by Scenario

Table 1: PDCP-64 Acute MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.46E+04	3.46E+04
	No Foam B	Dodecylbenzene sulfonate	N/A	1.39E+04	1.39E+04
	No Foam B	Ethanolamine	5.87E+03	3.21E+05	5.76E+03
	No Foam B	Isopropyl alcohol	N/A	6.11E+07	6.11E+07
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.31E+06	7.85E+04	7.41E+04
	All Products	Summed	5.84E+03	8.56E+03	3.47E+03
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 2: PDCP-64 Subchronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	8.43E+05	8.43E+05
	No Foam B	Dodecylbenzene sulfonate	N/A	3.37E+05	3.37E+05
	No Foam B	Ethanolamine	1.43E+05	7.81E+06	1.40E+05
	No Foam B	Isopropyl alcohol	N/A	2.28E+09	2.28E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.36E+07	1.91E+06	1.68E+06
	All Products	Summed	1.41E+05	2.08E+05	8.41E+04
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Appendix 3A

Table 3: PDCP-64 Chronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	2.25E+03	N/A	2.25E+03
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	8.43E+04	8.43E+04
	No Foam B	Dodecylbenzene sulfonate	N/A	3.37E+04	3.37E+04
	No Foam B	Ethanolamine	1.43E+04	7.81E+05	1.40E+04
	No Foam B	Isopropyl alcohol	N/A	1.49E+08	1.49E+08
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.36E+05	1.91E+04	1.68E+04
	All Products	Summed	1.92E+03	1.05E+04	1.62E+03
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 4: PDCP-65 Acute MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.97E+03	3.97E+03
	No Foam B	Dodecylbenzene sulfonate	N/A	1.59E+03	1.59E+03
	No Foam B	Ethanolamine	6.73E+02	3.68E+04	6.60E+02
	No Foam B	Isopropyl alcohol	N/A	7.01E+06	7.01E+06
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.50E+05	9.00E+03	8.50E+03
	All Products	Summed	6.70E+02	9.81E+02	3.98E+02
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

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Table 5: PDCP-65 Subchronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.45E+06	1.45E+06
	No Foam B	Dodecylbenzene sulfonate	N/A	5.80E+05	5.80E+05
	No Foam B	Ethanolamine	2.45E+05	1.34E+07	2.41E+05
	No Foam B	Isopropyl alcohol	N/A	3.92E+09	3.92E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.34E+07	3.29E+06	2.88E+06
	All Products	Summed	2.43E+05	3.58E+05	1.45E+05
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 6: PDCP-65 Chronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	1.93E+04	N/A	1.93E+04
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	7.25E+05	7.25E+05
	No Foam B	Dodecylbenzene sulfonate	N/A	2.90E+05	2.90E+05
	No Foam B	Ethanolamine	1.23E+05	6.72E+06	1.21E+05
	No Foam B	Isopropyl alcohol	N/A	1.28E+09	1.28E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.17E+06	1.64E+05	1.44E+05
	All Products	Summed	1.65E+04	9.04E+04	1.39E+04
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

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Table 7: PDCP-66 Acute MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	4.74E+02	4.74E+02
	All Products	Summed	N/A	4.74E+02	4.74E+02
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 8: PDCP-66 Subchronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.73E+05	1.73E+05
	All Products	Summed	N/A	1.73E+05	1.73E+05
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 9: PDCP-66 Chronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	8.63E+03	N/A	8.63E+03
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.73E+05	1.73E+05
	All Products	Summed	8.63E+03	1.73E+05	8.22E+03
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

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Table 10: PDCP-66 Aerial Acute MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	9.29E+02	9.29E+02
	All Products	Summed	N/A	9.29E+02	9.29E+02
Mixer-Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	9.32E+02	9.32E+02
	All Products	Summed	N/A	9.32E+02	9.32E+02
Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.23E+05	3.23E+05
	All Products	Summed	N/A	3.23E+05	3.23E+05

Table 11: PDCP-66 Aerial Subchronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.39E+05	3.39E+05
	All Products	Summed	N/A	3.39E+05	3.39E+05
Mixer-Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.40E+05	3.40E+05
	All Products	Summed	N/A	3.40E+05	3.40E+05
Applicator	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.18E+08	1.18E+08
	All Products	Summed	N/A	1.18E+08	1.18E+08

Table 12: PDCP-66 Aerial Chronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Safari 20 SG	Dinotefuran	7.58E+05	N/A	7.58E+05
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.39E+05	3.39E+05
	All Products	Summed	7.58E+05	3.39E+05	2.34E+05
Mixer-Loader	Safari 20 SG	Dinotefuran	9.86E+05	N/A	9.86E+05
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.40E+05	3.40E+05
	All Products	Summed	9.86E+05	3.40E+05	2.53E+05
Applicator	Safari 20 SG	Dinotefuran	3.27E+06	N/A	3.27E+06
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.18E+08	1.18E+08
	All Products	Summed	3.27E+06	1.18E+08	3.18E+06

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Table 13: PDCP-70 Acute MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Merit 2F	Imidacloprid	1.37E+03	3.02E+04	1.31E+03
	Merit 2F	Glycerin	N/A	1.53E+05	1.53E+05
	All Products	Summed	1.37E+03	2.52E+04	1.30E+03
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 14: PDCP-70 Subchronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Merit 2F	Imidacloprid	4.05E+05	1.10E+06	2.96E+05
	Merit 2F	Glycerin	N/A	5.57E+07	5.57E+07
	All Products	Summed	4.05E+05	1.08E+06	2.95E+05
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 15: PDCP-70 Chronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Merit 2F	Imidacloprid	3.16E+05	1.10E+05	8.18E+04
	Merit 2F	Glycerin	N/A	5.57E+07	5.57E+07
	All Products	Summed	3.16E+05	1.10E+05	8.16E+04
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 16: PDCP-71 Acute MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Merit 2F	Imidacloprid	1.17E+03	1.38E+04	1.08E+03
	Merit 2F	Glycerin	N/A	7.04E+04	7.04E+04
	All Products	Summed	1.17E+03	1.16E+04	1.06E+03
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

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Table 17: PDCP-71 Subchronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Merit 2F	Imidacloprid	3.47E+05	5.05E+05	2.05E+05
	Merit 2F	Glycerin	N/A	2.57E+07	2.57E+07
	All Products	Summed	2.89E-06	4.95E+05	2.89E-06
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 18: PDCP-71 Chronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Merit 2F	Imidacloprid	2.71E+05	5.05E+04	4.25E+04
	Merit 2F	Glycerin	N/A	2.57E+07	2.57E+07
	All Products	Summed	2.71E+05	5.04E+04	4.25E+04
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 19: PDCP-77 Acute MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	2.03E+05	4.49E+06	1.95E+05
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	2.44E+07	2.44E+07
	No Foam B	Dodecylbenzene sulfonate	N/A	3.04E+04	3.04E+04
	No Foam B	Ethanolamine	1.27E+04	6.96E+05	1.25E+04
	No Foam B	Isopropyl alcohol	N/A	1.33E+08	1.33E+08
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.86E+06	1.71E+05	1.62E+05
	All Products	Summed	1.19E+04	2.47E+04	8.04E+03
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

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Table 20: PDCP-77 Subchronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	4.01E+06	1.09E+07	2.93E+06
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	5.94E+08	5.94E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	7.40E+05	7.40E+05
	No Foam B	Ethanolamine	3.09E+05	1.69E+07	3.04E+05
	No Foam B	Isopropyl alcohol	N/A	4.96E+09	4.96E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.97E+07	4.17E+06	3.66E+06
	All Products	Summed	2.84E+05	5.73E+05	1.90E+05
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 21: PDCP-77 Chronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	3.13E+05	1.09E+05	8.10E+04
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	5.94E+07	5.94E+07
	No Foam B	Dodecylbenzene sulfonate	N/A	7.40E+04	7.40E+04
	No Foam B	Ethanolamine	3.09E+04	1.69E+06	3.04E+04
	No Foam B	Isopropyl alcohol	N/A	3.23E+08	3.23E+08
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.97E+05	4.17E+04	3.66E+04
	All Products	Summed	2.57E+04	2.12E+04	1.16E+04
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

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Table 22: PDCP-78 Acute MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	2.33E+04	5.15E+05	2.23E+04
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	2.80E+06	2.80E+06
	No Foam B	Dodecylbenzene sulfonate	N/A	3.49E+03	3.49E+03
	No Foam B	Ethanolamine	1.46E+03	7.98E+04	1.43E+03
	No Foam B	Isopropyl alcohol	N/A	1.52E+07	1.52E+07
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	3.27E+05	1.96E+04	1.85E+04
	All Products	Summed	1.37E+03	2.84E+03	9.22E+02
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

Table 23: PDCP-78 Subchronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	6.90E+06	1.88E+07	5.05E+06
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.02E+09	1.02E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	1.27E+06	1.27E+06
	No Foam B	Ethanolamine	5.32E+05	2.91E+07	5.22E+05
	No Foam B	Isopropyl alcohol	N/A	8.53E+09	8.53E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	5.11E+07	7.17E+06	6.29E+06
	All Products	Summed	4.89E+05	9.86E+05	3.27E+05
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

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Table 24: PDCP-78 Chronic MOEs for MLA

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Mixer-Loader-Applicator	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	2.69E+06	9.39E+05	6.96E+05
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	5.11E+08	5.11E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	6.36E+05	6.36E+05
	No Foam B	Ethanolamine	2.66E+05	1.46E+07	2.61E+05
	No Foam B	Isopropyl alcohol	N/A	2.78E+09	2.78E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.55E+06	3.59E+05	3.14E+05
	All Products	Summed	2.21E+05	1.82E+05	9.98E+04
Mixer-Loader	All Products	See Mixer-Loader-Applicator			
Applicator	All Products	See Mixer-Loader-Applicator			

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Table 25: PDCP-64 Acute MOEs for Downwind Bystander

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.17E+08	1.17E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	4.70E+07	4.70E+07
	No Foam B	Ethanolamine	2.79E+08	1.09E+09	2.22E+08
	No Foam B	Isopropyl alcohol	N/A	3.18E+11	3.18E+11
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	6.23E+10	2.66E+08	2.65E+08
	All Products	Summed	2.78E+08	2.90E+07	2.63E+07
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.42E+08	1.42E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	5.69E+07	5.69E+07
	No Foam B	Ethanolamine	3.38E+08	1.32E+09	2.69E+08
	No Foam B	Isopropyl alcohol	N/A	3.85E+11	3.85E+11
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	7.54E+10	3.22E+08	3.21E+08
	All Products	Summed	3.36E+08	3.51E+07	3.18E+07
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	8.24E+08	8.24E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	3.30E+08	3.30E+08
	No Foam B	Ethanolamine	1.96E+09	7.64E+09	1.56E+09
	No Foam B	Isopropyl alcohol	N/A	1.45E+12	1.45E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	4.37E+11	1.87E+09	1.86E+09
	All Products	Summed	1.95E+09	2.03E+08	1.84E+08

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Table 26: PDCP-64 Subchronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	2.86E+09	2.86E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	1.14E+09	1.14E+09
	No Foam B	Ethanolamine	6.79E+09	2.65E+10	5.41E+09
	No Foam B	Isopropyl alcohol	N/A	5.04E+12	5.04E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	6.48E+11	6.48E+09	6.41E+09
	All Products	Summed	6.72E+09	7.06E+08	6.39E+08
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.46E+09	3.46E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	1.38E+09	1.38E+09
	No Foam B	Ethanolamine	8.22E+09	3.21E+10	6.55E+09
	No Foam B	Isopropyl alcohol	N/A	6.10E+12	6.10E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	7.84E+11	7.84E+09	7.76E+09
	All Products	Summed	8.14E+09	8.54E+08	7.73E+08
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	2.01E+10	2.01E+10
	No Foam B	Dodecylbenzene sulfonate	N/A	8.02E+09	8.02E+09
	No Foam B	Ethanolamine	4.77E+10	1.86E+11	3.79E+10
	No Foam B	Isopropyl alcohol	N/A	5.43E+13	5.43E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	4.55E+12	4.55E+10	4.50E+10
	All Products	Summed	4.72E+10	4.95E+09	4.48E+09

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Table 27: PDCP-64 Chronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	1.07E+08	N/A	1.07E+08
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	2.86E+08	2.86E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	1.14E+08	1.14E+08
	No Foam B	Ethanolamine	6.79E+08	2.65E+09	5.41E+08
	No Foam B	Isopropyl alcohol	N/A	7.73E+11	7.73E+11
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	6.48E+09	6.48E+07	6.41E+07
	All Products	Summed	9.12E+07	3.56E+07	2.56E+07
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	1.30E+08	N/A	1.30E+08
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.46E+08	3.46E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	1.38E+08	1.38E+08
	No Foam B	Ethanolamine	8.22E+08	3.21E+09	6.55E+08
	No Foam B	Isopropyl alcohol	N/A	9.36E+11	9.36E+11
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	7.84E+09	7.84E+07	7.76E+07
	All Products	Summed	1.10E+08	4.31E+07	3.10E+07
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	7.51E+08	N/A	7.51E+08
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	2.01E+09	2.01E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	8.02E+08	8.02E+08
	No Foam B	Ethanolamine	4.77E+09	1.86E+10	3.79E+09
	No Foam B	Isopropyl alcohol	N/A	3.54E+12	3.54E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	4.55E+10	4.55E+08	4.50E+08
	All Products	Summed	6.40E+08	2.50E+08	1.80E+08

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Table 28: PDCP-65 Acute MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.35E+07	1.35E+07
	No Foam B	Dodecylbenzene sulfonate	N/A	5.39E+06	5.39E+06
	No Foam B	Ethanolamine	3.20E+07	1.25E+08	2.55E+07
	No Foam B	Isopropyl alcohol	N/A	3.64E+10	3.64E+10
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	7.14E+09	3.05E+07	3.04E+07
	All Products	Summed	3.19E+07	3.33E+06	3.01E+06
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.63E+07	1.63E+07
	No Foam B	Dodecylbenzene sulfonate	N/A	6.52E+06	6.52E+06
	No Foam B	Ethanolamine	3.88E+07	1.51E+08	3.08E+07
	No Foam B	Isopropyl alcohol	N/A	4.41E+10	4.41E+10
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	8.65E+09	3.69E+07	3.68E+07
	All Products	Summed	3.86E+07	4.03E+06	3.65E+06
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	9.45E+07	9.45E+07
	No Foam B	Dodecylbenzene sulfonate	N/A	3.78E+07	3.78E+07
	No Foam B	Ethanolamine	2.25E+08	8.76E+08	1.79E+08
	No Foam B	Isopropyl alcohol	N/A	1.67E+11	1.67E+11
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	5.01E+10	2.14E+08	2.13E+08
	All Products	Summed	2.24E+08	2.33E+07	2.11E+07

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Table 29: PDCP-65 Subchronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	4.91E+09	4.91E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	1.97E+09	1.97E+09
	No Foam B	Ethanolamine	1.17E+10	4.55E+10	9.30E+09
	No Foam B	Isopropyl alcohol	N/A	8.67E+12	8.67E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.11E+12	1.11E+10	1.10E+10
	All Products	Summed	1.16E+10	1.21E+09	1.10E+09
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	5.95E+09	5.95E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	2.38E+09	2.38E+09
	No Foam B	Ethanolamine	1.41E+10	5.51E+10	1.13E+10
	No Foam B	Isopropyl alcohol	N/A	1.05E+13	1.05E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.35E+12	1.35E+10	1.34E+10
	All Products	Summed	1.40E+10	1.47E+09	1.33E+09
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.45E+10	3.45E+10
	No Foam B	Dodecylbenzene sulfonate	N/A	1.38E+10	1.38E+10
	No Foam B	Ethanolamine	8.20E+10	3.20E+11	6.53E+10
	No Foam B	Isopropyl alcohol	N/A	9.33E+13	9.33E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	7.82E+12	7.82E+10	7.74E+10
	All Products	Summed	8.12E+10	8.52E+09	7.71E+09

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Table 30: PDCP-65 Chronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	9.21E+08	N/A	9.21E+08
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	2.46E+09	2.46E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	9.83E+08	9.83E+08
	No Foam B	Ethanolamine	5.84E+09	2.28E+10	4.65E+09
	No Foam B	Isopropyl alcohol	N/A	6.65E+12	6.65E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	5.57E+10	5.57E+08	5.52E+08
	All Products	Summed	5.29E+09	3.06E+08	2.90E+08
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	1.11E+09	N/A	1.11E+09
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	2.97E+09	2.97E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	1.19E+09	1.19E+09
	No Foam B	Ethanolamine	7.07E+09	2.76E+10	5.63E+09
	No Foam B	Isopropyl alcohol	N/A	8.05E+12	8.05E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	6.74E+10	6.74E+08	6.68E+08
	All Products	Summed	6.40E+09	3.71E+08	3.51E+08
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	6.46E+09	N/A	6.46E+09
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.72E+10	1.72E+10
	No Foam B	Dodecylbenzene sulfonate	N/A	6.90E+09	6.90E+09
	No Foam B	Ethanolamine	4.10E+10	1.60E+11	3.26E+10
	No Foam B	Isopropyl alcohol	N/A	3.04E+13	3.04E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	3.91E+11	3.91E+09	3.87E+09
	All Products	Summed	3.71E+10	2.15E+09	2.03E+09

Table 31: PDCP-66 Acute MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	2.02E+05	2.02E+05
	All Products	Summed	N/A	2.02E+05	2.02E+05
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	2.45E+05	2.45E+05
	All Products	Summed	N/A	2.45E+05	2.45E+05
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.42E+06	1.42E+06
	All Products	Summed	N/A	1.42E+06	1.42E+06

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Table 32: PDCP-66 Subchronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	7.37E+07	7.37E+07
	All Products	Summed	N/A	7.37E+07	7.37E+07
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	8.92E+07	8.92E+07
	All Products	Summed	N/A	8.92E+07	8.92E+07
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	5.17E+08	5.17E+08
	All Products	Summed	N/A	5.17E+08	5.17E+08

Table 33: PDCP-66 Chronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	2.76E+07	N/A	2.76E+07
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	7.37E+07	7.37E+07
	All Products	Summed	2.76E+07	7.37E+07	2.01E+07
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	3.34E+07	N/A	3.34E+07
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	8.92E+07	8.92E+07
	All Products	Summed	3.34E+07	8.92E+07	2.43E+07
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	1.94E+08	N/A	1.94E+08
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	5.17E+08	5.17E+08
	All Products	Summed	1.94E+08	5.17E+08	1.41E+08

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Table 34: PDCP-66 Aerial Acute MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	4.40E+03	4.40E+03
	All Products	Summed	N/A	4.40E+03	4.40E+03
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	5.32E+03	5.32E+03
	All Products	Summed	N/A	5.32E+03	5.32E+03
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.09E+04	3.09E+04
	All Products	Summed	N/A	3.09E+04	3.09E+04

Table 35: PDCP-66 Aerial Subchronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.61E+06	1.61E+06
	All Products	Summed	N/A	1.61E+06	1.61E+06
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.94E+06	1.94E+06
	All Products	Summed	N/A	1.94E+06	1.94E+06
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.13E+07	1.13E+07
	All Products	Summed	N/A	1.13E+07	1.13E+07

Table 36: PDCP-66 Aerial Chronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Safari 20 SG	Dinotefuran	6.01E+05	N/A	6.01E+05
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.61E+06	1.61E+06
	All Products	Summed	6.01E+05	1.61E+06	4.38E+05
Downwind Bystander Child 2-<16	Safari 20 SG	Dinotefuran	7.28E+05	N/A	7.28E+05
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.94E+06	1.94E+06
	All Products	Summed	7.28E+05	1.94E+06	5.30E+05
Downwind Bystander Adult	Safari 20 SG	Dinotefuran	4.22E+06	N/A	4.22E+06
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.13E+07	1.13E+07
	All Products	Summed	4.22E+06	1.13E+07	3.07E+06

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Table 37: PDCP-70 Acute MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Merit 2F	Imidacloprid	6.51E+07	1.02E+08	3.98E+07
	Merit 2F	Glycerin	N/A	7.94E+08	7.94E+08
	All Products	Summed	6.51E+07	9.07E+07	3.79E+07
Downwind Bystander Child 2-<16	Merit 2F	Imidacloprid	7.89E+07	1.24E+08	4.82E+07
	Merit 2F	Glycerin	N/A	9.61E+08	9.61E+08
	All Products	Summed	7.89E+07	1.10E+08	4.59E+07
Downwind Bystander Adult	Merit 2F	Imidacloprid	4.57E+08	7.18E+08	2.79E+08
	Merit 2F	Glycerin	N/A	3.63E+09	3.63E+09
	All Products	Summed	4.57E+08	6.00E+08	2.59E+08

Table 38: PDCP-70 Subchronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Merit 2F	Imidacloprid	1.93E+10	3.74E+09	3.13E+09
	Merit 2F	Glycerin	N/A	2.90E+11	2.90E+11
	All Products	Summed	1.93E+10	3.69E+09	3.10E+09
Downwind Bystander Child 2-<16	Merit 2F	Imidacloprid	2.33E+10	4.52E+09	3.79E+09
	Merit 2F	Glycerin	N/A	3.51E+11	3.51E+11
	All Products	Summed	2.33E+10	4.47E+09	3.75E+09
Downwind Bystander Adult	Merit 2F	Imidacloprid	1.35E+11	2.62E+10	2.20E+10
	Merit 2F	Glycerin	N/A	1.33E+12	1.33E+12
	All Products	Summed	1.35E+11	2.57E+10	2.16E+10

Table 39: PDCP-70 Chronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Merit 2F	Imidacloprid	1.51E+10	3.74E+08	3.65E+08
	Merit 2F	Glycerin	N/A	2.90E+11	2.90E+11
	All Products	Summed	1.51E+10	3.73E+08	3.64E+08
Downwind Bystander Child 2-<16	Merit 2F	Imidacloprid	1.82E+10	4.52E+08	4.41E+08
	Merit 2F	Glycerin	N/A	3.51E+11	3.51E+11
	All Products	Summed	1.82E+10	4.52E+08	4.41E+08
Downwind Bystander Adult	Merit 2F	Imidacloprid	1.06E+11	2.62E+09	2.56E+09
	Merit 2F	Glycerin	N/A	1.33E+12	1.33E+12
	All Products	Summed	1.06E+11	2.62E+09	2.55E+09

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Table 40: PDCP-77 Acute MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	9.68E+09	1.52E+10	5.92E+09
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.27E+11	1.27E+11
	No Foam B	Dodecylbenzene sulfonate	N/A	1.03E+08	1.03E+08
	No Foam B	Ethanolamine	6.05E+08	2.36E+09	4.81E+08
	No Foam B	Isopropyl alcohol	N/A	6.91E+11	6.91E+11
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.36E+11	5.81E+08	5.78E+08
	All Products	Summed	5.67E+08	8.38E+07	7.30E+07
Downwind Bystander Child 2-<16	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.17E+10	1.84E+10	7.16E+09
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.54E+11	1.54E+11
	No Foam B	Dodecylbenzene sulfonate	N/A	1.25E+08	1.25E+08
	No Foam B	Ethanolamine	7.32E+08	2.85E+09	5.83E+08
	No Foam B	Isopropyl alcohol	N/A	8.36E+11	8.36E+11
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.65E+11	7.03E+08	7.00E+08
	All Products	Summed	6.86E+08	1.02E+08	8.84E+07
Downwind Bystander Adult	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	6.79E+10	1.07E+11	4.15E+10
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	5.81E+11	5.81E+11
	No Foam B	Dodecylbenzene sulfonate	N/A	7.23E+08	7.23E+08
	No Foam B	Ethanolamine	4.25E+09	1.65E+10	3.38E+09
	No Foam B	Isopropyl alcohol	N/A	3.16E+12	3.16E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	9.54E+11	4.08E+09	4.06E+09
	All Products	Summed	3.98E+09	5.88E+08	5.12E+08

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Table 41: PDCP-77 Subchronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.91E+11	3.70E+10	3.10E+10
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	3.09E+12	3.09E+12
	No Foam B	Dodecylbenzene sulfonate	N/A	2.51E+09	2.51E+09
	No Foam B	Ethanolamine	1.47E+10	5.74E+10	1.17E+10
	No Foam B	Isopropyl alcohol	N/A	1.10E+13	1.10E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.41E+12	1.41E+10	1.40E+10
	All Products	Summed	1.35E+10	1.94E+09	1.70E+09
Downwind Bystander Child 2-<16	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	2.31E+11	4.48E+10	3.75E+10
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	3.74E+12	3.74E+12
	No Foam B	Dodecylbenzene sulfonate	N/A	3.04E+09	3.04E+09
	No Foam B	Ethanolamine	1.78E+10	6.94E+10	1.42E+10
	No Foam B	Isopropyl alcohol	N/A	1.33E+13	1.33E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.71E+12	1.71E+10	1.69E+10
	All Products	Summed	1.64E+10	2.35E+09	2.06E+09
Downwind Bystander Adult	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.34E+12	2.60E+11	2.18E+11
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.41E+13	1.41E+13
	No Foam B	Dodecylbenzene sulfonate	N/A	1.76E+10	1.76E+10
	No Foam B	Ethanolamine	1.03E+11	4.03E+11	8.22E+10
	No Foam B	Isopropyl alcohol	N/A	1.18E+14	1.18E+14
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	9.92E+12	9.92E+10	9.82E+10
	All Products	Summed	9.50E+10	1.36E+10	1.19E+10

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Table 42: PDCP-77 Chronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.49E+10	3.70E+08	3.61E+08
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	3.09E+11	3.09E+11
	No Foam B	Dodecylbenzene sulfonate	N/A	2.51E+08	2.51E+08
	No Foam B	Ethanolamine	1.47E+09	5.74E+09	1.17E+09
	No Foam B	Isopropyl alcohol	N/A	1.68E+12	1.68E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.41E+10	1.41E+08	1.40E+08
	All Products	Summed	1.22E+09	7.17E+07	6.77E+07
Downwind Bystander Child 2-<16	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.81E+10	4.48E+08	4.37E+08
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	3.74E+11	3.74E+11
	No Foam B	Dodecylbenzene sulfonate	N/A	3.04E+08	3.04E+08
	No Foam B	Ethanolamine	1.78E+09	6.94E+09	1.42E+09
	No Foam B	Isopropyl alcohol	N/A	2.03E+12	2.03E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.71E+10	1.71E+08	1.69E+08
	All Products	Summed	1.48E+09	8.68E+07	8.20E+07
Downwind Bystander Adult	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.05E+11	2.60E+09	2.53E+09
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.41E+12	1.41E+12
	No Foam B	Dodecylbenzene sulfonate	N/A	1.76E+09	1.76E+09
	No Foam B	Ethanolamine	1.03E+10	4.03E+10	8.22E+09
	No Foam B	Isopropyl alcohol	N/A	7.69E+12	7.69E+12
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	9.92E+10	9.92E+08	9.82E+08
	All Products	Summed	8.59E+09	5.03E+08	4.75E+08

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Table 43: PDCP-78 Acute MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.11E+09	1.74E+09	6.78E+08
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.46E+10	1.46E+10
	No Foam B	Dodecylbenzene sulfonate	N/A	1.18E+07	1.18E+07
	No Foam B	Ethanolamine	6.94E+07	2.70E+08	5.52E+07
	No Foam B	Isopropyl alcohol	N/A	7.92E+10	7.92E+10
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.56E+10	6.66E+07	6.63E+07
	All Products	Summed	6.50E+07	9.61E+06	8.38E+06
Downwind Bystander Child 2-<16	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.34E+09	2.11E+09	8.21E+08
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.76E+10	1.76E+10
	No Foam B	Dodecylbenzene sulfonate	N/A	1.43E+07	1.43E+07
	No Foam B	Ethanolamine	8.40E+07	3.27E+08	6.68E+07
	No Foam B	Isopropyl alcohol	N/A	9.59E+10	9.59E+10
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.89E+10	8.06E+07	8.03E+07
	All Products	Summed	7.87E+07	1.16E+07	1.01E+07
Downwind Bystander Adult	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	7.79E+09	1.22E+10	4.76E+09
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	6.66E+10	6.66E+10
	No Foam B	Dodecylbenzene sulfonate	N/A	8.29E+07	8.29E+07
	No Foam B	Ethanolamine	4.87E+08	1.90E+09	3.87E+08
	No Foam B	Isopropyl alcohol	N/A	3.62E+11	3.62E+11
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.09E+11	4.67E+08	4.65E+08
	All Products	Summed	4.56E+08	6.74E+07	5.88E+07

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Table 44: PDCP-78 Subchronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	3.29E+11	6.37E+10	5.33E+10
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	5.31E+12	5.31E+12
	No Foam B	Dodecylbenzene sulfonate	N/A	4.31E+09	4.31E+09
	No Foam B	Ethanolamine	2.53E+10	9.87E+10	2.01E+10
	No Foam B	Isopropyl alcohol	N/A	1.88E+13	1.88E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.43E+12	2.43E+10	2.41E+10
	All Products	Summed	2.33E+10	3.34E+09	2.92E+09
Downwind Bystander Child 2-<16	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	3.98E+11	7.71E+10	6.46E+10
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	6.43E+12	6.43E+12
	No Foam B	Dodecylbenzene sulfonate	N/A	5.22E+09	5.22E+09
	No Foam B	Ethanolamine	3.06E+10	1.19E+11	2.44E+10
	No Foam B	Isopropyl alcohol	N/A	2.28E+13	2.28E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.94E+12	2.94E+10	2.91E+10
	All Products	Summed	2.82E+10	4.05E+09	3.54E+09
Downwind Bystander Adult	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	2.31E+12	4.47E+11	3.74E+11
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	2.43E+13	2.43E+13
	No Foam B	Dodecylbenzene sulfonate	N/A	3.03E+10	3.03E+10
	No Foam B	Ethanolamine	1.78E+11	6.92E+11	1.41E+11
	No Foam B	Isopropyl alcohol	N/A	2.03E+14	2.03E+14
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.71E+13	1.71E+11	1.69E+11
	All Products	Summed	1.63E+11	2.35E+10	2.05E+10

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Table 45: PDCP-78 Chronic MOEs for DWB

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Downwind Bystander Child <2	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.28E+11	3.18E+09	3.11E+09
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	2.66E+12	2.66E+12
	No Foam B	Dodecylbenzene sulfonate	N/A	2.16E+09	2.16E+09
	No Foam B	Ethanolamine	1.27E+10	4.93E+10	1.01E+10
	No Foam B	Isopropyl alcohol	N/A	1.45E+13	1.45E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.22E+11	1.22E+09	1.20E+09
	All Products	Summed	1.05E+10	6.17E+08	5.83E+08
Downwind Bystander Child 2-<16	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.55E+11	3.85E+09	3.76E+09
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	3.22E+12	3.22E+12
	No Foam B	Dodecylbenzene sulfonate	N/A	2.61E+09	2.61E+09
	No Foam B	Ethanolamine	1.53E+10	5.97E+10	1.22E+10
	No Foam B	Isopropyl alcohol	N/A	1.75E+13	1.75E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.47E+11	1.47E+09	1.46E+09
	All Products	Summed	1.27E+10	7.47E+08	7.05E+08
Downwind Bystander Adult	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	9.00E+11	2.23E+10	2.18E+10
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.22E+13	1.22E+13
	No Foam B	Dodecylbenzene sulfonate	N/A	1.51E+10	1.51E+10
	No Foam B	Ethanolamine	8.88E+10	3.46E+11	7.07E+10
	No Foam B	Isopropyl alcohol	N/A	6.61E+13	6.61E+13
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	8.53E+11	8.53E+09	8.44E+09
	All Products	Summed	7.39E+10	4.33E+09	4.09E+09

Table 46: PDCP-64 Acute MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	2.29E+04	8.19E+05	2.22E+04
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	5.10E+06	1.83E+08	4.96E+06
	All Products	Summed	2.28E+04	8.15E+05	2.21E+04

Table 47: PDCP-64 Subchronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	5.56E+05	1.99E+07	5.41E+05
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	5.30E+07	1.90E+09	5.16E+07
	All Products	Summed	5.51E+05	1.97E+07	5.36E+05

Table 48: PDCP-64 Chronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	8.77E+03	3.14E+05	8.53E+03
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	5.56E+04	1.99E+06	5.41E+04
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	5.30E+05	1.90E+07	5.16E+05
	All Products	Summed	7.47E+03	2.67E+05	7.26E+03

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Table 49: PDCP-65 Acute MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	2.29E+04	8.19E+05	2.22E+04
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	5.10E+06	1.83E+08	4.96E+06
	All Products	Summed	2.28E+04	8.15E+05	2.21E+04

Table 50: PDCP-65 Subchronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	8.35E+06	2.99E+08	8.12E+06
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	7.96E+08	2.85E+10	7.74E+08
	All Products	Summed	8.26E+06	2.96E+08	8.03E+06

Table 51: PDCP-65 Chronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	6.58E+05	2.35E+07	6.40E+05
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	4.17E+06	1.49E+08	4.06E+06
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	3.98E+07	1.42E+09	3.87E+07
	All Products	Summed	5.60E+05	2.00E+07	5.45E+05

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Table 52: PDCP-66 Acute MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	All Products	Summed	N/A	N/A	N/A

Table 53: PDCP-66 Subchronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	All Products	Summed	N/A	N/A	N/A

Table 54: PDCP-66 Chronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	1.32E+06	4.71E+07	1.28E+06
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	All Products	Summed	1.32E+06	4.71E+07	1.28E+06

Table 55: PDCP-66 Aerial Acute MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	All Products	Summed	N/A	N/A	N/A

Table 56: PDCP-66 Aerial Subchronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	All Products	Summed	N/A	N/A	N/A

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Table 57: PDCP-66 Aerial Chronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Safari 20 SG	Dinotefuran	1.32E+06	4.71E+07	1.28E+06
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	N/A	N/A
	All Products	Summed	1.32E+06	4.71E+07	1.28E+06

Table 58: PDCP-77 Acute MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	3.96E+04	2.84E+07	3.96E+04
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	4.95E+04	1.77E+06	4.82E+04
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.11E+07	3.99E+08	1.08E+07
	All Products	Summed	2.20E+04	1.66E+06	2.17E+04

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Table 59: PDCP-77 Subchronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.56E+07	5.60E+08	1.52E+07
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	1.21E+06	4.32E+07	1.17E+06
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.16E+08	4.14E+09	1.13E+08
	All Products	Summed	1.11E+06	3.97E+07	1.08E+06

Table 60: PDCP-77 Chronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.22E+06	4.37E+07	1.19E+06
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	1.21E+05	4.32E+06	1.17E+05
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.16E+06	4.14E+07	1.13E+06
	All Products	Summed	1.01E+05	3.59E+06	9.73E+04

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Table 61: PDCP-78 Acute MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	3.96E+04	2.84E+07	3.96E+04
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	4.95E+04	1.77E+06	4.82E+04
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.11E+07	3.99E+08	1.08E+07
	All Products	Summed	2.20E+04	1.66E+06	2.17E+04

Table 62: PDCP-78 Subchronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	2.35E+08	8.40E+09	2.28E+08
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	1.81E+07	6.47E+08	1.76E+07
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.74E+09	6.21E+10	1.69E+09
	All Products	Summed	1.66E+07	5.95E+08	1.61E+07

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Table 63: PDCP-78 Chronic MOEs for PAL

Receptor	Product	Ingredient	Dermal Veg MOE	Dermal Soil MOE	Total MOE
Post-Application Loader	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	9.16E+07	3.28E+09	8.91E+07
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	N/A	N/A
	No Foam B	Dodecylbenzene sulfonate	N/A	N/A	N/A
	No Foam B	Ethanolamine	9.04E+06	3.24E+08	8.80E+06
	No Foam B	Isopropyl alcohol	N/A	N/A	N/A
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	8.68E+07	3.11E+09	8.44E+07
	All Products	Summed	7.52E+06	2.69E+08	7.32E+06

Table 64: PDCP-64 Acute MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.46E+04	3.46E+04
	No Foam B	Dodecylbenzene sulfonate	N/A	1.39E+04	1.39E+04
	No Foam B	Ethanolamine	4.64E+03	3.21E+05	4.58E+03
	No Foam B	Isopropyl alcohol	N/A	6.11E+07	6.11E+07
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.04E+06	7.85E+04	7.30E+04
	All Products	Summed	4.62E+03	8.56E+03	3.00E+03

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Table 65: PDCP-64 Subchronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	8.43E+05	8.43E+05
	No Foam B	Dodecylbenzene sulfonate	N/A	3.37E+05	3.37E+05
	No Foam B	Ethanolamine	1.13E+05	7.81E+06	1.11E+05
	No Foam B	Isopropyl alcohol	N/A	2.28E+09	2.28E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.08E+07	1.91E+06	1.62E+06
	All Products	Summed	1.12E+05	2.08E+05	7.27E+04

Table 66: PDCP-64 Chronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	1.78E+03	N/A	1.78E+03
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	8.43E+04	8.43E+04
	No Foam B	Dodecylbenzene sulfonate	N/A	3.37E+04	3.37E+04
	No Foam B	Ethanolamine	1.13E+04	7.81E+05	1.11E+04
	No Foam B	Isopropyl alcohol	N/A	1.49E+08	1.49E+08
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.08E+05	1.91E+04	1.62E+04
	All Products	Summed	1.52E+03	1.05E+04	1.33E+03

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Table 67: PDCP-65 Acute MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.97E+03	3.97E+03
	No Foam B	Dodecylbenzene sulfonate	N/A	1.59E+03	1.59E+03
	No Foam B	Ethanolamine	6.53E+02	3.68E+04	6.41E+02
	No Foam B	Isopropyl alcohol	N/A	7.01E+06	7.01E+06
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.46E+05	9.00E+03	8.48E+03
	All Products	Summed	6.50E+02	9.81E+02	3.91E+02

Table 68: PDCP-65 Subchronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.45E+06	1.45E+06
	No Foam B	Dodecylbenzene sulfonate	N/A	5.80E+05	5.80E+05
	No Foam B	Ethanolamine	2.38E+05	1.34E+07	2.34E+05
	No Foam B	Isopropyl alcohol	N/A	3.92E+09	3.92E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.27E+07	3.29E+06	2.87E+06
	All Products	Summed	2.36E+05	3.58E+05	1.42E+05

Table 69: PDCP-65 Chronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	1.88E+04	N/A	1.88E+04
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	7.25E+05	7.25E+05
	No Foam B	Dodecylbenzene sulfonate	N/A	2.90E+05	2.90E+05
	No Foam B	Ethanolamine	1.19E+05	6.72E+06	1.17E+05
	No Foam B	Isopropyl alcohol	N/A	1.28E+09	1.28E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	1.14E+06	1.64E+05	1.44E+05
	All Products	Summed	1.60E+04	9.03E+04	1.36E+04

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Table 70: PDCP-66 Acute MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	4.74E+02	4.74E+02
	All Products	Summed	N/A	4.74E+02	4.74E+02

Table 71: PDCP-66 Subchronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.73E+05	1.73E+05
	All Products	Summed	N/A	1.73E+05	1.73E+05

Table 72: PDCP-66 Chronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	8.57E+03	N/A	8.57E+03
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	1.73E+05	1.73E+05
	All Products	Summed	8.57E+03	1.73E+05	8.17E+03

Table 73: PDCP-66 Aerial Acute MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	9.29E+02	9.29E+02
	All Products	Summed	N/A	9.29E+02	9.29E+02

Table 74: PDCP-66 Aerial Subchronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	N/A	N/A	N/A
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.39E+05	3.39E+05
	All Products	Summed	N/A	3.39E+05	3.39E+05

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Table 75: PDCP-66 Aerial Chronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Safari 20 SG	Dinotefuran	4.76E+05	N/A	4.76E+05
	Safari 20 SG	Sodium dodecylbenzene sulfonate	N/A	3.39E+05	3.39E+05
	All Products	Summed	4.76E+05	3.39E+05	1.98E+05

Table 76: PDCP-77 Acute MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	3.31E+04	4.49E+06	3.29E+04
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	2.44E+07	2.44E+07
	No Foam B	Dodecylbenzene sulfonate	N/A	3.04E+04	3.04E+04
	No Foam B	Ethanolamine	1.01E+04	6.96E+05	9.91E+03
	No Foam B	Isopropyl alcohol	N/A	1.33E+08	1.33E+08
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.26E+06	1.71E+05	1.59E+05
	All Products	Summed	7.69E+03	2.47E+04	5.86E+03

Table 77: PDCP-77 Subchronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	3.18E+06	1.09E+07	2.46E+06
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	5.94E+08	5.94E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	7.40E+05	7.40E+05
	No Foam B	Ethanolamine	2.45E+05	1.69E+07	2.41E+05
	No Foam B	Isopropyl alcohol	N/A	4.96E+09	4.96E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.35E+07	4.17E+06	3.54E+06
	All Products	Summed	2.25E+05	5.73E+05	1.62E+05

Table 78: PDCP-77 Chronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	2.48E+05	1.09E+05	7.58E+04
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	5.94E+07	5.94E+07
	No Foam B	Dodecylbenzene sulfonate	N/A	7.40E+04	7.40E+04
	No Foam B	Ethanolamine	2.45E+04	1.69E+06	2.41E+04
	No Foam B	Isopropyl alcohol	N/A	3.23E+08	3.23E+08
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.35E+05	4.17E+04	3.54E+04
	All Products	Summed	2.04E+04	2.12E+04	1.04E+04

Table 79: PDCP-78 Acute MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	1.47E+04	5.15E+05	1.43E+04
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	2.80E+06	2.80E+06
	No Foam B	Dodecylbenzene sulfonate	N/A	3.49E+03	3.49E+03
	No Foam B	Ethanolamine	1.41E+03	7.98E+04	1.39E+03
	No Foam B	Isopropyl alcohol	N/A	1.52E+07	1.52E+07
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	3.18E+05	1.96E+04	1.85E+04
	All Products	Summed	1.28E+03	2.84E+03	8.84E+02

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Table 80: PDCP-78 Subchronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	6.70E+06	1.88E+07	4.94E+06
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	1.02E+09	1.02E+09
	No Foam B	Dodecylbenzene sulfonate	N/A	1.27E+06	1.27E+06
	No Foam B	Ethanolamine	5.16E+05	2.91E+07	5.07E+05
	No Foam B	Isopropyl alcohol	N/A	8.53E+09	8.53E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	4.96E+07	7.17E+06	6.26E+06
	All Products	Summed	4.75E+05	9.85E+05	3.20E+05

Table 81: PDCP-78 Chronic MOEs for CNW

Receptor	Product	Ingredient	Dermal MOE	Inhalation MOE	Total MOE
Combined Nursery Worker	Marathon II Greenhouse & Nursery Insecticide	Imidacloprid	2.62E+06	9.39E+05	6.91E+05
	Marathon II Greenhouse & Nursery Insecticide	Glycerin	N/A	5.11E+08	5.11E+08
	No Foam B	Dodecylbenzene sulfonate	N/A	6.36E+05	6.36E+05
	No Foam B	Ethanolamine	2.58E+05	1.46E+07	2.54E+05
	No Foam B	Isopropyl alcohol	N/A	2.78E+09	2.78E+09
	No Foam B	POE Nonylphenol	N/A	N/A	N/A
	No Foam B	Sodium xylene sulfonate	2.48E+06	3.59E+05	3.13E+05
	All Products	Summed	2.15E+05	1.82E+05	9.86E+04

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Table 82: PDCP-70 Acute MOEs for PAR

Receptor	Product	Ingredient	Soil Dermal MOE	Veg Dermal MOE	Turf Dermal MOE	Veg HtM MOE	Turf HtM MOE	Turf OtM MOE	Soil Ing MOE	Veg Ing MOE	Total MOE
Post-Application Resident Child <2	Merit 2F	Imidacloprid	9.40E+07	1.60E+04	5.42E+04	3.89E+04	1.32E+05	4.35E+06	8.95E+06	3.00E+03	2.23E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	9.04E+07	3.07E+08	1.01E+10	2.08E+10	6.82E+06	6.21E+06
	All Products	Summed	9.40E+07	1.60E+04	5.42E+04	3.89E+04	1.32E+05	4.35E+06	8.95E+06	3.00E+03	2.23E+03
Post-Application Resident Child 2-<16	Merit 2F	Imidacloprid	2.92E+07	2.19E+04	5.74E+04	3.74E+04	2.25E+05	5.47E+06	1.08E+07	6.36E+03	3.97E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	8.69E+07	5.23E+08	1.27E+10	2.52E+10	1.45E+07	1.21E+07
	All Products	Summed	2.92E+07	2.19E+04	5.74E+04	3.74E+04	2.25E+05	5.47E+06	1.08E+07	6.36E+03	3.97E+03
Post-Application Resident Adult	Merit 2F	Imidacloprid	9.53E+07	1.51E+04	1.03E+05	N/A	N/A	N/A	N/A	9.66E+03	5.57E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.20E+07	2.20E+07
	All Products	Summed	9.53E+07	1.51E+04	1.03E+05	N/A	N/A	N/A	N/A	9.66E+03	5.57E+03

Table 83: PDCP-70 Subchronic MOEs for PAR

Receptor	Product	Ingredient	Soil Dermal MOE	Veg Dermal MOE	Turf Dermal MOE	Veg HtM MOE	Turf HtM MOE	Turf OtM MOE	Soil Ing MOE	Veg Ing MOE	Total MOE
Post-Application Resident Child <2	Merit 2F	Imidacloprid	8.65E+07	5.97E+04	2.02E+05	1.45E+05	4.94E+05	1.63E+07	8.24E+06	2.43E+03	2.26E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	1.81E+09	6.14E+09	2.02E+11	1.51E+11	6.82E+06	6.79E+06
	All Products	Summed	8.65E+07	5.97E+04	2.02E+05	1.45E+05	4.94E+05	1.63E+07	8.24E+06	2.43E+03	2.26E+03
Post-Application Resident Child 2-<16	Merit 2F	Imidacloprid	2.69E+07	8.20E+04	2.14E+05	1.40E+05	8.42E+05	2.05E+07	9.98E+06	5.16E+03	4.56E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	1.74E+09	1.05E+10	2.54E+11	1.83E+11	1.45E+07	1.46E+07
	All Products	Summed	2.69E+07	8.20E+04	2.14E+05	1.40E+05	8.42E+05	2.05E+07	9.97E+06	5.16E+03	4.56E+03
Post-Application Resident Adult	Merit 2F	Imidacloprid	8.77E+07	5.65E+04	3.87E+05	N/A	N/A	N/A	N/A	7.83E+03	6.76E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.20E+07	2.20E+07
	All Products	Summed	8.77E+07	5.65E+04	3.87E+05	N/A	N/A	N/A	N/A	7.83E+03	6.76E+03

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Table 84: PDCP-70 Chronic MOEs for PAR

Receptor	Product	Ingredient	Soil Dermal MOE	Veg Dermal MOE	Turf Dermal MOE	Veg HtM MOE	Turf HtM MOE	Turf OtM MOE	Soil Ing MOE	Veg Ing MOE	Total MOE
Post-Application Resident Child <2	Merit 2F	Imidacloprid	2.01E+08	5.64E+05	1.92E+06	1.38E+06	4.67E+06	1.54E+08	1.91E+07	1.90E+03	1.89E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	2.21E+10	7.49E+10	2.47E+12	1.84E+12	6.82E+06	6.82E+06
	All Products	Summed	2.01E+08	5.64E+05	1.92E+06	1.50E+07	4.67E+06	1.54E+08	1.91E+07	1.90E+03	1.89E+03
Post-Application Resident Child 2-<16	Merit 2F	Imidacloprid	6.25E+07	7.76E+05	2.03E+06	1.32E+06	7.97E+06	1.93E+08	2.32E+07	4.03E+03	3.99E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	2.12E+10	1.28E+11	3.10E+12	2.23E+12	1.45E+07	1.45E+07
	All Products	Summed	6.25E+07	7.76E+05	2.03E+06	1.32E+06	7.96E+06	1.93E+08	2.32E+07	4.03E+03	3.99E+03
Post-Application Resident Adult	Merit 2F	Imidacloprid	2.04E+08	5.35E+05	3.66E+06	N/A	N/A	N/A	N/A	6.12E+03	6.04E+03
	Merit 2F	Glycerin	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.20E+07	2.20E+07
	All Products	Summed	2.04E+08	5.35E+05	3.66E+06	N/A	N/A	N/A	N/A	6.12E+03	6.04E+03

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Table 85: PDCP-71 Acute MOEs for PAR

Receptor	Product	Ingredient	Soil Dermal MOE	Soil Ing MOE	Veg Ing MOE	Total MOE
Post-Application Resident Child <2	Merit 2F	Imidacloprid	1.08E+06	1.03E+05	5.08E+04	3.30E+04
	Merit 2F	Glycerin	N/A	2.41E+08	3.76E+06	3.70E+06
	All Products	Summed	1.08E+06	1.03E+05	5.01E+04	3.27E+04
Post-Application Resident Child 2-<16	Merit 2F	Imidacloprid	3.36E+05	1.25E+05	1.08E+05	4.94E+04
	Merit 2F	Glycerin	N/A	2.92E+08	7.98E+06	7.77E+06
	All Products	Summed	3.36E+05	1.25E+05	1.07E+05	9.92E+04
Post-Application Resident Adult	Merit 2F	Imidacloprid	1.10E+06	N/A	1.64E+05	1.43E+05
	Merit 2F	Glycerin	N/A	N/A	1.21E+07	1.21E+07
	All Products	Summed	1.10E+06	N/A	1.62E+05	1.41E+05

Table 86: PDCP-71 Subchronic MOEs for PAR

Receptor	Product	Ingredient	Soil Dermal MOE	Soil Ing MOE	Veg Ing MOE	Total MOE
Post-Application Resident Child <2	Merit 2F	Imidacloprid	9.95E+05	9.48E+04	4.12E+04	2.79E+04
	Merit 2F	Glycerin	N/A	1.75E+09	3.76E+06	3.75E+06
	All Products	Summed	9.95E+05	9.48E+04	4.08E+04	2.77E+04
Post-Application Resident Child 2-<16	Merit 2F	Imidacloprid	3.09E+05	1.15E+05	8.74E+04	4.28E+04
	Merit 2F	Glycerin	N/A	2.12E+09	7.98E+06	7.95E+06
	All Products	Summed	3.09E+05	1.15E+05	8.65E+04	4.26E+04
Post-Application Resident Adult	Merit 2F	Imidacloprid	1.01E+06	N/A	1.33E+05	4.26E+04
	Merit 2F	Glycerin	N/A	N/A	1.21E+07	1.21E+07
	All Products	Summed	1.01E+06	N/A	1.32E+05	4.25E+04

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Table 87: PDCP-71 Chronic MOEs for PAR

Receptor	Product	Ingredient	Soil Dermal MOE	Soil Ing MOE	Veg Ing MOE	Total MOE
Post-Application Resident Child <2	Merit 2F	Imidacloprid	2.31E+06	2.20E+05	3.22E+04	2.78E+04
	Merit 2F	Glycerin	N/A	2.13E+10	3.76E+06	3.76E+06
	All Products	Summed	2.31E+06	2.20E+05	3.19E+04	2.76E+04
Post-Application Resident Child 2-<16	Merit 2F	Imidacloprid	7.19E+05	2.67E+05	6.83E+04	5.06E+04
	Merit 2F	Glycerin	N/A	2.58E+10	7.98E+06	7.98E+04
	All Products	Summed	7.19E+05	2.67E+05	6.77E+04	3.10E+04
Post-Application Resident Adult	Merit 2F	Imidacloprid	2.34E+06	N/A	1.04E+05	9.96E+04
	Merit 2F	Glycerin	N/A	N/A	1.21E+07	1.21E+07
	All Products	Summed	2.34E+06	N/A	1.03E+05	9.88E+04

Table 88: PDCP-70 Acute MOEs for DPAR

Receptor	Ingredient	Soil Dermal MOE	Veg Dermal MOE	Turf Dermal MOE	Veg HtM MOE	Turf HtM MOE	Turf OtM MOE	Soil Ing MOE	Veg Ing MOE	Dermal Drift MOE	Inhalation Drift MOE	Total MOE
DPAR Child <2	Imidacloprid	9.40E+07	1.60E+04	5.42E+04	3.89E+04	1.32E+05	4.35E+06	8.95E+06	3.00E+03	6.51E+07	1.02E+08	2.23E+03
	Glycerin	N/A	N/A	N/A	9.04E+07	3.07E+08	1.01E+10	2.08E+10	6.82E+06	N/A	7.94E+08	6.16E+06
	Summed	9.40E+07	1.60E+04	5.42E+04	3.89E+04	1.32E+05	4.35E+06	8.95E+06	3.00E+03	6.51E+07	9.07E+07	2.23E+03
DPAR Child 2-<16	Imidacloprid	2.92E+07	2.19E+04	5.74E+04	3.74E+04	2.25E+05	5.47E+06	1.08E+07	6.36E+03	7.89E+07	1.24E+08	3.97E+03
	Glycerin	N/A	N/A	N/A	8.69E+07	5.23E+08	1.27E+10	2.52E+10	1.45E+07	N/A	9.61E+08	1.20E+07
	Summed	2.92E+07	2.19E+04	5.74E+04	3.74E+04	2.25E+05	5.47E+06	1.08E+07	6.36E+03	7.89E+07	1.10E+08	3.97E+03
DPAR Adult	Imidacloprid	9.53E+07	1.51E+04	1.03E+05	N/A	N/A	N/A	N/A	9.66E+03	4.57E+08	7.18E+08	5.57E+03
	Glycerin	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.20E+07	N/A	3.63E+09	2.18E+07
	Summed	9.53E+07	1.51E+04	1.03E+05	N/A	N/A	N/A	N/A	9.66E+03	4.57E+08	6.00E+08	5.57E+03

Table 89: PDCP-70 Subchronic MOEs for DPAR

Receptor	Ingredient	Soil Dermal MOE	Veg Dermal MOE	Turf Dermal MOE	Veg HtM MOE	Turf HtM MOE	Turf OtM MOE	Soil Ing MOE	Veg Ing MOE	Dermal Drift MOE	Inhalation Drift MOE	Total MOE
DPAR Child <2	Imidacloprid	8.65E+07	5.97E+04	2.02E+05	1.45E+05	4.94E+05	1.63E+07	8.24E+06	2.43E+03	1.93E+10	3.74E+09	2.26E+03
	Glycerin	N/A	N/A	N/A	1.81E+09	6.14E+09	2.02E+11	1.51E+11	6.82E+06	N/A	2.90E+11	6.79E+06
	Summed	8.65E+07	5.97E+04	2.02E+05	1.45E+05	4.94E+05	1.63E+07	8.24E+06	2.43E+03	1.93E+10	3.69E+09	2.26E+03
DPAR Child 2-<16	Imidacloprid	2.69E+07	8.20E+04	2.14E+05	1.40E+05	8.42E+05	2.05E+07	9.98E+06	5.16E+03	2.33E+10	4.52E+09	4.56E+03
	Glycerin	N/A	N/A	N/A	1.74E+09	1.05E+10	2.54E+11	1.83E+11	1.45E+07	N/A	3.51E+11	1.43E+07
	Summed	2.69E+07	8.20E+04	2.14E+05	1.40E+05	8.42E+05	2.05E+07	9.97E+06	5.16E+03	2.33E+10	4.47E+09	4.56E+03
DPAR Adult	Imidacloprid	8.77E+07	5.65E+04	3.87E+05	N/A	N/A	N/A	N/A	7.83E+03	1.35E+11	2.62E+10	6.76E+03
	Glycerin	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.20E+07	N/A	1.33E+12	2.20E+07
	Summed	8.77E+07	5.65E+04	3.87E+05	N/A	N/A	N/A	N/A	7.83E+03	1.35E+11	2.57E+10	6.76E+03

Table 90: PDCP-70 Chronic MOEs for DPAR

Receptor	Ingredient	Soil Dermal MOE	Veg Dermal MOE	Turf Dermal MOE	Veg HtM MOE	Turf HtM MOE	Turf OtM MOE	Soil Ing MOE	Veg Ing MOE	Dermal Drift MOE	Inhalation Drift MOE	Total MOE
DPAR Child <2	Imidacloprid	2.01E+08	5.64E+05	1.92E+06	1.38E+06	4.67E+06	1.54E+08	1.91E+07	1.90E+03	1.51E+10	3.74E+08	1.89E+03
	Glycerin	N/A	N/A	N/A	2.21E+10	7.49E+10	2.47E+12	1.84E+12	6.82E+06	N/A	2.90E+11	6.82E+06
	Summed	2.01E+08	5.64E+05	1.92E+06	1.50E+07	4.67E+06	1.54E+08	1.91E+07	1.90E+03	1.51E+10	3.73E+08	1.89E+03
DPAR Child 2-<16	Imidacloprid	6.25E+07	7.76E+05	2.03E+06	1.32E+06	7.97E+06	1.93E+08	2.32E+07	4.03E+03	1.82E+10	4.52E+08	3.98E+03
	Glycerin	N/A	N/A	N/A	2.12E+10	1.28E+11	3.10E+12	2.23E+12	1.45E+07	N/A	3.51E+11	1.45E+07
	Summed	6.25E+07	7.76E+05	2.03E+06	1.32E+06	7.96E+06	1.93E+08	2.32E+07	4.03E+03	1.82E+10	4.52E+08	3.98E+03
DPAR Adult	Imidacloprid	2.04E+08	5.35E+05	3.66E+06	N/A	N/A	N/A	N/A	6.12E+03	1.06E+11	2.62E+09	6.04E+03
	Glycerin	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.20E+07	N/A	1.33E+12	2.20E+07
	Summed	2.04E+08	5.35E+05	3.66E+06	N/A	N/A	N/A	N/A	6.12E+03	1.06E+11	2.62E+09	6.04E+03

Appendix 3A

Table 91: PDCP-71 Acute MOEs for DPAR

Receptor	Ingredient	Soil Dermal MOE	Soil Ing MOE	Veg Ing MOE	Dermal Drift MOE	Inhalation Drift MOE	Total MOE
During-and-Post-Application-Resident Child <2	Imidacloprid	1.08E+06	1.03E+05	5.08E+04	N/A	N/A	3.30E+04
	Glycerin	N/A	2.41E+08	3.76E+06	N/A	N/A	3.70E+06
	Summed	1.08E+06	1.03E+05	5.01E+04	N/A	N/A	3.27E+04
During-and-Post-Application-Resident Child 2-<16	Imidacloprid	3.36E+05	1.25E+05	1.08E+05	N/A	N/A	4.93E+04
	Glycerin	N/A	2.92E+08	7.98E+06	N/A	N/A	7.76E+06
	Summed	3.36E+05	1.25E+05	1.07E+05	N/A	N/A	4.90E+04
During-and-Post-Application-Resident Adult	Imidacloprid	1.10E+06	N/A	1.64E+05	N/A	N/A	1.42E+05
	Glycerin	N/A	N/A	1.21E+07	N/A	N/A	1.21E+07
	Summed	1.10E+06	N/A	1.62E+05	N/A	N/A	1.40E+05

Table 92: PDCP-71 Subchronic MOEs for DPAR

Receptor	Ingredient	Soil Dermal MOE	Soil Ing MOE	Veg Ing MOE	Dermal Drift MOE	Inhalation Drift MOE	Total MOE
During-and-Post-Application-Resident Child <2	Imidacloprid	9.95E+05	9.48E+04	4.12E+04	N/A	N/A	2.79E+04
	Glycerin	N/A	1.75E+09	3.76E+06	N/A	N/A	3.75E+06
	Summed	9.95E+05	9.48E+04	4.08E+04	N/A	N/A	2.77E+04
During-and-Post-Application-Resident Child 2-<16	Imidacloprid	3.09E+05	1.15E+05	8.74E+04	N/A	N/A	4.28E+04
	Glycerin	N/A	2.12E+09	7.98E+06	N/A	N/A	7.95E+06
	Summed	3.09E+05	1.15E+05	8.65E+04	N/A	N/A	4.26E+04
During-and-Post-Application-Resident Adult	Imidacloprid	1.01E+06	N/A	1.33E+05	N/A	N/A	1.17E+05
	Glycerin	N/A	N/A	1.21E+07	N/A	N/A	1.21E+07
	Summed	1.01E+06	N/A	1.32E+05	N/A	N/A	1.16E+05

Table 93: PDCP-71 Chronic MOEs for DPAR

Receptor	Ingredient	Soil Dermal MOE	Soil Ing MOE	Veg Ing MOE	Dermal Drift MOE	Inhalation Drift MOE	Total MOE
During-and-Post-Application-Resident Child <2	Imidacloprid	2.31E+06	2.20E+05	3.22E+04	N/A	N/A	2.77E+04
	Glycerin	N/A	2.13E+10	3.76E+06	N/A	N/A	3.76E+06
	Summed	2.31E+06	2.20E+05	3.19E+04	N/A	N/A	2.75E+04
During-and-Post-Application-Resident Child 2-<16	Imidacloprid	7.19E+05	2.67E+05	6.83E+04	N/A	N/A	5.05E+04
	Glycerin	N/A	2.58E+10	7.98E+06	N/A	N/A	7.97E+06
	Summed	7.19E+05	2.67E+05	6.77E+04	N/A	N/A	5.02E+04
During-and-Post-Application-Resident Adult	Imidacloprid	2.34E+06	N/A	1.04E+05	N/A	N/A	9.93E+04
	Glycerin	N/A	N/A	1.21E+07	N/A	N/A	1.21E+07
	Summed	2.34E+06	N/A	1.03E+05	N/A	N/A	9.85E+04

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Term	Definition
Acetylcholine	A neurotransmitter found in vertebrates that plays a critical role in transmitting impulses in both the central and peripheral nervous system.
Acetylcholinesterase	Enzyme that terminates nerve signals by breaking down acetylcholine.
Active Ingredient	The chemical or substance component of a pesticide product that can kill, repel, attract, mitigate or control a pest.
Acute Exposure	Acute exposure is one or a series of short-term exposures generally lasting less than 24 hours. For calculating human risk, an acute exposure is considered 24 hours. In the human risk assessment, acute exposure values are compared to acute health effect endpoints to estimate acute risk. Acute health effect endpoints are effects observed at less than 14 days.
Acute Intake	The amount of chemical taken in by an individual during a single short-term exposure. Units of mg/kg-day.
ADDc	The average daily dose calculated using a 365 day average EEC. The ADDc is used to calculate the Annual Average Daily Dose.
ADDsc	The average daily dose calculated using a maximum 30-day average EEC instead of the acute EEC. The ADDsc is used to calculate the Subchronic Average Daily Dose.
Adjuvant	Material added to a pesticide mixture to improve or alter the deposition, toxic effects, mixing ability, persistence, or other qualities of the active ingredient.
Aerial application	An application method comprised of a tank, boom and spray nozzles attached to fixed-winged aircraft or helicopter that delivers pesticide droplets low over the ground. Commonly used to make applications to large areas when ground equipment is unavailable, impractical, or unsuitable.
Aerobic biodegradation	Breakdown of contaminants by bacteria, fungi, or other microorganisms in the presence of oxygen.
Aerosol	Fine liquids or solids that are suspended in the air.
AgDRIFT	A model that describes the overall method for evaluating off-site deposition of pesticide active and inert ingredients applied by aerial, ground, and orchard airblast spraying methods, as well as the methods for evaluating the potential of buffer zones to protect sensitive aquatic and terrestrial habitats from undesired exposures. This tool was developed by the USEPA's Office of Pesticide Programs, the U.S. Department of Agriculture's Agricultural Research Service, the U.S. Forest Service, and the Spray Drift Task Force (SDTF).
Age-Dependent Adjustment Factor (ADAF)	An adjustment factor that accounts for increased carcinogenic potency during early life stages.

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Term	Definition
Agency for Toxic Substances Disease Registry (ATSDR)	Federal public health agency of the U.S. Department of Health and Human Services in Atlanta, Georgia
Airblast Sprayer	Application equipment comprised of a tank, sprayers with nozzles, and a fan towed behind a ground vehicle such as a tractor or all-terrain vehicle (ATV). The pesticide is delivered by a low-pressure pump into the high-pressure airstream produced by the fan. The airstream is typically directed upwards and to each side in order to deliver pesticide spray droplets throughout a tree canopy.
American Conference of Government Industrial Hygienists Threshold Limit Values (AGIH TLV)	Health based values developed by committees that review existing published and peer-reviewed literature in various scientific disciplines. These values are guidelines designed for industrial hygienists in making decisions regarding safe levels of exposure to various chemical substances and physical agents found in the workplace. They are based on a time weighted average (TWA) of 8 hours per day during a 40-hour work week.
Anaerobic biodegradation	Breakdown of contaminants by bacteria, fungi, or other microorganisms in the absence of oxygen.
Annual Average Daily Dose (AADD)	The estimated amount of exposure averaged over the duration of exposure. Often expressed in mg/kg-d.
Application Rate (AR)	The quantity of pesticide applied per unit area or unit volume. It can be expressed according to the amount of product or active ingredient applied. Units can be lbs a.i./acre, kg a.i./ha, oz. (weight)/100 gallons, fl. oz./100 gallons, etc.
Applicator (A)	A worker who only applies the chemical and is a separate receptor from the worker who mixes and loads the chemical into the tank.
Approved Treatment Protocol (ATP)	Program that is part of the Pierce’s Disease Control Program (PDCP) and allows qualified nurseries to ship nursery stock treated with selected chemicals to non-infested areas without an origin inspection.
AppScenID	A unique ID that designates the specific combination of application methods and details for every application scenario in the Statewide scenario program.
Aquatic Invertebrate Uptake Factor (AIUF)	Multipliers that are used to estimate concentrations of pesticides that are taken in or absorbed by an aquatic invertebrate.
Area Use Factor (AUF)	The proportion of a species home range or foraging area where food or prey will contain pesticide residues.
Asian Citrus Psyllid (ACP)	A 3 to 4 mm long insect with a light brown mottled body and head, and belongs to the Psyllidae family. It is known to transmit Candidatus Liberibacter asiaticus, which causes Huanglongbing in both citrus and close relatives to the citrus tree.

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Term	Definition
Attractant	A substance that lures insects to it, thereby removing them from crops, animals, or stored products.
Average Daily Dose (ADD)	The amount of absorbed dose an individual receives from a given short-term exposure to a chemical per day. Units of mg/kg-day.
Average Suction at the Wetting Front (m)	Green-Ampt's average suction at wet front
Averaging Time (AT)	The appropriate time period over which human exposure is averaged. For acute assessments, exposures are averaged over the shortest exposure period that could produce an effect, usually an exposure event or a day. For chronic assessments, the averaging time is typically equal to the exposure duration for non-cancer assessments, or a lifetime (70 years) for cancer assessments. Units of days or years.
Backpack Motorizer Sprayer	Application equipment comprised of a tank that is worn on the back, a motorized pump, and a spray wand with one or more nozzles that delivers pesticide spray droplets to the target site.
Backpack Sprayer	Application equipment consisting of a tank that is worn on the back, a hand-lever-operated pump, and a spray wand with one or more nozzles that delivers pesticide spray droplets to the target site.
Bait Station	Used to attract and kill pests using a pesticide and attractant. In the case of MAT, the bait station kills male fruit flies and is applied to utility poles and street trees at least 6 feet above the ground.
Bait Trap	A trap that lures pests using pheromones, odors, color, heat and other attractants.
Baseline	A designation given to any set of estimated environmental concentrations and risk results that reflect the original application scenario reported in the program-specific application scenarios table for each program, without any modifications (e.g. changes in application techniques, PPE, acres treated per day, etc.) that may influence risk outcomes. This designation is made within the RunID.
Benthic	The lowest level of a body of water which includes the sediment surface and sub-surface layers.
Best Management Practices (BMP)	Practices that are considered to be the most effective, practical, economical, and efficient means to obtain a specific objective. BMPs are often established to prevent water pollution, but they can be established to meet any objective of a critical nature within an industry.
Bioaccumulation	General term describing a process by which chemicals are taken up and retained by an organism either directly from exposure to a contaminated medium or by consumption of food containing the chemical. Body loads often increase as the duration of exposure increases.
Bioconcentration Factor (BCF)	Multipliers that are used to estimate the concentration of a chemical in biological tissue per concentration of the chemical in surrounding media (e.g., soil or water).

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Term	Definition
Biodegradation	A process by which microbial organisms transform (through metabolic or enzymatic action) the structure of chemicals introduced into the environment.
Biomagnification	The increasing concentration of a substance, such as a toxic chemical, in the tissues of organisms at successively higher trophic levels in a food chain.
Biomagnification Factor (BMF)	Multiplier used to estimate the increasing concentration of a substance, such as a toxic chemical, from one level of the food chain to a higher trophic level.
Boll Weevil Trap	Used to attract and trap weevils. Made up of the following parts: trap body, molded screen cone, and plastic collection chamber. Weevils attracted to the trap enter through the opening at the top of the molded screen cone.
Buffer - Length (m)	The length of the filter strip used in the Vegetated Filter Strips Modeling System - distance in the direction of flow. This typically corresponds to the distance from edge of the field to the water (stream, canal, pond, etc.).
Buffer - Roughness (unitless)	The roughness at each segment used in the Vegetated Filter Strips Modeling System.
Buffer - Slope (fraction)	The slope at each segment used in the Vegetated Filter Strips Modeling System
Buffer - Width (m)	The width of the filter strip used in the Vegetated Filter Strips Modeling System -movement in the direction perpendicular to the flow. This typically corresponds to the length of the side of the field adjacent to the filter.
Buffer Zone (Fumigation)	Fumigation buffer zones are the area immediately surrounding a fumigation chamber or other fumigation activity. Restricted entry to a buffer zone limits the access or time a person spends in areas near fumigations and are intended to reduce exposure to an acceptable level by allowing airborne residues to disperse before reaching the individual.
Buffer Zone (Soil)	Soil buffer zones are land areas situated between sites of pesticide application and a surface-water body that receives runoff. The term "filter strip" is often used synonymously, but filter strips generally contain vegetation.
California Department of Food and Agriculture (CDFA)	California government agency responsible for protecting and promoting agriculture.
California Department of Pesticide Regulation (DPR)	California government agency whose mission is to protect human health and the environment by regulating pesticide sales and use, and fostering reduced-risk pest management.
California Department of Public Health (CDPH)	The state department responsible for public health in California. CDPH responsibilities include public outreach concerning health related issues and enforcement of laws and regulations that protect health and ensure safety.

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Term	Definition
California Department of Toxic Substances Control (DTSC)	The state department responsible for protecting the public health and the environment from toxic harm. DTSC responsibilities include enforcement of hazardous waste laws and regulations and the clean-up or overseeing of hazardous substance release sites.
California Environmental Data Exchange Network (CEDEN)	The State Water Board's data system for surface water quality in California.
California Environmental Protection Agency (Cal/EPA)	The cabinet-level California state agency responsible for developing, implementing, and enforcing environmental laws that regulate air, water and soil quality, pesticide use and waste recycling and reduction.
California Environmental Quality Act (CEQA)	A California statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.
California Food and Agricultural Code (CFAC)	A California legal code enacted by the California State Legislature to promote and protect the agricultural industry of the state and for the protection of public health, safety, and welfare.
Cancer Slope Factor (CSF/SF)	An upper-bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent. This estimate, usually expressed in units of proportion (of a population) affected per mg/kg-day, is generally reserved for use in the low-dose region of the dose-response relationship, that is, for exposures corresponding to risks less than 1 in 100. Units of (mg/kg-day)^-1
Canopy-Interception Factor (CIF)	The interception factor (e.g., 20%) applied to foliar applications to account for residues blocked by foliage.
Carcinogen	A chemical classification for the purpose of risk assessment as an agent that is known or suspected to cause cancer in humans, including but not limited to a known or likely human carcinogen or a probable or possible human carcinogen.
Carnivore	A species that primarily consumes terrestrial vertebrate prey.
Carrying Agent	The liquid or powdered inert substance that is combined with the active ingredient in a pesticide formulation.
Chemigation	Application of pesticides to target areas through an irrigation system.
Chromosomal aberration	Any change in the normal structure or number of chromosomes

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Term	Definition
Chronic Daily Intake (CDI)	The rate of the absorbed dose an individual receives from a given exposure to a chemical every day over a long-term duration. Units of mg/kg-day.
Chronic Exposure	Chronic exposure is a long term exposure, usually lasting one year to a lifetime. For calculating human risk, a chronic exposure is considered the number of years a receptor is being exposed. The following are the receptors and the years that they are exposed: occupational exposure, 40 years; resident adult exposure, 24 years; and resident child exposure, 24 years. In the human risk assessment, chronic exposure values are compared against chronic endpoints to estimate chronic risk. Chronic health effect endpoints are effects observed at greater than 90 days. To extrapolate from a subchronic or acute health effect endpoint to a chronic health effect endpoint, an uncertainty factor (UF) of 10x is used.
Clastogenic	Agent capable of causing breakages of chromosomes.
Clay Content (%)	For ecological receptors, a chronic exposure is occurs over a long period of time relative to the life span of an organism or effectively infinite in duration relative to the response rate of the exposed system.
Combined-Nursery-Worker (CNW)	A worker employed at a nursery that is occupationally exposed to Statewide pesticide active ingredients, inert ingredients, and adjuvants while preparing pesticide solutions and applying them, as well as loading the treated plants into a truck for transport.
Compound	A substance formed by chemical union of two or more elements or ingredients in definite proportion by weight.
Conceptual Site Model (CSM)	A schematic representation of an environmental system that demonstrates the transport and fate of contaminants through environmental media to environmental receptors and their most likely exposure modes.
Contact Rate (CR)	The contact rate between contaminated environmental media and a receptor. Contact may occur through ingestion, inhalation, or dermal exposure and is expressed in units such as L/day, m3/day, and cm2/day.
Conversion Factor (CF)	A value used to convert units. For example, a conversion factor of 1000 could be used to convert mg to ug.
Courant Number	Courant number for the calculation of time step from 0.5-0.8
Crop Factor	C factor as defined in Muñoz-Carpena and Parsons, 2011
Curve Number	NRCS (SCS) Curve Number for the source area
Cytotoxin	A chemical agent that is toxic to cells.

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Term	Definition
Dashboard Database	The Dashboard Database (Dashboard) is an interface designed to provide quick and easy access to the supporting data used to perform the human health and ecological risk assessment for the California Department of Food and Agriculture (CDFA) Statewide Programmatic Environmental Impact Report (PEIR).
de minimis	Insignificant or negligible.
Dermal Absorption Factor (DAF)	A chemical-specific value that accounts for the desorption of a chemical from the soil matrix, contact via vegetation, or direct contact to the pesticide spray and absorption of the chemical across the skin.
Detection Limit (DL)	The smallest quantity of a substance that can be detected following accepted chemical analytical methods.
Developmental Toxicology	The study of chemicals that disrupt or disturb an organism's early development.
Dislodgeable Foliar Residue (DFR)	The amount of pesticide ingredient residue that can be dislodged from the two-sided foliar surface of a plant during a well-defined procedure. It is used, together with worker exposure determinations, to estimate transfer coefficients for workers re-entering treated crops. DFR is also used as a conservative method for estimating residential exposure.
Dosatron	A water powered, proportional injector that dispenses and dilutes chemicals.
Downwind Bystander (DWB)	Any human receptor 25 feet away from the application area, who has the potential to be exposed to off-site drift. Exposure can occur through inhalation and dermal routes.
Drench	An application method where chemical is poured or sprayed on the soil at the base of a plant or tree, thereby reducing or eliminating the likelihood of chemical residue on foliage. The applied chemical seeps into the soil and is absorbed by the plant or tree via the roots. Drench applications can also be used to control soil-dwelling pests.
Drift to Object (DtO)	The fraction of pesticide applied that drifts from its target of application to an inanimate object.
Drift to Turf (DtT)	The fraction of pesticide applied that drifts from its target of application to turf.
Drinking Water Exposure (DWE)	The exposure a human receptor receives from ingestion of water.
Drip Irrigation	Drip irrigation is a form of irrigation that saves water and fertilizer by allowing water to drip slowly to the roots of many different plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters.
Droplet Size Distribution (DSD)	The frequency distribution of droplet sizes (either diameter or volume) that is characteristic of a pesticide product being applied.

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Term	Definition
Dry deposition	The falling of small particles and gases to the earth without rain or snow.
Dry Weight (dw)	The weight of an organism without water content.
During and Post Application Resident (DPAR)	A person living in a residential environment who is present 25 feet away during a residential application and has the potential to be exposed to chemical residues immediately after the treatment as well. Typical exposures occur from off-site drift during applications and from contact with residues while performing activities in the garden after application.
Ecological Risk Assessment (ERA)	The report prepared to evaluate the potential ecological risk associated with pesticide use under the California Department of Food and Agriculture's (CDFA) Statewide Plant Pest Prevention and Management Program (Statewide Program). This document is intended to be referenced in tandem with this Dashboard Database.
Ecotoxicity	The study of how chemicals affect the environment and the organisms living in it.
Emulsifiable Concentrate (EC, E)	A formulation type that is a liquid formulation containing the pesticide active ingredient, one or more solvents, and an emulsifier which allows mixing of water. Such formulations commonly have “EC” or occasionally “E’’ within the product name.
Endpoint	A measurable occurrence of a health effect following exposure.
Environmental Fate	The life cycle of a chemical once it has been released into the environment. Includes the distribution, transformation, and external forces that affect a chemical's movement, accumulation, and degradation.
Environmental Impact Report (EIR)	Document that describes the impacts on the environment as a result of a proposed action. It also describes impacts of alternatives and plans to mitigate the impacts.
Environmental Media	A compartment in the environment that can contain a chemical of interest (e.g., soil, water).
Erodibility	Gradual wearing away of soil from natural or anthropogenic sources
Estimated Environmental Concentration (EEC)	The amount of a pesticide ingredient estimated to exist in a particular environmental medium (e.g., food, water, soil) following an application. For some instances in the human risk assessment, "EEC" was used as a general term to describe certain generic exposure values that are inputted into the exposure calculations (e.g. unit exposures).
Estimated Exposure Dose (EED)	A measured or estimated dose of a substance to which an organism is likely to be exposed, considering exposure by all sources and routes.
Estimation Programs Interface (EPI)	A USEPA screening level software tool developed by the Office of Pollution Prevention and Toxics and Syracuse Research Corporation used to estimate physical and environmental properties.

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Term	Definition
European Grapevine Moth (EGVM)	A 6-8 mm long moth with mosaic-patterned wings, which is known to feed on many plants including grapes. The third generation larvae feed on ripening grapes making them susceptible to Botrytis cinerea (bunch rot).
Event Frequency (EV)	The number of times a certain event occurs in a day. Units of events/day.
Evolutionary Significant Units (ESU)	A population of organisms that is substantially and reproductively isolated from other conspecific populations and that represents an important component of evolutionary legacy of the species.
EXAMS-PRZM Exposure Simulation Shell (EXPRESS)	A USEPA program that estimates reproducible maximum water concentrations for different time periods (peak, 4-day, 21-day, 60-day, annual), which are derived by coupling 30-year time-series of meteorological data to linked PRZM/EXAMS simulation studies. Multiple geographic and agronomic settings are also taken into account in EXPRESS.
Exposure Analysis Modeling System (EXAMS)	Developed by Environmental Fate and Effects Division (EFED) of the Office of Pesticide Products (OPP) of the USEPA. Contains a set of process modules that link fundamental chemical properties to the limnological parameters that estimate the kinetics of fate and transport in aquatic systems.
Exposure Duration (ED)	Amount of time an individual is exposed to a pesticide ingredient via one or all routes of exposure. Units of years.
Exposure Factor	Exposure factors are parameters related to human behavior and characteristics that affect the extent to which a receptor is exposed to a chemical. They are often utilized for both qualitative and quantitative purposes (USEPA, 2011p).
Exposure Frequency (EF)	The number of days on which a particular exposure to a chemical occurs in a year. Units of days/year.
Exposure Pathway/Exposure Route	Pathways through which a receptor could potentially come into contact with pesticide (e.g., dermal contact with soil).
Exposure Point Concentrations (EPC)	A location within which an exposed receptor may reasonably be assumed to move at random and where contact with an environmental medium is equally likely at all sub-locations.
Exposure Time (ET)	Amount of time an individual is exposed to a pesticide ingredient via one or all routes of exposure. Units of hours/day.
Extraction by Saliva (SE)	The fraction of chemical residue that is extracted by saliva from a hand or object when contact is made with the mouth.
Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)	Federal regulation which provides federal control of pesticide distribution, sale, and use. All pesticides used in the United States must be registered (licensed) by USEPA. Registration assures that pesticides will be properly labeled. Use of each registered pesticide must be consistent with use directions contained on the label or labeling.

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Term	Definition
Feedback the change in slope and roughness at the sediment wedge	Flag to feedback the change in slope and surface roughness at the sediment wedge for each time step (0 = no feedback; 1 = feedback). Used in the Vegetated Filter Strips Modeling System
Filter Strip	See Buffer Zone (Soil)
Flagger	Individuals who guide aerial applicators from the ground during the release of a pesticide product onto its target.
Flowable (F)	A formulation type that is a finely ground pesticide suspended in a liquid and mixed with water for application.
Foliar Pesticide	A pesticide applied to the plant surface that may or may not be taken up by the plant. Foliar pesticides are effective against pests from direct spray deposition or as a result of either the chemical's presence on the plant surface or the chemical entering the plant and becoming systemically active by spreading throughout the plant tissue.
Food Intake Rate (FIR)	The amount of food that is ingested over a period of time.
Food Quality Protection Act Safety Factor (FQPA SF)	A safety factor included in the establishment of pesticide tolerances based on the FQPA of 1996. It is designed to protect infants and children.
Formulation	A mixture of active and inert ingredients.
Fraction Ingested (FI)	Fraction of pesticide absorbed following ingestion of contaminated soil (unitless).
Fraction of Hand Surface Area Mouthed per Event (Fm)	The fraction of a hand that the mouth makes contact with in hand-to-mouth exposure assessments.
Fraction of Organic Carbon (Foc)	The fraction of organic carbon in the soil. Used in estimating the terrestrial vegetation update factor (VUF).
Fraction of Residue that Dissipates per Day	The fraction of pesticide residue that has dissipated per day, often estimated through use of first-order rate kinetics and the ingredient half-life on the media of interest (e.g., soil).

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Term	Definition
Fraction of Residue that Dissipates per Day (FD)	The fraction of chemical residue that dissipates from the surface of vegetation, turf, or an object each day.
Fraction of the filter where ponding is checked	Relative distance from the upper filter edge where the check for ponding conditions is made (i.e., 1 = end filter, 0.5 = mid point, 0 = beginning)
Fraction of Total Residue on Hands (FaiHands)	Fraction of active ingredient on hands compared to total surface residue from the dermal transfer coefficient study (unitless).
Fraction of Total Residue on Object (Fo)	The fraction of pesticide residue that could be transferred to an object following an application.
Fraction of Transferable a.i. (FAR)	Fraction of pesticide available as transferable residue on treated or contaminated turf or foliage.
Frugivore	Species with a diet consisting of primarily of fruits.
Fumigant	Gas applied to soil, structures, or post-harvest treatment of commodities and acts as an acaricide, antimicrobial, fungicide, insecticide, nematicide and vertebrate control agent.
Fumigation	Application of fumigant to soil, structures, or post-harvest treatment of commodities and acts as an acaricide, antimicrobial, fungicide, insecticide, nematicide and vertebrate control agent.
Fumigation Chamber	An enclosed room with a circulating fan and an exhaust port. Commodities are loaded into this room, and during fumigation, the fumigant is introduced into the chamber by being released in front of the fan, being passed through a vaporizer, or allowing it to evaporate from a shallow pan. When fumigant exposure is complete, the chamber is vented and evacuated.
Fumigation Downwind Bystander (FDWB)	An individual downwind from a commodity fumigation site that has the potential to be exposed to fumigants through off-site drift.
Fumigation Worker (FUW)	A worker employed at any commodity fumigation facility who has the potential to be exposed during any fumigation activity, including but not limited to applying the fumigant in the fumigation chamber, aerating the chamber, or using a forklift to unload the commodity from the chamber.
Generally Recognized As Safe (GRAS)	Defined by USFDA as a substance indirectly or directly added to food that is regarded as generally safe via the oral route of exposure. Although no database exists for GRAS, substances considered GRAS can be found in USEPA's Reregistration Eligibility Decision, Code of Federal Regulations and in the data from the manufacturer.

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Term	Definition
Genotoxicity	The property of a chemical that is damaging to DNA and thereby capable of causing mutations or cancer.
Glassy-Winged Sharpshooter (GWSS)	A large leaf hopper, belonging to the Cicadellidae family, which feeds on plants by injecting a needle-like mouth into the plant's xylem. It is a vector for Pierce's Disease.
Granivores	Species with a diet consisting of primarily grains and seeds.
Groundboom sprayer	A type of application equipment comprised of a chemical mixing tank and a system of evenly spaced spray nozzles. The equipment can be attached to, or extend from a truck, tractor, or ATV, or it can be held by hand. The nozzles are directed towards the ground or target vegetation and allow the applicator to control the application rate.
Ground Cover/Groundcover	Plants that typically grow densely and are low to the ground (e.g., mosses).
Groundwater Protection Areas (GWPAs)	An area of land that is vulnerable to the movement of pesticides to ground water according to either leaching or runoff processes (DPR, 2013d).
Groundwater Protection List (GWPL)	The list of pesticides that are designated as having the potential to pollute ground water.
Gypsy Moth	A moth originally from Europe and Asia that was brought to the US for breeding experiments and escaped. Gypsy moth caterpillars are known to rapidly defoliate trees causing trees to be more susceptible to pests and diseases.
Haemorrhage	Bleeding from ruptured blood vessels
Half-life	The period of time required for the environmental concentration of a chemical to decrease by half.
Hand-to-mouth (HtM)	A potential exposure pathway in which pesticide residues on the hands may be transferred to a receptor's mouth, resulting in incidental ingestion.
Hazardous Substances Database (HSDB)	A toxicology database providing information on human exposure, industrial hygiene, emergency handling procedures, environmental fate, and regulatory requirements for potentially hazardous chemicals. Maintained by the U.S. National Library of Medicine of the National Institutes of Health.
Height of Grass (cm)	Filter media height

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Term	Definition
Hematocrit	The volume percentage of red blood cells in whole blood
Henry's Law Constant	The degree to which a chemical, as a gas, will dissolve in a liquid.
Herbivores	Species with a diet consisting of primarily vegetation such as leaves and stems.
Huanglongbing (HLB)	Plant disease caused by a phloem-restricted bacterium that is vectored by the Asian Citrus Psyllid. In citrus, HLB symptoms include blotchy, yellow, asymmetric mottling of leaves.
Hudson Sprayer	A type of application equipment comprised of a hand-carried tank, a manually-pressurized pump, and a spray wand that delivers pesticide droplets to the target site.
Human Equivalent Concentration (HEC)	The human concentration (for inhalation exposure) or dose (for other routes of exposure) of an agent that is believed to induce the same magnitude of toxic effect as the experimental animal species concentration or dose. This adjustment incorporates the ratio of the animal respiration rate to human respiration rate.
Human Health Risk Assessment (HHRA)	The report prepared to evaluate the potential human health risk associated with pesticide use under the California Department of Food and Agriculture's (CDFA) Statewide Plant Pest Prevention and Management Program (Statewide Program). This document is intended to be referenced in tandem with this Dashboard Database.
Hydraulic sprayer	Application equipment that contain a tank, pump with agitator, pressure gauge, regulating valve, relief valve, control valves, piping and nozzles, power source, and support frame.
Hydrolysis	Breakdown of a chemical due to reaction with water.
Hyperaemia	Process by which body increases blood flow to meet the metabolic needs of its different tissues in health and disease.
Impregnated Wick	Trap component that contains lures and capturing agents to attract and stun the insect.
Incoming Sediment Characteristics	Incoming sediment characteristics include sediment particle class, percent of particles from incoming sediment with diameter > 0.0037 cm, incoming flow sediment concentration, porosity of deposited sediment, sediment particle size (d50), and sediment particle density.
Index Lifestage (ILS)	An index lifestage (ILS) represents "the lifestage of highest concern due to unique behavioral characteristics that may lead to higher levels of exposure." The USEPA determined these index lifestages through both "quantitative (e.g., exposure assessments) and qualitative (e.g., exposure and activity data) considerations," and assessment of the ILS is expected to "protect for the exposures and risks for all potentially exposed lifestages" (USEPA, 2012l).

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Term	Definition
Inert Ingredient	Any ingredient other than the active ingredient. It may be a solvent, carrier, or any other chemical not intended to affect the target pest directly.
Inhalation Absorption Factor (IAF)	A chemical-specific value that accounts for the absorption of the chemical in the lung.
Inhalation Rate (IRi)	The volume of air a person breathes over a specific period of time. Units include cubic meters/hour.
Initial Water Content (cm^3/cm^3)	Initial soil-water content
Insect Growth Regulator (IGR)	A chemical that interrupts the life cycle of an insect by inhibiting maturity of the insect (e.g. transforming to its next growth stage).
Insecticide	A chemical agent designed to kill insects.
Insectivore	Species with a diet consisting of primarily terrestrial insects.
Integrated Pest Control (IPC)	A CDFA Program which conducts a wide range of pest management and eradication projects.
Integrated Pest Management (IPM)	A long-term pest management system that focuses on pest prevention and damage through a combination of techniques, such as biological control, habitat manipulation, modification of cultural practices, and use of resistant variety crops/plants/etc.
Integrated Risk Information System (IRIS)	USEPA's human health assessment program that evaluates information on health effects that may result from exposure to environmental contaminants. Its database provides science-based human health assessments to support USEPA's regulatory activities, and chemical-specific information.
Interspecies	Arising or occurring between species.
Invertivores	Species with a diet consisting of primarily invertebrates such as earthworms or snails.
In-vitro	The use of animal or plant tissues or organs in a test tube or artificial environment to conduct more detailed and convenient biological studies.
In-vivo	The use of whole organisms to conduct studies.

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Term	Definition
Jackson Trap	A triangular, plastic-coated trap that is hung in foliage. It contains a solid lure plug that is suspended in the trap, and a sticky insert at the bottom of the trap.
Japanese Beetle	A broadly oval, metallic insect about ½” long and a ¼” wide. It is known to use a wide range of plants as hosts and can cause a loss of export markets and damage to crops, nursery stock, and ornamental plants.
Japanese Beetle Trap	A plastic trap consisting of four fins attached to a funnel which directs beetles into a screw-on can at the bottom of the trap. Beetles respond to the attractants, fly into the fins, and fall down the funnel into the beetle can.
Kaolinosis	Benign case of pneumoconiosis, which mildly impairs the lung function and has fibrogenic potential considered to be at least an order of magnitude less than quartz.
Koc – Organic Carbon Absorption Coefficient	The ratio of chemical present in the organic carbon fraction of the soil versus the chemical concentration in water at equilibrium. It is useful in predicting the mobility of a chemical in the soil.
Kow Aquatic BioAccumulation Model (KABAM)	Estimates potential bioaccumulation of hydrophobic organic pesticides in freshwater aquatic food webs and subsequent risks to mammals and birds via consumption of contaminated aquatic prey. This model can also be used to estimate pesticide concentrations in fish tissues consumed by humans.
Kow– Octanol-Water Partition Coefficient	The ratio of a chemical present in octanol versus water at equilibrium. It reflects the ability of a chemical to dissolve in many plant and animal fatty or waxy tissues and is used to predict many environmental fate properties of the chemical.
Lacrimation	Secretion and discharge of tears.
Larva	The immature, wingless, and often worm-like feeding form that hatches from the egg of many insects, alters chiefly in size while passing through several molts, and is finally transformed into a pupa or chrysalis from which the adult emerges.
LC50	The concentration of a chemical needed to produce death in 50% of the test population - median lethal concentration.
LD50	The dose of a chemical needed to produce death in 50% of the test population - median lethal dose.
Level of Concern (LOC)	For Human Health Risk Assessment, the LOC is synonymous to a target Margin of Exposure (MOE). The target MOE for human risk assessment is compared to a specific scenario derived MOE to estimate risk. Generally the appropriate LOC of 100 is used because it takes into account intraspecies and interspecies. Additionally, a FQPA SF is used if necessary.
Lifetime (LT)	The life span of a particular organism. For humans, this is assumed to be 70 years or 22,550 days.
Lifetime Average Daily Dose (LADD)	The estimated dose to an individual averaged over a lifetime of 40 years (non-cancer assessment) or 70 years (cancer assessment). Units of mg/kg-day.

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Term	Definition
Light Brown Apple Moth (LBAM)	A light brown, yellowish moth with a wingspan of 16-25 mm long, originally from Australia that is known to be an economically important pest due to damaging a wide range of crops and other plants.
Limnetic	The surface waters of a lake open to light penetration.
Lindgren Funnel	A series of black funnels that mimic standing trees suspended from branches or rope. The bottom of the funnel leads to a container that is filled with an attractant.
Lowest Observable (Adverse) Effect Concentration (LOAEC/LOEC)	The lowest tested concentration of an effluent or a toxicant where a toxic response can be observed on aquatic or soil-dwelling test organisms at a specific time of observation.
Lowest Observable (Adverse) Effect Level (LO(A)EL/LOAEL)	The lowest dose in a toxicity study resulting in adverse health effects.
Lure	Synonym to attractant. See Attractant definition in glossary.
Male Attractant Technique (MAT)	Use of male specific lures to attract flies to a bait station. Its purpose is to remove all males from a population in order to prevent mating, thereby leading to eventual collapse of the population as reproduction ceases. Formulations are prepared by mixing a male lure with an insecticide into a slow release matrix.
Manually pressurized sprayer	See 'Hudson Sprayer'
Margin of Exposure (MOE)	The concept used to estimate non-cancer risk for each chemical is the margin of exposure (MOE). This unit measures how close the receptor's daily intake is to the NOAEL, or toxicity of the chemical (e.i. how close a chemical exposure is to being a concern). If the MOE value is greater than 100, it is unlikely that exposure will cause adverse health effects. Non-cancer MOE values greater than 100 generally do not warrant further investigation or mitigation. The MOE is unitless.
Margin of Safety (MOS)	Synonymous to MOE. The concept used to estimate non-cancer risk for each chemical is the margin of exposure (MOS). This unit measures how close the receptor's daily intake is to the NOAEL, or toxicity of the chemical (e.i. how close a chemical exposure is to being a concern). A MOS equal to or greater than 100 is considered adequate for the protection of human health when based on No Observable Adverse Effect Levels (NOAELs) from non-human mammalian studies.
Mating Disruption	A pest management technique in which synthetically produced insect sex pheromones are released in large amounts to confuse the males of a specific species and limit their ability to locate calling females of the same species.

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Term	Definition
Maximum Contaminant Level (MCL)	A standard set by the USEPA for drinking water quality that identifies the threshold limit of the amount of a chemical that is allowed in public water systems.
Maximum Iteration	Maximum number of iterations allowed in the Picard loop
Maximum Surface Storage (m)	The amount of excess rainfall that must be filled at the surface before runoff can begin.
McPhail Trap	Plastic trap with a pheromone dispenser at the top and an inverted funnel at the base. The insect is attracted to the pheromone being released, enters the trap through a hole at the base, and when exhausted, falls into the pesticide contained in the inverted funnel base.
Mechanically Pressurized Handgun	Also known as a "mechanically pressurized sprayer". Application equipment comprised of a hose attached to a pesticide mixing tank which is pressurized by a mechanically-powered pump. The tank is typically mounted on a truck or ATV. A nozzle at the end of the hose allows the applicator to direct the spray and control the application rate.
Mechanically Pressurized Sprayer	See "mechanically pressurized handgun".
Mechanism of Action	Specific biochemical interaction or physical porcess through which a pesticide produces its adverse effect in the target pest or non-target species.
Metabolism	The sum of the physical and chemical processes in an organism by which its material substance is produced, maintained, and destroyed, and by which energy is made available.
Methyl Bromide Commodity Residue Level (R0)	Methyl bromide residue levels in commodity
Methyl Bromide Concentration in Transport Container (Cmb)	Methyl bromide air concentration in commodity transport container resulting from off-gassing of fumigant treated plants.
Methyl Bromide Residue Half-Life (λmb)	Methyl bromide residue half-life in commodity
Minimum Risk Pesticide	A minimum risk pesticide means the pesticide product is not subject to federal registration requirements. It has been shown to be demonstrably safe for its intended use. All minimum risk pesticides must meet the following criteria: (1) The pesticide product must contain specific active ingredients, (2) The pesticide product must contain only those inert ingredients that have been classified by USEPA as List 4A Inert Ingredients of Minimal Concern, (3) All active and inert ingredients must be listed on the label. Active ingredients must be listed by name and percentage weight. Inert ingredients must be listed by name, (4) The label cannot include any

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Term	Definition
	false and misleading statements, and claims that minimum risk pesticides that protect human or public health are prohibited, (5) In general, public health claims are prohibited. Minimum risk pesticide labels may not bear claims to control rodent, insect, or microbial pests in a way that links the pesticide with any specific disease. Also, pesticides that are intended for use in a manner that may result in food or feed must have maximum residue tolerances or exemptions from the requirement of a tolerance.
Mixer Loader Applicator (MLA)	A worker who is occupationally exposed to pesticide active ingredients, inert ingredients, and adjuvants while preparing pesticide solutions and applying them.
Mixer-Loader (ML)	A worker who only mixes and loads the pesticide active ingredients, inert ingredients, and adjuvants into the tank of the application equipment and is separate from the worker who applies the chemical.
Molecular Weight (MW)	The weight of a molecule calculated by summing the atomic weights of the atoms making up the chemical's formula.
Mutagen	Agent causing a change in the DNA sequence of a cell's DNA. Mutations can lead to birth defects, miscarriages, or cancer.
National Institute for Occupational Safety and Health Recommended Exposure Limit (NIOSH REL)	NIOSH developed RELs for hazardous substances or conditions in a workplace based on a time weighted average (TWA) of 10 hours per day during a 40-hour workweek. These values were determined by using risk evaluations using human or animal health effects data, and on an assessment of what levels can be achieved by engineering controls and measured by analytical techniques.
National Institute of Environmental Health Sciences (NIEHS)	One of the research institutes under the National Institutes of Health (NIH) whose mission is to discover how the environment affects people in order to promote healthier lives.
National Resources Conservation Service (NRCS)	A federal agency within the United States Department of Agriculture (USDA) that provides technical assistance to farmers, ranchers, and other private landowners and managers. The NRCS maintains soil surveys.
Neurotoxin	Any of several natural and synthetic substances that interfere with the electrical activities or otherwise damage nerves and nervous system, thus preventing them from functioning.
New York State Department of Environmental Conservation (NYDSEC)	The department of the New York state government whose mission is to conserve, improve, and protect New York's natural resources and environment.

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Term	Definition
No Data Available (NDA)	No data were available.
No Observable (Adverse) Effect Concentration (NO(A)EC/NOEC)	The highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the test organisms at a specific time of observation.
No Observable (Adverse) Effect Level (NO(A)EL/NOAEL)	The highest exposure level at which there are no biologically significant increases in the frequency or severity of adverse effect between the exposed population and its appropriate control. Some effects may be produced at this level, but they are not considered adverse or precursors of adverse effects.
Nomogram	A diagram representing the relations between three or more variable quantities by means of a number of scales, so arranged that the value of one variable can be found by a simple geometric construction.
Normalized Water Intake Rate (NWI)	Population's standard rate of water ingestion
Not Applicable (NA)	Information is not relevant or not appropriate for the given situation.
Not Of Concern (NOC)	A designation given to chemicals for a specific exposure route when they are evaluated to be not of toxicogical concern for that exposure route.
Number of Elemental Nodal Points	Number of nodal points over each element (polynomial degree +1)
Number of Nodes in Solution Domain	The number of nodes in the domain (integer)
Number of Replenishment Intervals per Hour (Nrep)	The number of times an hour the residues on the receptor's hands will be replenished.
Nursery	A place, typically a business, where plants are grown to be used elsewhere for purposes such as transplanting, for use as stock for budding or grafting, or for sale. For the purposes of this risk assessment, the size of a nursery is defined as follows: Small Nursery: less than 250 plants for production or retail Medium Nursery: between 250-1,000 plants for production or retail Large Nursery: greater than 1,000 plants for wholesale production
Nursery Stock	Plants being grown at or distributed to or from a nursery, which include the following plants: field grown or container grown perennial & woody plants, including, but not limited to, vegetative or propagative parts or perennial or woody plants dug from the wild, so

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Term	Definition
	labeled, and distributed, and excluding, among other things, greenhouse plants grown for indoor use, annual plants, biennial plants, florist stock, cut flowers, sod, turf, onions, or potatoes, or seeds of any such plant.
Object Surface Area Mouthed per Event (SAMo)	The surface area [(cm^2)/event] of an inanimate object that comes into contact with a mouth during an object-to-mouth exposure assessment.
Object-to-mouth (OtM)	A potential exposure pathway in which pesticide residues on an object may be transferred to a receptor's mouth, resulting in incidental ingestion.
Occupational Pesticide Handler Exposure Database (OPHED)	A major source of generic unit exposures, representing handling of pesticides under actual field conditions, compiled by the USEPA as the basis for conducting occupational pesticide handler exposure assessments. According to the USEPA, "handlers" include mixer/loaders, applicators, mixer/loader/applicators, and flaggers. Unit exposures are derived from the Pesticide Handler Exposure Database (PHED), Agricultural Handler Exposure Task Force (AHETF), and Outdoor Residential Exposure Task Force (ORETF) and are correlated to specific application scenarios. These unit exposures are provided in the Occupational Pesticide Handler Unit Exposure Surrogate Reference Table.
Occupational Safety and Health Administration Permissible Exposure Level (OSHA PEL)	OSHA sets regulatory limits on the amount or concentration in the air used to protect workers against the health effects of exposure to hazardous substances. The values are based on a time weighted-average (TWA) of 8 hours per day during a 40-hour work week.
Octanol-Air Partition Coefficient (Koa)	Ratio of solute concentration in air versus octanol when the octanol-air system is at equilibrium.
Office of Environmental Health Hazard Assessment (OEHHA)	A department within the California Environmental Protection Agency (Cal/EPA) whose responsibility and mission it to protect and enhance public health and the environment through scientific evaluation of risks posed by hazardous substances.
Off-site drift	See 'Percent Off-target Drift'
Organic Carbon (%)	The percentage organic carbon in the filter strip soil
Oriental Fruit Fly	An 8 mm long fly first established in Hawaii and now a major pest of agriculture. It has a bright yellow body with a dark T-shaped marking on the abdomen, and clear wings. The oriental fruit fly larvae tunnel through the fruit as they feed, making the damaged fruit unfit for consumption.

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Term	Definition
Output Element Information	Flag to output elemental information (1) or not (0)
Particle Class Diameter	Particle class diameter of source sediment
Percent Off-target Drift	Fraction of active and inert ingredient that drifts off-site during an application and has the potential to expose a receptor downwind from the application site. Also referred to as off-site drift.
Percent Organic Matter	Percent organic matter of the source sediment
Personal Protective Equipment (PPE)	Equipment worn by workers to minimize exposure to hazards. Typically includes gloves, long-sleeves, long pants, and/or a respirator.
Pest Detection/Emergency Projects - Detection (PDEP-D)	A CDFA Program that is responsible for early detection of serious agricultural pests in California. It is a subset of the PD/EP Branch which uses operations such as special detection surveys, a statewide trapping program, and emergency project response teams to detect and eradicate pests.
Pest Detection/Emergency Projects - Eradication (PDEP-E)	A CDFA Program that is responsible for quickly and efficiently eradicating incipient infestations of serious agricultural pests in California. It is a subset of the PD/EP Branch which uses operations such as special detection surveys, a statewide trapping program, and emergency project response teams to detect and eradicate pests.
Pesticide	Substances intended to repel, kill, or control any species designated a “pest” including weeds, insects, rodents, fungi, bacteria, or other organisms. Pesticides includes herbicides, insecticides, rodenticides, fungicides, and bactericides along with others.
Pesticide Data Program (PDP)	A national pesticide residue monitoring program that includes sampling, testing, and reporting of pesticide residues in/on U.S. agricultural commodities.
Pesticide in Water Calculator (PWC)	U.S. EPA tool that is used to estimate pesticide concentrations in water bodies that result from pesticide applications to land.
Pesticide Retained to Foliage (%)	The percent of pesticide that is intercepted by foliage during a foliar application.
Pesticide Root Zone Model (PRZM)	Developed by Environmental Fate and Effects Division (EFED) of the Office of Pesticide Products (OPP) of the USEPA. A one-dimensional, dynamic, compartmental model that can be used to simulate pesticide movement in unsaturated soil systems within and immediately below the plant root zone.
Pesticide Use Reporting (PUR)	Monthly reports regarding pesticide use in California, which include pesticide applications to agriculture, parks, golf courses, cemeteries, rangeland, pastures, and along roadside and railroad rights-of-way.

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Term	Definition
Petechial	Bleeding under the skin can occur from broken blood vessels that result in small purplish hemorrhagic spots
Petrov-Galerkin Solution/Regular Finite Element	Flag to choose the Petrov-Galerkin solution (1) or regular finite element (0)
Pheromone	A chemical secreted externally by an organism to communicate to other members of the same species. There are alarm pheromones, food trail pheromones, sex pheromones, and many others that affect behavior or physiology.
Pheromone Lure Trap	A trap that releases pheromones to attract insects. These traps help determine if a pest is present and if the population is increasing, decreasing or peaking.
Photodegradation	Synonymous with photolysis. Breakdown of a chemical caused by exposure to light.
Pica	Intentional or unintentional ingestion of unusually high amounts of soil.
Pierce's Disease Control Program (PDCP)	A pest control program implemented by the CDFA to minimize the statewide impact of Pierce's disease and its vectors in California.
Piscivore	Species that consumes primarily fish.
Plant Off-gassing	During fumigation, the plant sorbs a substantial mass of the fumigant and then releases it. For subsequent handlers of the plant or commodity, this can lead to fumigant inhalation exposure.
Plant off-gassing rate (α)	The plant off-gassing rate (hr^-1), which is dependent on commodity and temperature.
Post-Application Loader (PAL)	A worker who is employed in a nursery setting and loads treated plants into trucks for transport.
Post-Application Resident (PAR)	An individual living in an urban or residential environment who has the potential to come into contact with Statewide-applied pesticide active ingredient, inert ingredient, or adjuvant residues after residential treatments.
Post-Application Worker (PAW)	A worker who is employed to harvest fruit or otherwise work in a production agriculture setting after the application is complete but not before the restricted entry interval (REI) has elapsed. The PAW is assumed to have limited knowledge about chemical toxicity and proper chemical handling techniques.
Post-Transfer Worker (PTW)	A worker employed at a post-transport receiving facility who has the potential to be exposed to fumigant that has off-gassed from the treated commodity during transport.

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Term	Definition
Potential Dose Rate (PDR)	Amount of chemical per time period that could be ingested or deposited upon the skin.
Potential Toxicological Concern (PTC)	A designation given to a chemical that is evaluated to be of potential toxicological concern based on whether its reported effects are pathological in nature or are likely to lead to a pathological effect.
Practice Factor	P factor as defined in Muñoz-Carpena and Parsons, 2011
Pre Harvest Intervals (PHI)	The time required between the last pesticide application and harvest of the treated crops.
Program Material Data Sheet (PMDS)	Document supplied by CDFA that contains the application rate and other relevant details for specific scenarios under the Proposed Program.
Programmatic Environmental Impact Report (PEIR)	A document that serves as the overarching CEQA framework for efficient and proactive implementation of Statewide Program activities.
Proportion	The fractional contribution of any active or inert ingredient to the total composition of a formulated pesticide product.
Protection Factor (PF)	The overall protection afforded by a certain type of respirator as defined by the ratio of the concentration of contaminant outside a face mask or hood to that inside the mask while in a contaminated atmosphere. According to USEPA Occupational Pesticide Handler Exposure Data, a PF5 respirator reduces inhalation exposure by 80% and a PF10 respirator reduces inhalation exposure by 90%.
PRZM-EXAMS Model Shell Version 5.0 (PE5)	Developed by the Environmental Fate and Effects Division (EFED) of the Office of Pesticide Products (OPP) of the USEPA. A graphical user interface that facilitates placing chemical- and-use-specific input values into the proper positions in the Pesticide Root Zone Model (PRZM) input files and the Exposure Analysis Modeling System (EXAMS) chemical files. PE5 estimates pesticide concentrations in the water as the annual daily peak, maximum annual 96-hour average, maximum annual 21-day average, maximum annual 60-day average, and annual average.
Pupa	The inactive immature life stage of an insect between larva and adult.
Quarantine	A time period which animals or plants that have been exposed to infections or diseases are isolated. In the case of CDFA's Plant Protection Programs, a quarantine area is an area where an invasive pest is known to occur and movement of host plants is restricted.
Rainfall (mm)	Amount of storm precipitation.

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Term	Definition
Receptor	An organism that has the potential to be exposed to a particular material.
Red Palm Weevil	A 42 mm long weevil native to southern Asia and Melanesia, and a major pest to date palms. It has a long rostrum and a reddish-brown body with variable dark markings. Larvae and adults destroy the interior of the palm tree by hollowing out the trunk. This reduces the trunk's mechanical resistance, makes it susceptible to collapsing, and can be a danger to the public.
Reduced Exp.	A designation given to any set of estimated environmental concentrations and risk results that reflects any modifications from the original application scenario requested in order to reduce exposure. This designation is made within the RunID.
Reference Exposure Level (REL)	Developed by NIOSH. The concentration level at or below which no adverse health effects are anticipated for a specified exposure duration. RELs are designed to protect the most sensitive individuals in the population by the inclusion of margins of safety.
Representative Chemical	A chemical within a mixture whose physical, chemical, or toxicological properties are used to represent the mixture
Reproductive Toxicity	Impacts to male or female reproductive success resulting from exposure to a toxicant. Effects could include teratogenicity, reduced sperm count, reduced egg production, etc.
Reregistration Eligibility Decision (RED)	Document issued by USEPA after completing the review and risk management decision for a pesticide ingredient that is subject to reregistration. The RED summarizes the risk assessment conclusions and outlines any risk reduction measures necessary for the chemical to continue to be registered in the U.S.
Residue Available on Hand (HR)	The potential amount of residue available on the post-application resident's hands.
Residue Available on Object (ORt)	The chemical residue available on an object that is available for transfer to a receptor. Usually expressed in µg/cm^2.
Resp	Abbreviation for 'respirator', an apparatus worn over the mouth and nose or the entire face to prevent the inhalation of dust, smoke, or other noxious substances.
Restricted Entry Interval (REI)	The period of time after a field is treated with a pesticide during which restrictions on entry are in effect to protect persons from potential exposure to hazardous levels of pesticide residues.
Retreatment Interval (RTI)	The time between pesticide applications.
Risk Assessment Guidance for Superfunds (RAGS)	USEPA guidance for conducting risk assessments at Superfund sites.
Risk Characterizaton Document (RCD)	A document prepared by California Department of Pesticide Regulation (DPR) containing risk assessments that evaluate the toxicity of a pesticide and the likelihood that the use of that pesticide will result in adverse human health effects.

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Term	Definition
Risk Quotient (RQ)	Calculated by dividing the estimated environmental concentration (EEC) or dose by the toxicity reference value (TRV) for use in determining the potential for risk to a specific ecological receptor.
Roughness - Bare Surface Mannings (s/m^1/3)	Bare surface Manning's n for sediment inundated area and overland flow
Roughness - Grass Mannings n (s/cm^1/3)	Filter media (grass) Manning's n
RunID	An ID used to determine the application scenario run that was conducted for a given program. The run has a baseline run and sometimes a reduced exposure run.
Safety Data Sheet (SDS)	A document that contains information about the potential health effects of exposure to a chemical and the procedures to take when handling said chemical.
Saturated Water Content (cm^3/cm^3)	Saturated soil-water content
Screening Information DataSet (SIDS)	A study of the hazards associated with a particular chemical or group of chemicals prepared by the Organisation for Economic Co-operation and Development (OECD).
Screening Tool for Inhalation Risk (STIR)	A USEPA model that estimates inhalation-type exposure based on pesticide-specific information. Physical properties of each chemical, such as molecular weight and vapor pressure, are used to estimate vapor phase exposure. The STIR model also estimates spray droplet exposure using the application method (e.g., ground versus aerial spray) and rate, and then compares these exposure estimates to avian and mammalian toxicity data.
Sea Van	Commercial or government-owned shipping containers which lack wheels and are transported via ship. Fumigation can take place in sea vans.
Silicosis	This respiratory disease is the oldest known occupational lung disease, and is caused by inhaling silica dust. Nodules and fibrous scar tissues are formed in the lungs.
Simplified Molecular-Input Line-Entry System (SMILES)	Chemical notation that allows a user to represent a chemical structure in a way that can be used by the computer.
Single-LCG	Personal Protection equipment that entails single-layer clothes and gloves
Slurry (SL)	A formulation type that is a solution of the pesticide that is clear to opalescent liquid after dilution in water. The liquid may contain water-insoluble formulations.

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Term	Definition
Soil Adherence Factor (AF)	The amount of soil that adheres to the skin per unit of surface area.
Soil Bulk Density (ρ)	The weight of soil in a given volume, often expressed as g/cm^3.
Soil Degradation	Breakdown of a chemical in the soil.
Soil Dermal Exposure (SDE)	The dermal exposure a human receptor receives from skin contact with soil.
Soil Dissipation Curve	Dissipation of pesticide active or inert ingredient concentration from soil over a period of time. Dissipation could result from degradation in the soil or dispersion from the soil.
Soil Drench	A broad application method where a pesticide is manually or mechanically applied directly to potting soil or to soil at the base of a growing plant. This technique typically involves the use of a systemic pesticide, which is taken up through the roots and circulated throughout the plant in order to treat pests on the foliage. Soil drench is also used to directly treat pests within the soil.
Soil Drench Direct Pour	A type of application method where small quantities (up to a few gallons) of pesticide mixtures are prepared and manually poured directly onto potting soil or to soil at the base of a growing plant. Typically used for systemic applications, but can also be used to control of soil-dwelling pests.
Soil Ingestion Rate (IRs)	The amount of soil ingested by an individual over a specific period of time (e.g., mg/day). For the ecological risk assessment, the percent of diet and dry weight of soil is taken into account when determining the soil ingestion rate.
Soil Injection	A soil treatment that uses a tank, hose and injection rod or similar device. Pesticide is typically diluted in water and is delivered under pressure to areas adjacent to the target plant beneath the soil surface. Typically used for systemic applications.
Soil Tablet Insertion	Soil treatment using pesticide in form of a solid tablet that is placed into the soil beneath the ground surface near the target plant. Used for systemic application.
Soil Type	Soil types as defined in Muñoz-Carpena and Parsons, 2011
Soil-Water Content by Volume (Θ)	The amount of water in a given volume of soil, often expressed as cm3/cm3.
Soil-Water Partition Coefficient (Kd)	The ratio of a chemical's adsorbed concentration in soil (mg/kg) to the concentration dissolved in water (mg/L), expressed in L/kg. It is an important parameter for understanding the mobility of a chemical in the environment and its distribution between various environmental compartments such as soil, water, and sediment.
Solution (S)	A formulation type that is a liquid and usually consists of the pesticide active and inert ingredients. When mixed with water will not settle out or separate.

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Term	Definition
Sorption	The process of taking up and holding a substance.
Source - Area (ha)	Area of the upstream portion
Source - Length along the slope (m)	Length of the source area along the slope
Source - Slope (fraction)	Slope of the source area (% expressed as a fraction)
Source Area Storm Runoff	Source area runoff rate of flow versus time
Spacing for Grass Stems (cm)	Spacing of filter media elements
Special Local Needs (SLN)	Registration provided by DPR with approval from the USEPA which authorizes state pesticide regulators to register a new end-use product or an additional use of a federally registered pesticide product to address an existing or imminent pest situation. The pest situation must be a special local need within the state that cannot be mitigated by a currently registered product.
Specialized Pheromone and Lure Application Technology (SPLAT)	Biologically inert matrix which provides longevity of the pheromone and/or pesticide ingredients, and can vary its release rates and duration dependent on the SPLAT size. Commonly used in Male Attractant Technique.
Spot Application	Also known as spot treatment. A method of applying pesticides only in small, localized areas where pests congregate rather than treating a larger, general area.
Spot Trap	A trap that is placed in a location where a large pest population is likely to be.
State Water Resource Control Board (SWRCB)	A department within the California Environmental Protection Agency (Cal/EPA) whose responsibility and mission it to preserve, enhance, and restore the quality of California’s water resources and drinking water for the protection of the environment.
Statewide Plant Pest Prevention and Management Program, Environmental Impact Report - Volumes 1-5,	The Statewide PEIR is a comprehensive evaluation of CDFA's activities which serves as an overarching CEQA framework for implementation of Statewide Program activities. The PEIR is intended to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of implementation of the Proposed Program.

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Term	Definition
Appendices A-P, SCH # 2011062057 (Statewide PEIR)	
Statewide Plant Pest Prevention and Management Program, Human Health and Ecological Risk Assessments, Acelepryn Residential Foliar and Turf, Japanese Beetle Eradication Program (Acelepryn Residential Foliar and Turf Assessment)	A supplement to the Statewide Plant Pest Prevention and Management Program Environmental Impact Report (Statewide PEIR). The purpose of this supplement is to include the Acelepryn foliar and turf application scenarios in the Japanese Beetle Program.
Statewide Plant Pest Prevention and Management Program, Human Health and Ecological Risk Assessments, Merit 2F Residential Turf, Japanese Beetle Eradication Program (Merit 2F Residential Turf Assessment)	A supplement to the Statewide Plant Pest Prevention and Management Program Environmental Impact Report (Statewide PEIR). The purpose of this supplement is to evaluate the Merit 2F turf application scenarios in the Japanese Beetle Program.
Storm Duration (h)	Duration of storm event
Storm Hyetograph	Distribution of rainfall over time over the vegetated filter strip.

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Term	Definition
Storm Type	The type of rainfall event (I, IA, II, or III). Type I is typically associated with Hawaii, coastal side of Sierra Nevada in southern California and the interior regions of Alaska. Type IA is used to represent storms for the coastal side of the Sierra Nevada and the Cascade Mountains of Oregon, Washington, and northern California, and the coastal regions of Alaska. Type II represents most of the remaining areas of the US. Type III represents storms along the Gulf coast, southern Florida and coastal areas of the eastern US.
Straight Chain Lepidopteran Pheromone (SCLP)	Naturally-occurring compounds, or identical or substantially similar synthetic compounds, designated by an unbranched aliphatic chain (between 9 and 18 carbons) ending in an alcohol, aldehyde or acetate functional group and containing up to 3 double bonds in the aliphatic backbone. They are volatile and can easily be broken down by UV light and oxidation.
Subchronic Average Daily Dose (SADD)	The estimated exposure from a subchronic duration exposure, considering the dose, time period, and the body weight of the individual exposed. Often expressed in mg/kg-d.
Subchronic exposure	Subchronic exposure is a repeated or continuous exposure generally lasting between 14 days to less than 90 days. In some cases, subchronic exposures may be considered as short as one week. Subchronic exposure estimates are compared to subchronic health effect endpoints to estimate subchronic risk.
Substantially Similar Products	Substantially similar products are products that are considered sufficiently similar in composition and methods of application such that the risk results generated for one product are considered equally relevant. Substantial similarity between two products may be concluded based on one or more of the following features: A) similar product formulation including similar or identical active and inert ingredients and percent composition thereof; B) similarities in the methods of application, including equipment, rates, location, and timing.
Substantially Similar Scenarios	A Substantially Similar Scenario is one in which products and application details are identical or substantially similar to one or more previously analyzed scenario or differs only in ways that would not significantly increase the risk of unreasonable adverse effects on the environment. Example questions that are generated by this definition include: Ingredients – do the pesticide formulations differ? Concentration – is the quantity of chemicals in the end-use product similar? Labeling – is the amount and method of application similar? Risk to environment – is there any change in risk to humans or the environment?
Surface Water Concentration Calculator (SWCC)	The Surface Water Concentration Calculator (SWCC) is a USEPA-developed environmental model that estimates pesticide concentrations in water bodies that result from pesticide applications to land.
Surface Water Monitoring Database (SURF)	A Database that contains data from environmental monitoring studies designed to test for the presence or absence of pesticides in California surface waters.
Surrogate Chemical	A structurally similar chemical whose physical, chemical, or toxicological properties are used as a substitute.
Suspension Concentrate (SC)	A formulation type that is a stable suspension of pesticide ingredients with water as the fluid, intended for dilution with water before use.
Systemic Pesticide	A pesticide that is taken up and circulated throughout the plant. The pesticide can be absorbed through foliage or through the roots from the soil.

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Term	Definition
Tank Sprayer	An application method involving a tank containing pesticides mounted on to a truck, trailer, or ATV, a hose, a pump to pressurize the hose, and a handheld spray gun or boom sprayer to direct the chemical and control the application rate.
Target Margin of Exposure (Target MOE)	Synonymous with Level of Concern (LOC). Derived from uncertainty factors of up to 10x each and may include a Food Quality Protection Act Safety Factor (FQPA SF) if necessary. The target MOE for human risk assessment is compared to a derived scenario-specific MOE to determine whether the scenario has the potential for unacceptable risk. For the purposes of this risk assessment, the target MOE was assumed to be 100. See Margin of Exposure (MOE) in Glossary for more information.
Technical Grade of the Active Ingredient (TGAI)	The pesticide active ingredient in its purest form containing minimal impurities and no additives.
Teratogenicity	The capacity of a chemical to cause malformation of an embryo or fetus.
Terrestrial Residue Exposure (T-REX)	A USEPA model that estimates the residues on avian and mammalian plant and insect food items along with the dissipation rate of a chemical applied to foliar surfaces (for single or multiple applications) in order to estimate acute and chronic exposures.
Time to Loading of Transport Container (TL)	Time period between when fumigant residue level (R0) was sampled and when commodity is loaded into post-fumigation transport container
Time to Unloading of Transport Container (TU)	Time period between when fumigant residue level (R0) was sampled and when commodity is unloaded from post-fumigation transport container
Time Weight Factor	Time-weight factor for the Crank-Nicholson solution
Time Weighted Average (TWA)	The concentration of a chemical in an environmental medium that has been averaged over a certain period of time.
Toxicity Reference Value (TRV)	A chemical concentration expressed as an administered dose (e.g., oral, inhalation, or dermal dose) or as a media concentration that is used in conjunction with an exposure prediction to estimate health hazard or ecological risk.
Transfer Coefficient (TC)	The measure of surface-to-skin residue transfer for a given treated area and activity, often expressed as cm^2/hr.
Transfer coefficient from ExpoSAC (Tc)	Developed by the USEPA Science Advisory Council for Exposure (ExpoSAC) Policy 3, a Tc is the ratio of after-application worker exposure to the exposure time and the dislodgeable residue on the surface contacted by the worker. Conceptually, the Tc can be thought of as a "contact factor" determining a worker's exposure depending on how long they work, what activity they are doing, and how much residue is available for contact and transfer. Tc's are used generically to allow for estimation of exposure for any pesticide ingredient (except volatile chemicals) using estimates for exposure time and the dislodgeable foliar residue (DFR). Tc were estimated via post-application worker exposure monitoring studies and concurrent DFR sampling, and are chosen based on crop and crop activity scenario.

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Term	Definition
Transferable Turf Residue (TTRt)	The amount of an chemical on turf surfaces post application that is available for dermal transfer to a receptor's skin, expressed as ug/cm^2.
Transpiration Stream Concentration Factor (TSCF)	TSCF represents the ratio of contaminant concentration in the xylem stream of the stem, mg/L, to contaminant concentration in soil solution, mg/L. The TSCF accounts for the reduction in concentration in the pore water as it crosses the root membrane and moves through the xylem to the stem.
Trophic Transfer	Movement of residues from one trophic level to the next (e.g. from plants to herbivores).
Turf Dermal Exposure (TDE)	The amount of dermal exposure (mg) to chemical residues on turf.
Turf Drench	An application method where chemical is applied to turf using ground equipment, such as a mechanically pressurized sprayer. In the case of some products (e.g., Merit 2F), this method may require a follow-up application of water to dislodge the product from the turf surface so it may translocate to the soil below.
Twist Ties	A pheromone dispenser which consists of an aluminum wire and a hollow plastic tube sealed at both ends that contains pheromones and stabilizing additives.
U.S. Environmental Protection Agency (USEPA)	Federal agency whose purpose is to protect human health and the environment by writing and enforcing regulations.
U.S. Environmental Protection Agency Standard Operating Procedures for Residential Pesticide Exposure Assessment (SOP)	U.S. EPA guidance document used for estimating exposure resulting from non-occupational pesticide use, including but not limited to lawns, gardens, and pet treatment.
Ultra Low Volume (ULV)	Application process of putting fine mist droplets into the air, allowing the droplets to float on air currents, and allowing pests to come into contact with them.
Uncertainty Factor (UF)	One of several, generally 10-fold, default factors used in extrapolating from experimental data to an appropriate toxicity endpoint for the purposes of the risk assessment. The factors are intended to account for (1) variation in susceptibility among the members of the human population (i.e., inter-individual or intraspecies variability); (2) uncertainty in extrapolating animal data to humans (i.e., interspecies uncertainty); (3) uncertainty in extrapolating from data obtained in a study with less-than-lifetime exposure (i.e., extrapolating from subchronic to chronic exposure); (4) uncertainty in extrapolating from a LOAEL rather than from a NOAEL; and (5) uncertainty associated with extrapolation when the database is incomplete.

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Term	Definition
Unit Exposure (UE)	Compiled by the USEPA, unit exposures (UEs) are normalized exposure values derived from a number of sources, including the Pesticide Handler Exposure Database (PHED), the Outdoor Residential Exposure Task Force (ORETF), the Agricultural Handler Exposure Task Force (AHETF), or other available registrant-submitted exposure monitoring studies. The USEPA uses UEs to assess handler exposures to pesticides, and are used generically by scenario, regardless of chemical. Each UE is based on a unique handler scenario, which refers to the specific type of application equipment, formulation type, job function, and level of personal protective equipment (PPE). The values are expressed as mass of pesticide active ingredient exposure per unit mass of active ingredient handled (e.g. ug/lb ai). The USEPA has collected all their UEs into the Occupational Pesticide Handler Unit Exposure Surrogate Reference Table. Originally, recommended UEs were generally derived only from PHED, but as more reliable data has become available (such as that from the AHETF and ORETF) the USEPA has replaced the PHED values with the new data.
United Nations Environmental Programme (UNEP)	In ecological risk assessment, an uncertainty factor is a numerical value used to adjust an estimate of toxicity or risk. It is an approach for dealing with uncertainty related assessing chemical risks. Uncertainty factors are frequently used to develop a toxicity reference value when the available endpoint is insufficiently protective of the ecological receptor of interest.
United States Department of Agriculture (USDA)	The U.S. federal agency responsible for developing and executing federal laws relating to agriculture, farming, forestry, rural development, and food.
Upland Hydrology (UH)	A front-end model added to VFSMOD-W that generates model inputs for the upslope area based on the NRCS (SCS) design storm for a given location and soil type.
Urban Residential Rapid Response (URRR)	Part of the Pierce's Disease Control Program (PDCP) which responds quickly to detections of glassy-winged sharp shooter in urban and residential areas by intensively surveying the area and applying treatments if necessary.
USEPA Science Advisory Council for Exposure Policy 3 (ExpoSAC)	Refers to USEPA Science Advisory Council for Exposure Policy 3, which contains transfer coefficients from post-application worker exposure monitoring studies and concurrent dislodgeable foliar residue sampling for any given crop or, potentially, crop stage and activity combination (e.g., hand harvesting apples, scouting late season cotton).
USEPA Toxicity Categories	In order to fulfill guidelines from Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of USEPA, acute oral, dermal, and inhalation studies as well as primary eye irritation and primary skin irritation studies using the test chemical are conducted. Based on the acute studies, the USEPA classifies chemicals using an acute toxicity category for regulatory purposes such as labeling, classification for restricted use, and requirements for child-resistant packaging. The following values are used to determine the chemical's toxicity category: Acute oral study: Category I - Up to and including 50 mg/kg, Category II - > 50 -500 mg/kg, Category III - > 5000 mg/kg, Category IV - > 5000 mg/kg Acute dermal study: Category I - Up to and including 200 mg/kg, Category II - > 200-2000 mg/kg, Category III - > 5000 mg/kg, Category IV - > 5000 mg/kg

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Term	Definition
	Acute inhalation study: Category I - Up to and including 0.05 mg/L, Category II - > 0.05-0.5 mg/L, Category III - > 0.5-2 mg/L, Category IV - > 2 mg/L Primary eye irritation study: Category I - Corrosive or corneal involvement persisting for more than 21 days, Category II - Corneal involvement or other eye irritation clearing in 8-21 days, Category III - Corneal involvement or other eye irritation clearing in 7 days or less, Category IV - Minimal effects clearing in less than 24 hours Primary skin irritation study: Category I - Corrosive (tissue destruction into the dermis and/or scarring), Category II - Severe irritation at 72 hours (severe erythema or edema), Category III - Moderate irritation at 72 hours (moderate erythema), Category IV - Mild or slight irritation at 72 hours (no irritation or slight erythema)
USEPA's Exposure Factors Handbook: 2011 Edition (USEPA, 2011p) (EFH)	The USEPA Exposure Factors Handbook that summarizes data on human behavior and characteristics that affect exposure to environmental contaminants and recommended values for these factors.
Vadose Zone	The region of Earth extending from the top of the land surface to the surface of the water table
Vadose Zone Fate and Transport Model (VADOFT)	A model used in EXPRESS that solves the Richard's equation for flow in the unsaturated zone by taking into account the relationship between pressure, hydraulic conductivity and water content. The model can simulate the fate of two parent compounds and their daughter products.
Vapor Pressure	Pressure of a vapor in equilibrium with its liquid or solid phase in a closed system.
Variant	A designation given to any set of estimated environmental concentrations and risk results that reflect an alternative application method within the original application scenario requested, without any modifications to reduce exposure. This designation is made within the RunID.
Variant Reduced Exp.	A designation given to any set of estimated environmental concentrations and risk results that reflects any modifications from the original variant application scenario requested in order to reduce exposure. This designation is made within the RunID.
Vegetated filter strip	A permanent or maintained strip of planted or indigenous vegetation located between nonpoint sources of pollution and receiving water bodies for the purpose of removing, or mitigating the effects of nonpoint source pollutants such as nutrients, pesticide ingredients, sediments, and suspended solids.
Vegetation Dermal Exposure (VDE)	Exposure estimated due to a receptor's dermal contact with vegetation that contains pesticide surface residue.

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Term	Definition
Vegetation Ingestion Rate (IRv)	The amount of vegetation ingested by an individual of a given weight over a specific period of time (e.g., g/kg-day).
Vegetation Uptake Factor (VUF)	A multiplier used to estimate concentrations of pesticide ingredients that are taken in or absorbed by vegetation.
Vegetative Dermal Exposure (VDE)	The amount of chemical exposure that takes place through dermal contact with residues on garden plants and trees.
Vegetative Filter Strip Modelling System (VFSMOD-W)	A graphical user interface that is used to estimate pesticide removal efficiency (%) by incorporating an empirical model for pesticide trappings by vegetative filter strips with a foundation of hydrological, sedimentological, and chemical specific parameters.
Vertical Saturated K (cm/h)	Saturated hydraulic conductivity
Volatilization	The conversion of a chemical substance from a liquid or solid state to a gaseous or vapor state.
Volume of Transport Container (VT)	Volume of post-fumigation commodity transport container
Water Intake Rate (IRw)	The amount of water ingested by an individual over a specific period of time (e.g., L/day).
Water Intake Rate (WI)	The amount of water that is ingested over a period of time.
Water solubility	The measure of a chemical’s ability to dissolve in water.
Water Soluble Granule (SG)	A formulation type consisting of granules to be applied as a true solution of the pesticide after dissolution in water, but which may contain insoluble inert ingredients.
Water Soluble Packet (WSP)	A formulation type that is a wettable powder or soluble powder containing the pesticide ingredients, packaged in water soluble plastic bags, dropped into a filled spray mixing tank, and dissolved in the water. As long as the packets are not opened, the risk via inhalation and dermal exposure to the packet contents is essentially eliminated.
Water-in Reduction Factor (WRF)	The fraction of chemical residue that is removed from the turf surface after drenching or watering-in.
Water-in Reduction Multiplier (WRM)	The fraction of chemical residue that remains on turf after drenching or watering-in.

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Term	Definition
Wet deposition	The process by which chemicals are removed from the atmosphere and deposited on the earth's surface via rain, sleet, snow, cloudwater, and fog
Wettable Powder (WP)	A formulation type that is a pesticide combined with a finely ground dry carrier. It is mixed with water for application as spray.
World Health Organization (WHO)	Agency of the United Nations which is concerned with international public health, and monitors and assesses health trends.

Appendix G: Evaluation of POE-Nonylphenol Breakdown Product, Nonylphenol, in Human Health Risk Assessment

1. Background

The surfactant No Foam B includes several chemicals, including as polyoxyethylene (POE) Nonylphenol (POE-NP or NPE). POE-NP is not one distinct chemical, but a class of chemicals characterized by an ethoxylated phenolic ring with a nine-carbon side chain (USEPA 2010t, DSTC, 2018). POE-NP may break down in the environment into shorter chain POE-NP compounds and/or the degradation product nonylphenol (NP), which is considered more toxic than the parent compound. NP can be either straight-chained or branched and, like NPE, includes multiple isomers.

The presence of NPE in the environment is attributed to many sources, including automobiles, laundry detergents/cleaners, paint and clothing manufacturing, and pesticide inerts/surfactants. NPE is predominantly used in laundry detergent and cleaner (39%); agrochemicals (e.g., pesticides and defoliants) are reported to be responsible for 6% of NPE use (USEPA 2010t, DTSC, 2018a).

Once in an aquatic environment, parent NPEs degrade most rapidly in the presence of oxygen to smaller chain NPEs. In these aerobic environments, NP may also be formed and degraded to carbon dioxide and water, In anoxic conditions, such as is common in sediments and sludges, NP is resistant to degradation and may persist and accumulate. As such, NP is considered immobile in water columns unless it is resuspended (Soares, et al., 2008). Because NP is highly lipophilic, it preferentially partitions to the organic matter in sediments.

To accommodate the possible presence of NP from the release of POE-NP found in No Foam B, the comparative toxicity and risk were evaluated and discussed below.

2. Nonylphenol Toxicity Evaluation

Nonylphenol (NP) and NPE induce toxicity through endocrine-mediated pathways, exhibiting estrogenic activity (OEHHA, 2009b; DTSC, 2018a). Nonylphenol is reported to be weakly estrogenic at about 1,000 to 100,000 the estrogenic potential compared to endogenous 17β-estradiol *in vitro* and *in vivo* (DSTC, 2018). The conclusion NP and its ethoxylates act through endocrine-based pathways is supported by adverse effects typically associated with development and reproduction.

In general, NP and its ethoxylates are an aquatic organism health issue more so than a mammalian issue. NPE-4 through NPE-9 are reported as slightly toxic to practically non-toxic acutely in mammals (Toxicity Category III or IV), with NP considered slightly more toxic than its ethoxylates (Toxicity Category III) (USDA, 2003; CCME, 2002a). Oral LD_{50} values for in rats, rabbits, mice, and guinea pigs for NP9E, NP5E, NP6E, and NP4E range from 620 to 7400 mg/kg, while those for NP are reported between 580 and 1620 (USDA, 2003). Oftentimes, data is not available for either NP or its ethoxylates or an endpoint cannot be identified at the highest dose tested. No MCL, PHG, PELs, RELs, or drinking Water Quality Goals have been established for NP or NPE (SWRCB, 2018a; SWRCB, 2019a; OEHHA, 2019a; USEPA, 2009x; OSHA, 2019a; OSHA, 2019b; Cal/OSHA, 2019a; CDC, 2007).

Despite NP being reported as somewhat more toxic than NPE, no acute, oral NO(A)ELs were identified from the available literature. The subchronic NO(A)EL for NP is reported as somewhat higher than NPE, likely due to limitations in the doses tested for NPE. This suggests the true acute, oral NO(A)EL for NPE is likely somewhat higher than the reported 50 mg/kg (acute) and 40 mg/kg-d (subchronic).

Of the available data deemed of sufficient quality, the only toxic endpoint identified as more sensitive for NP than NPE is through chronic oral exposure. **Table 1** presents a comparison of the representative chemicals and NO(A)ELs used in the Statewide PEIR (2014), PDCP Addendum (2019), and currently identified toxic values for NP.

Table 1: Comparative Toxicity of Nonylphenol Ethoxylates to Nonylphenol

Pathway/Duration	Statewide PEIR		PDCP (2019) Addendum		Nonylphenol
	Representative Chemical	NO(A)EL (mg/kg-d)	Representative Chemical	NO(A)EL (mg/kg-d)	NO(A)EL (mg/kg-d)
Acute Adult Inhalation	NDA	NDA	NDA	NDA	NDA
Acute Child Inhalation	NDA	NDA	NDA	NDA	NDA
Acute Dermal	NP9E	500 (a)	NP9E	NOC (a)	NDA
Acute Oral	NP9E	500 (a)	NP9E	50 (a)	NDA
Chronic Adult Inhalation	NDA	NDA	NDA	NDA	NDA
Chronic Child Inhalation	NDA	NDA	NDA	NDA	NDA
Chronic Dermal	NP9E	50 (a)	NP9E	NOC (a)	NDA
Chronic Oral	NP9E	11 (b)	NP9E	28 (b)	13 (c)(d)
Subchronic Adult Inhalation	N/A	N/A	NDA	NDA	NDA
Subchronic Child Inhalation	N/A	N/A	NDA	NDA	NDA
Subchronic Dermal	N/A	N/A	NP9E	NOC	NDA
Subchronic Oral	N/A	N/A	NP4E	40 (b)	50 (c)
Cancer	NP	NOC (e)	NP	NOC (e)	NOC (e)

Notes:

NDA = No Data available
NP9E = Nonylphenol ethoxylate with 9 carbons
NP = Nonyl phenol
N/A = Not Applicable
NOC = Not of Concern
Red = NP endpoint more sensitive than NPE
Yellow = Updated from Statewide PEIR (2014)
Green = Reported NP endpoint less sensitive than NPE
For information on the POE-NP NO(A)ELs, see Appendix B: Critical NO(A)ELs Selected for Risk Characterization. For details regarding endpoints used in the original Statewide PEIR (2014), see the Statewide Database Dashboard.

(a) Meyer et al., 1988
(b) USDA, 2003
(c) USEPA, 2009aa
(d) USEPA, 2010t
(e) European Union, 2002

3. Nonylphenol in Drinking Water

Because POE-NP may breakdown into NP in surfacewater bodies and the chronic, oral NO(A)EL for NP is reported as more sensitive (i.e., lower) than NPE, risk associated with exposure to NP metabolized from NPE was estimated. From an environmental fate perspective, while longer chain (i.e., >2 ethoxylate groups) POE-NP breakdown into smaller chain POE-NP is facilitated by aquatic aerobic environments, the subsequent metabolism of 1- and 2-ethoxylate chain POE-NP to NP occurs more frequently under anoxic conditions (e.g., sediments and wastewater treatment sludge) (DSTC, 2018a). Therefore, concentrations of NP assumed present in estimating risk in surfacewater are likely an overestimation.

There is limited information about POE-NP and NP presence in groundwater that may be used as drinking water sources. While some sources indicate NP has been detected in groundwater (CCME, 2002a; DSTC, 2018a; Soares, et al., 2008), it isn't clear if the presence is from landfill leachate/industrial water discharge, the groundwater sources would be used as drinking water, or what concentrations could be expected in California groundwater. In one study, NP9E was applied in both poorly-drained and permeable soil with no detections of POE-NP or NP after 16 to 25 months (USDA, 2003).

The Critical NO(A)ELs that were selected to estimate risk to NP in drinking water are presented in

Appendix 3A

Table 2. For details on estimating risk to POE-NP, including selection of NO(A)ELs and reporting of concentrations in surfacewater used for estimating exposure, see Appendix B: Critical NO(A)ELs Selected for Risk Characterization and Appendix D: PWC Concentrations and Surfacewater Ingestion Risk Estimates, respectively.

Table 2: Critical NO(A)ELs Selected for Risk Characterization of Nonylphenol in Drinking Water

Exposure Route	NO(A)EL (mg/kg d)	Toxic Endpoint	Study details	Source
Acute Oral	50 (a)	Decreases in body weight and food consumption	90 day repeated-dose oral study in rats, based on decrease in food consumption and body weight at 150 mg/kg-d	USEPA, 2009aa; 2010t
Subchronic Oral	50	Decreases in body weight and food consumption	90 day repeated-dose oral study in rats, based on decrease in food consumption and body weight at 150 mg/kg-d	USEPA, 2009aa; 2010t
Chronic Oral	13	Maternal toxicity (decrease in body weight), reproductive effects (decreases in epididymal sperm density or testicular sperm head counts, increases in estrous cycle length, and decreases in ovarian weights), and developmental toxicity for offspring (based on accelerated vaginal opening in pups)	3-generation oral repeated dose/reproductive/development study in rats; based on effects at 43-64 mg/kg-d	USEPA, 2009aa

(a) The subchronic NO(A)EL of 50 mg/kg-d was selected for acute assessment of NP through ingestion of drinking water based on lack of an acute NO(A)EL.

4. Nonylphenol Exposure Scenarios

Four application scenarios (i.e., PDCP-64, 65, 77, and 78) considered in this risk assessment entail the use of No Foam B, the surfactant containing NPE. Of those four (4), all are applied in nursery settings. Because the only human endpoint identified and of toxicological concern for NP is through the oral exposure pathways, dermal and inhalation assessment was not evaluated for NP.

The Post-Application Resident (PAR) is not anticipated to be present in nursery settings, and, therefore, would not be exposed to NP residues for PDCP-64, -65, -77, and -78. See the Conceptual Site Model (CSM) in the report body to review complete pathways associated with nursery settings. Pesticide workers (i.e., MLAs, PALs, CNWs) are not evaluated for ingestion to pesticide residues as they are assumed to be trained not to consume pesticide. Therefore, the only exposure pathway subject to evaluation of NP is through ingestion of drinking water.

5. Risk to Nonylphenol and its Ethoxylates Through Ingestion of Surfacewater

1.1 Surfacewater

1.1.1 Monitoring Data

Databases from authoritative and reliable sources, such as those described in the Human Health Risk Assessment were queried from all available years for the presence of NP and its ethoxylates. Note that because NP/NPE are not pesticides, some of these databases did not contain information for these chemicals.

Of the databases searched, the California Environmental Data Exchange Network (CEDEN) was the only database that reported surfacewater samples containing NPE and NP (SWRCB, 2019b). Total NPE concentrations in surfacewater ranged from below the detection limit to 2.39 mg/L and Total NP concentrations ranged from below the detection limit to 8.72 µg/L. Note these concentrations are through all environmental release mechanisms, including NPE and NP found in in laundry detergents, automobiles, clothing manufacturing, industrial cleaners and solvents, firefighting gels, paints, and toilet paper (DTSC, 2018a). The amount, if any, of NPE and NP detected in surfacewater that is as a result of pesticide use cannot be determined.

As described in the report body, monitoring data was used as a qualitative indicator as to the potential presence of POE-NP and NP in surfacewater. Monitoring data was not used to quantitate risk, as it is not informative of activities specifically by the proposed program, but instead includes all sources of chemical introduced into the environment. Because there is no way to identify the amount of POE-NP and NP due to program activities, assessment of risk using this data would not be accurate.

1.1.2 Modeling Data

Methods for evaluating risk from drinking water using PWC modeling data are described in the Human Risk Report, Section 5.3.7.1.2. The selected acute, subchronic, and chronic oral NO(A)ELs for NP were compared to the PWC concentrations estimated for PDCP-64, -65, -77, and -78. The concentration of POE-NP converted to NP was assumed to be 30% of the applied POE-NP. For explanation on the assumptions made for the conversion of POE-NP water concentrations to NP, see the Ecological Risk Assessment, Appendix E. The PWC concentrations and subsequent risk results estimated for NP are presented in **Table 3**.

Table 3: Pesticides in Water Calculator Concentrations and Surface Water (PWC) Ingestion Risk Estimates

Application Scenario	Index Life Stage	Concentration Category	NPE MOE (unitless)	NP Limnetic Concentration (ug/L)	NP Oral NOAEL (mg/kg d)	NP MOE (unitless)
PDCP-64	0-<6 y.o.	Peak	2.67E+05	1.08	50	8.90E+05
PDCP-64	0-<6 y.o.	4-Day Average	2.73E+05	1.056	50	9.11E+05
PDCP-64	0-<6 y.o.	21-Day Average	2.19E+05	1.056	50	9.11E+05
PDCP-64	0-<6 y.o.	60-Day Average	2.20E+05	1.05	50	9.16E+05
PDCP-64	0-<6 y.o.	90-Day Average	1.54E+05	1.047	13	2.39E+05
PDCP-64	0-<6 y.o.	365-Day Average	1.71E+05	0.945	13	2.65E+05
PDCP-64	Adult	Peak	4.44E+05	1.08	50	1.48E+06
PDCP-64	Adult	4-Day Average	4.55E+05	1.056	50	1.52E+06
PDCP-64	Adult	21-Day Average	3.64E+05	1.056	50	1.52E+06
PDCP-64	Adult	60-Day Average	3.66E+05	1.05	50	1.52E+06
PDCP-64	Adult	90-Day Average	2.57E+05	1.047	13	3.97E+05
PDCP-64	Adult	365-Day Average	2.84E+05	0.945	13	4.40E+05
PDCP-65	0-<6 y.o.	Peak	4.91E+06	0.0588	50	1.64E+07
PDCP-65	0-<6 y.o.	4-Day Average	5.56E+06	0.0519	50	1.85E+07
PDCP-65	0-<6 y.o.	21-Day Average	6.20E+06	0.0372	50	2.58E+07
PDCP-65	0-<6 y.o.	60-Day Average	9.12E+06	0.02529	50	3.80E+07
PDCP-65	0-<6 y.o.	90-Day Average	7.40E+06	0.02184	13	1.14E+07
PDCP-65	0-<6 y.o.	365-Day Average	1.11E+07	0.01461	13	1.71E+07
PDCP-65	Adult	Peak	8.16E+06	0.0588	50	2.72E+07
PDCP-65	Adult	4-Day Average	9.25E+06	0.0519	50	3.08E+07
PDCP-65	Adult	21-Day Average	1.03E+07	0.0372	50	4.30E+07
PDCP-65	Adult	60-Day Average	1.52E+07	0.02529	50	6.33E+07
PDCP-65	Adult	90-Day Average	1.23E+07	0.02184	13	1.90E+07
PDCP-65	Adult	365-Day Average	1.84E+07	0.01461	13	2.85E+07
PDCP-77	0-<6 y.o.	Peak	5.83E+05	0.495	50	1.94E+06
PDCP-77	0-<6 y.o.	4-Day Average	5.94E+05	0.486	50	1.98E+06
PDCP-77	0-<6 y.o.	21-Day Average	4.75E+05	0.486	50	1.98E+06
PDCP-77	0-<6 y.o.	60-Day Average	4.78E+05	0.483	50	1.99E+06
PDCP-77	0-<6 y.o.	90-Day Average	3.37E+05	0.48	13	5.21E+05
PDCP-77	0-<6 y.o.	365-Day Average	3.71E+05	0.435	13	5.75E+05
PDCP-77	Adult	Peak	9.70E+05	0.495	50	3.23E+06
PDCP-77	Adult	4-Day Average	9.88E+05	0.486	50	3.29E+06
PDCP-77	Adult	21-Day Average	7.90E+05	0.486	50	3.29E+06
PDCP-77	Adult	60-Day Average	7.95E+05	0.483	50	3.31E+06
PDCP-77	Adult	90-Day Average	5.60E+05	0.48	13	8.67E+05
PDCP-77	Adult	365-Day Average	6.18E+05	0.435	13	9.56E+05

Application Scenario	Index Life Stage	Concentration Category	NPE MOE (unitless)	NP Limnetic Concentration (ug/L)	NP Oral NOAEL (mg/kg d)	NP MOE (unitless)
PDCP-78	0-<6 y.o.	Peak	1.27E+07	0.02268	50	4.24E+07
PDCP-78	0-<6 y.o.	4-Day Average	1.45E+07	0.01986	50	4.84E+07
PDCP-78	0-<6 y.o.	21-Day Average	1.54E+07	0.01503	50	6.40E+07
PDCP-78	0-<6 y.o.	60-Day Average	2.19E+07	0.01056	50	9.11E+07
PDCP-78	0-<6 y.o.	90-Day Average	1.78E+07	0.00909	13	2.75E+07
PDCP-78	0-<6 y.o.	365-Day Average	2.78E+07	0.00582	13	4.30E+07
PDCP-78	Adult	Peak	2.12E+07	0.02268	50	7.05E+07
PDCP-78	Adult	4-Day Average	2.42E+07	0.01986	50	8.06E+07
PDCP-78	Adult	21-Day Average	2.55E+07	0.01503	50	1.06E+08
PDCP-78	Adult	60-Day Average	3.64E+07	0.01056	50	1.52E+08
PDCP-78	Adult	90-Day Average	2.96E+07	0.00909	13	4.58E+07
PDCP-78	Adult	365-Day Average	4.62E+07	0.00582	13	7.15E+07

1.1.3 Conclusions

The presence of NP and NPE have been reported in surfacewater, suggesting they have the potential to be consumed as drinking water. However, POE-NP and NP relative contribution to the environment through pesticide applications is reportedly low compared to manufacturing practices and urban runoff (e.g., laundry detergents). Specific monitoring data available cannot be attributed to any specific source of POE-NP (and subsequently, NP) and, as such, impacts from the proposed program are not properly assessed using this data.

Risk from consumption of surfacewater that could potentially be used for drinking water containing POE-NP and its breakdown product, NP, was estimated using modeling data. None of the estimated MOEs were below the target MOE of 100 (adults) or 300 (children) and all were more than three orders of magnitude higher than the target MOE. This indicates that ingestion of surfacewater containing POE-NP and NP as a result of program activity is not anticipated to result in adverse impacts to human health.

1.2 Ingestion of Groundwater

Databases from authoritative and reliable sources such as the National Water Quality Monitoring Council (NWQMC) Water Quality Portal (WQP) were investigated and/or queried for NP and NPE (NWQMC, 2019a). Although the USDA Pesticide Data Program and DPR Well Sampling Report were also searched, NP/NPE are not pesticides and, therefore, not included in these databases. In the WQP database, only four samples were reported as having measurable NP(E)(in the form of 4-NP) in groundwater, and all concentrations were described as preliminary, variable by the utilized method, and below the detection limit. Additionally, the sample aquifers were not disclosed, making it impossible to determine if these samples were drawn from a source that could potentially be drinking water.

The methods and models for estimating surfactants in groundwater are sufficiently lacking at this time. Although PRZM-GW and SCI-GROW have been reported for use in estimating pesticide concentrations in groundwater, they overestimate environmental concentrations in a manner that is not consistent lipophilic nature of this class of chemicals that would lend them to bind to organic material in soil and with minimal detections in groundwater databases. In combination with a lack of groundwater monitoring data availability for NP and NPE, MOEs were not generated for this pathway.

6. References

NOTE: References match those previously listed in the Statewide PEIR (CDFA, 2014a). Therefore, lettering order following publication years may not always be in sequence in this report. Links to webpages were active as of the listed access date. Access to those web resources and information presented therein are subject to change.

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