



US Environmental Protection Agency Office of Pesticide Programs

**BIOPESTICIDE REGISTRATION ACTION DOCUMENT
STRAIGHT CHAIN LEPIDOPTERAN PHEROMONES**

February 27, 2009

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**STRAIGHT CHAIN LEPIDOPTERAN PHEROMONES
(SCLP)**

U.S. Environmental Protection Agency
Office of Pesticide Programs
Biopesticides and Pollution Prevention Division

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CHAPTER 1

OVERVIEW OF STRAIGHT CHAIN LEPIDOPTERAN PHEROMONES

I. EXECUTIVE SUMMARY

A. IDENTITY

A pheromone (including identical or substantially similar synthetic compounds) as defined by the Agency is a compound produced by a species which, alone or in combination with other compounds produced by that species, modifies the behavior of other individuals of the same species. Straight Chain Lepidopteran Pheromones (SCLPs) are those produced by a member of the order Lepidoptera, which includes butterflies and moths.

The SCLPs that are addressed in this document fall under the criteria that are in 40 CFR 180.1153, titled Lepidopteran pheromones; exemption from the requirement of a tolerance. The 40 CFR 180.1153 states, "Lepidopteran pheromones that are 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.

B. USE/USAGE

In most cases the SCLPs listed in this document are for manufacturing use products (MPs). These MPs are then formulated into end use products (EPs) which in most cases are used as attractants or for mating disruption for the targeted lepidoteran species.

C. RISK ASSESSMENT

As stated above, the majority of these active ingredients are manufacturing use products, and do not require a food clearance/tolerance. However, straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices. [40 CFR 180.1153 (a) & (b)].

Toxicology and environmental data requirements for SCLP manufacturing use products are not required, and toxicology and environmental data requirements for end use products are greatly reduced per 40 CFR 158.2050 and 40 CFR Part 158.2060. Agency reviews confirm that no risks to human health are expected from the use of lepidopteran pheromones based on the low toxicity in animal testing and the expected low exposure to humans. Furthermore, adverse effects on nontarget organisms are not expected because these pheromones are released in very small quantities in the environment and act on a select group of insects. Appropriate precautionary labeling of end use products will further minimize potential exposure and mitigate risk to nontarget organisms.

The Agency has considered SCLPs in light of relevant safety factors in the Food Quality Protection Act (FQPA) of 1996 and under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and determined there will be no unreasonable adverse effects from the use of these

products. The Agency is basing its risk management decision regarding the registration of these SCLPs on the known low toxicity of lepidopteran pheromones, the limited exposure to humans, and the precautionary labeling that minimizes exposure and mitigates risk to nontarget organisms. The Agency believes that end use products containing SCLPs can be used without causing unreasonable adverse effects to humans or the environment.

D. DATA GAPS / LABELING RESTRICTIONS

Any data gaps and/or labeling restrictions are specific to each of the individual SCLP product. Please refer to the following chapters for each individual SCLP products.

II. OVERVIEW

A. ACTIVE INGREDIENT OVERVIEW

The active ingredients addressed under this document are Straight Chain Lepidopteran pheromones. Per 40 CFR 180.1153, the Agency defines lepidopteran pheromones as 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. Please refer to each individual SCLP chapter for its specific active ingredient overview.

B. USE PROFILE

The following is information on the proposed uses with an overview of use sites and application methods.

Type of Pesticide: Synthetic semiochemical insect attractant (mating disrupter)

Use Sites: SCLPs are used for manufacturing use and end use products. Please refer to each individual SCLP chapter for the specific uses.

Target Pests: Lepidoptera

Formulation Types: Please refer to each individual SCLP chapter for the specific formulation types.

Method and Rates of Application: Please refer to each individual SCLP chapter for the specific method and rates of application.

Use Practice Limitations: Please refer to each individual SCLP chapter for the specific use practice limitation

C. DATA REQUIREMENTS

Please refer to each individual SCLP chapter for the specific data requirements. Toxicology and environmental data requirements for SCLP manufacturing use products are not required, and toxicology and environmental data requirements for end use products are greatly reduced per 40 CFR 158.2050 and 40 CFR Part 158.2060. Reduced data requirements for SCLPs are based on the following: 1) low toxicity in animal testing, 2) expected low exposure to humans, 3) no expected risk to human health, 4) no reported adverse effects during more than 10 years of use as pesticides, and 5) no expected adverse effects to nontarget organisms. Please note that the formulation of these manufacturing use product into food use end use products will require all Tier I toxicity and Tier I nontarget organism data requirements to be addressed for each end use product.

D. REGULATORY HISTORY

On January 26, 1994 the Agency issued a notice that it was expanding the acreage cut-off for when an Experimental Use Permit (EUP) is required from 10 acres to 250 acres for arthropod pheromones in solid matrix dispensers (OPP-50573; FRL-4755-1). On March 4, 1994 the Agency issued a final rule establishing an exemption from the requirement of a tolerance for residues of from the use of arthropod pheromones in retrievably sized polymeric matrix dispensers with an annual application limitation of 150 grams active ingredient per acre per year (g a.i./A/year) (40 CFR 180.1124). On July 7, 1994 the Agency issued a notice that is was expanding the acreage cut-off for when an EUP is required from 10 acres to 250 acres for arthropod pheromones irrespective of formulation (OPP-50791; FRL-4869-8). On August 30, 1994 the Agency issued a final rule establishing an exemption from the requirement of a tolerance for residues of from the use of lepidopteran pheromones that are 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 in or on all raw agricultural commodities with application limitation of 150 g a.i./A/year (40 CFR 180.1153). On August 9, 2006 the 40 CFR 180.1153 was amended to include indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices.

F. CLASSIFICATION

OPP classifies straight-chained lepidopteran pheromone as biochemical pesticides.

G. FOOD CLEARANCES/TOLERANCES

Manufacturing use products do not require a food clearance/tolerance. Any other uses will require a tolerance. Please refer to each individual SCLP chapter for the specific to determine if there is a tolerance associated with that specific product. However, straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of

active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices [40 CFR 180.1153 (a) & (b)].

III. SCIENCE ASSESSMENT

Please refer to each individual SCLP chapter for the specific physical/chemical properties, human health, and environmental assessments.

A. PHYSICAL/CHEMICAL PROPERTIES ASSESSMENT

Please refer to each individual SCLP chapter for the specific physical/chemical properties assessment.

B. HUMAN HEALTH ASSESSMENT

Please refer to each individual SCLP chapter for the specific physical/chemical properties assessment.

1. Toxicology Assessment

It is the Agency's position that based on low toxicity in animal testing, and expected low exposure to humans, no risk to human health is expected from the use of lepidopteran pheromones, and consumption of food containing residues of these pheromones present no risk. Toxicology and environmental data requirements for SCLP manufacturing use products are not required, and toxicology and environmental data requirements for end use products are greatly reduced per 40 CFR 158.2050 and 40 CFR Part 158.2060.

2. Dose Response Assessment

Based on all available information for SCLPs, no toxicity endpoints were identified.

3. Dietary Exposure and Risk Characterization

Historically, data waivers have been granted for SCLPs for all mammalian toxicity studies (OPPTS Harmonized Guidelines Series 870). Currently, toxicology and environmental data requirements for SCLP products are greatly reduced per 40 CFR 158.2050 and 40 CFR 158.2060 due to the low toxicity of lepidopteran pheromones in animal testing, and the expected low exposure to humans, no risk to human health is expected from the use of lepidopteran pheromones. Consumption of food containing residues of these pheromones presents no risk. Refer to each individual SCLP chapter for any further characterization specific to the SCLP.

4. Occupational and Residential Exposure

a. Occupational Exposure and Risk Characterization:

The potential for dermal, eye, and inhalation exposures to the pesticide exists for handlers and applicators. Due to the low toxicity of SCLPs in animal testing, no purposeful exposure to human skin, and no repeated inhalation exposure to these active ingredients at toxic levels, worker exposure data on SCLPs are not required. The Agency will require the appropriate signal word and precautionary statements to mitigate any risk from exposure via these routes. Please refer to each individual SCLP chapter for any further characterization specific to the SCLP.

b. Residential, School and Daycare Exposure and Risk Characterization:

No indoor residential, school, or day care uses currently appear on SCLP labels. Although accidental non-dietary exposure at sites where children are present may occur, the health risk is expected to be minimal based on low mammalian toxicity. Please refer to each individual SCLP chapter for any further characterization specific to the SCLP.

5. Drinking Water Exposure and Risk Characterization

Please refer to each individual SCLP chapter for characterization specific to the SCLP.

6. Acute and Dietary Risks for Sensitive Subpopulations, Particularly Infants and Children

The Agency has concluded that the potential for SCLP residues are not a dietary risk to the general population, including infants and children. This decision was based on low toxicity in animal testing, expected low exposure to humans, no expected risk to human health, and no risk from consumption of food containing residues of these pheromones. Please refer to each individual SCLP chapter for further characterization specific to the SCLP.

7. Aggregate Exposure from Multiple Routes Including Dermal, Oral and Inhalation

Due to the low toxicity of SCLPs in animal testing, and the expected low exposure to humans, no risk to human health is expected. Consumption of food containing residues of these pheromones presents no risk. (This is reflected in the reduced data requirements set out in 40 CFR 158.2050 and 40 CFR 158.2060.) Based on this information, the Agency has concluded that aggregate exposure to SCLPs over a lifetime will not pose appreciable risks to human health. Moreover, the toxicity and exposure data are sufficiently complete to adequately address the potential for additional sensitivity of infants and children to residues of SCLPs. The Agency has considered the various routes of exposure and potential risks of the product and determined that the proposed use of the active ingredient does not pose significant risk to all populations, including infants and children.

8. Cumulative Effects

Section 408(b)(2)(D)(v) of the FFDCA requires the Agency to consider the cumulative effect of exposure to SCLPs and to other substances that have a common mechanism of toxicity. These considerations include the possible cumulative effects of such residues on infants and children. SCLPs have a non-toxic mode of action. Thus, there is no indication or any evidence to suggest that these biochemical pesticides share any common mechanisms of toxicity with other substances. Therefore, cumulative exposure concerns are not anticipated.

9. Endocrine System Effects

The Agency is required under the Federal Food, Drug, and Cosmetics Act (FFDCA), as amended by Food Quality Protection Act, to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) “may have an effect in humans that is similar to an effect produced by a naturally-occurring estrogen, or other such endocrine effects as the Administrator may designate.” Following the recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was scientific basis for including, as part of the program, the androgen- and thyroid-hormone systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC’s recommendation that the Program include evaluations of potential effects in wildlife. For pesticide chemicals, the Agency will use FIFRA and, to the extent that effects in wildlife may help determine whether a substance may have an effect in humans, FFDCA authority to require the wildlife evaluations. As the science develops and resources allow, screening of additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP).

Based on the weight of the evidence of available data, no endocrine system-related effects have been identified for SCLPs and none are expected. Available data further suggest that the active ingredient does not share any structural similarity to any known endocrine disruptor.

C. ENVIRONMENTAL ASSESSMENT

Please refer to each individual SCLP chapter for the specific environmental assessment.

1. Ecological Effects Hazard Assessment

Historically, it has been the Agency’s position that adverse effects on non target organisms (mammals, birds, and aquatic organisms) are not expected because these straight-chained lepidopteran pheromones are released in very small amounts to the environment and act on a select group of insects. For these the data requirements for ecological effects have been reduced per 40 CFR 158.2050 and 40 CFR 158.2060. Please refer to each individual SCLP chapter for the specific ecological effects hazard assessment.

2. Environmental Fate and Ground Water Data

Historically, since the Agency has waived, per the registrant’s request, the Tier I studies the need for environmental fate and groundwater data [Tier II, 40 CFR 158.690(d)] was not triggered. Please refer to each individual SCLP chapter for the specific physical/chemical properties

assessment. Please refer to each individual SCLP chapter for the specific physical/chemical properties assessment. Please refer to each individual SCLP chapter for the specific status as the requirement of environmental fate and ground water data.

3. Ecological Exposure and Risk Characterization

Please refer to each individual SCLP chapter for the specific ecological exposure and risk characterization.

D. EFFICACY DATA

Historically, no efficacy data were required to be submitted to the Agency because no public health uses are involved with the use of SCLPs.

IV. REFERENCES

Lepidopteran Pheromones Fact Sheet issued 09/01. U.S. EPA.

http://www.epa.gov/oppbppd1/biopesticides/ingredient/factsheets/factsheet_lep_pheromones.htm

OECD. 2001. OECD Environment, Health, and Safety Publication; Series on Pesticides No.12; Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Arthropod Pest Control. <http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>

Touhey, J.G. (1990) "A review of the current bases for the United States Environmental Protection Agency's policies for the regulation of pheromones and other semiochemicals, together with a review of the available relevant data which may impact the assessment of risk for these classes of chemicals. Part No. 1, Straight Chain Alcohols, Acetate Esters and Aldehydes". (Unpublished report, 474 pp.)

CHAPTER 2

n-Tetradecyl Acetate
(PC Code 128002)

I. EXECUTIVE SUMMARY

A. IDENTITY

The active ingredient n-tetradecyl acetate is a synthetic straight-chained lepidopteran pheromone. This active ingredient comprises 99.56% of the Technical Grade Active Ingredient (TGAI) and Manufacturing Use Product (MP), n-Tetradecyl Acetate Technical Pheromone. The product chemistry data submitted by the registrant satisfy all the requirements for an Straight Chain Lepidopteran Pheromone (SCLP) MP product.

B. USE/USAGE

The TGAI/MP n-Tetradecyl Acetate Technical Pheromone is only for combination with other SCLP pheromones formulated into hand placed, retrievable pheromone dispensers used in mating disruption of Codling Moth (*Cydia pomonella*).

C. RISK ASSESSMENT

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices. [40 CFR 180.1153 (a) & (b)].

Toxicology and environmental data requirements for this pheromone product were not required per 40 CFR 158.2050(a)(2) and 158.2060(a)(2). This document reports that no risks to human health are expected from the use of lepidopteran pheromones based on the low toxicity in animal testing and the expected low exposure to humans. Furthermore, adverse effects on nontarget organisms are not expected because pheromones are released in very small quantities in the environment and act on a select group of insects. Appropriate precautionary labeling of end use products will further minimize potential exposure and mitigate risk to nontarget organisms.

The Agency has considered n-tetradecyl acetate in light of relevant safety factors in the Food Quality Protection Act (FQPA) of 1996 and under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and determined there will be no unreasonable adverse effects from the use of this product. The Agency is basing its risk management decision regarding the registration of n-tetradecyl acetate on the known low toxicity of lepidopteran pheromones, the limited exposure to humans, and the precautionary labeling that minimizes exposure and mitigates risk to nontarget organisms. The Agency believes that end use products containing n-tetradecyl acetate can be used without causing unreasonable adverse effects to humans or the environment.

D. DATA GAPS / LABELING RESTRICTIONS

There are no data gaps.

II. OVERVIEW

A. ACTIVE INGREDIENT OVERVIEW

Common Name:	n-Tetradecyl Acetate
Chemical Name:	n-tetradecyl acetate
Chemical Formula:	C ₁₆ H ₃₂ O ₂
Chemical Family:	Insect attractant, repellent and chemosterilant
Trade and Other Names:	n-Tetradecyl Acetate Technical Pheromone; myristyl acetate
CAS Registry Number:	638-59-5
OPP Chemical Code:	128002
Manufacturer:	BASF Corporation Crop Protection P.O. Box 13528 Research Triangle Park, NC 27709-3528

B. USE PROFILE

The following is information on the proposed uses with an overview of use sites and application methods.

Type of Pesticide: Synthetic semiochemical insect attractant (mating disrupter)

Use Sites: For combination with other SCLP pheromones formulated into hand placed, retrievable pheromone dispensers used in mating disruption of Codling Moth (*Cydia pomonella*) on pome fruit, stone fruit, and tree nuts.

Target Pests: Codling Moth (*Cydia pomonella*).

Formulation Types: Liquid

Method and Rates of Application: This active ingredient is expected to be formulated in combination with other SCLP pheromones into hand placed, retrievable pheromone dispensers.

Use Practice Limitations: Not to exceed 150 grams active ingredient per acre per year.

C. ESTIMATED USAGE

The compound, n-tetradecyl acetate, is expected to be formulated in combination with other SCLP pheromones into hand placed, retrievable pheromone dispensers for the mating disruption of Codling moth (*Cydia pomonella*).

D. DATA REQUIREMENTS

The active ingredient, n-tetradecyl acetate is considered as a straight-chain lepidopteran pheromone (SCLP) as defined by the Agency in 40 CFR 158.2000 (a)(2)(iii). A SCLP is a lepidopteran pheromone consisting of an unbranched aliphatic chain (between 9 and 18 carbons) ending in an alcohol, aldehyde, or acetate functional group and containing up to three double bonds in the aliphatic backbone. The product containing the pheromone is intended to be used in end-use products for control of the Codling moth (*Cydia pomonella*), which is a pest of many types of orchard crops.

Product chemistry data are required for registration of the MP. Toxicology and non-target toxicology data are not required under 40 CFR 158.2050(a)(2) and 158.2060(a)(2), respectively. This active ingredient is exempt from the requirement of a tolerance under 40 CFR 180.1153 when applied at a rate ≤ 150 g a.i./acre/year. Toxicology and ecological effects data are not required based on the following background information: 1) low toxicity in animal testing, 2) expected low exposure to humans, 3) no expected risk to human health, 4) no reported and substantiated adverse effects during more than 10 years of use as pesticides, and 5) no expected adverse effects to nontarget organisms.

The data requirements for granting this registration under Section 3(c)(5) of FIFRA have been reviewed by the Biopesticides and Pollution Prevention Division (BPPD). Based on the submitted information, the Agency foresees no unreasonable adverse effects to human health and the environment from the use of n-tetradecyl acetate when used as labeled.

E. REGULATORY HISTORY

On June 6, 2008, the Agency received an application from BASF Corporation to register the manufacturing use product, n-Tetradecyl Acetate Technical Pheromone, containing n-tetradecyl acetate. A 'Notice of Receipt' of the application for registration of n-Tetradecyl Acetate Technical Pheromone for incorporation into EPs for mating disruption of Codling moth was published in the Federal Register on August 27, 2008.

F. CLASSIFICATION

N-tetradecyl acetate is a synthetic Straight-chained Lepidopteran Pheromone (SCLP) and is classified as a biochemical pesticide.

G. FOOD CLEARANCES/TOLERANCES

Straight-chained Lepidopteran Pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

III. SCIENCE ASSESSMENT

A. PHYSICAL/CHEMICAL PROPERTIES ASSESSMENT

All product chemistry data requirements for n-tetradecyl acetate have been satisfied.

1. Product Identity and Mode of Action

a. Product Identity: The active ingredient, n-tetradecyl acetate, represents 99.56% by weight of the MP, n-Tetradecyl Acetate Technical Pheromone, which is a colorless to light yellow liquid with a fatty, waxy odor.

b. Mode of Action: n-tetradecyl acetate is a synthetic lepidopteran pheromone. It is intended to disrupt the mating of the Codling moth (*Cydia pomonella*) by a non-toxic mode of action.

2. Food Clearances/Tolerances

Straight-chained Lepidopteran Pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

3. Physical and Chemical Properties Assessment

The physical and chemical characteristics of n-tetradecyl acetate were submitted to support its registration. These are summarized in Table 1.

TABLE 1. Physical and Chemical Properties for Bedoukian e,e-9,11-Tetradecadienyl Acetate Technical Pheromone ^a			
Guideline Reference No./Property (To Fulfill 40 CFR 158.2000 (a)(2)(iii))		Description of Result ^a	Methods ^a
830.6302	Color	Colorless to light yellow	Supplier's MSDS
830.6303	Physical State	Liquid at room temperature	Supplier's MSDS
830.6304	Odor	Fatty, waxy	Supplier's MSDS
830.6313	Stability	No assay data. The product is not expected to contact metals in storage. During production the product is subjected to temperatures >50°C for short periods with no stability issues observed the product is required to be refrigerated for long-term storage.	
830.6314	Oxidation/Reduction: Chemical Incompatibility	Not applicable, product is not intended to contact strong oxidizing or reducing agents.	
830.6315	Flammability	Flash Point = 130°C (Cleveland Open Cup)	Supplier's MSDS
830.6316	Explosibility	Not applicable, the product does not contain explosive ingredients	
830.6317	Storage Stability	Pending	
830.6319	Miscibility	Not applicable; the product is not to be mixed with petroleum solvents.	
830.6320	Corrosion Characteristics	Pending	
830.6321	Dielectric Breakdown Voltage	Not required for TGAI/MP	
830.7000	pH	5.5 – 7.0 at 20°C	
830.7050	UV/Visible Absorption	Maximum absorption is at ~210 nm.	830.7050 (MRID 47433704)
830.7100	Viscosity	5.8 – 6.6 cP at 20°C (Brookfield Method)	Public Literature
830.7200	Melting Range	Not applicable, product is a liquid	
830.7220	Boiling Range	142-146°C at 3 mm Hg	Supplier's MSDS
830.7300	Density/Relative Density/Bulk Density	Specific gravity = 0.866 – 0.869 at 20°C	Supplier's MSDS
830.7550	Partition Coefficient	Log P _{ow} = 6.76 at 20°C (HPLC method)	Public Literature
830.7840	Water Solubility	Insoluble	Supplier's MSDS
830.7950	Vapor Pressure	3.6 – 4.5 x 10 ⁻⁴ mm Hg at 20°C	Supplier's MSDS

^aData from MRID 47423705 unless another MRID number is noted.

B. HUMAN HEALTH ASSESSMENT

1. Toxicology Assessment

The active ingredient, n-tetradecyl acetate, is a synthetic Straight-chain Lepidopteran Pheromone (SCLP). While product chemistry data are required for the registration of a

TGAI/ MP for a Straight-chain Lepidopteran Pheromone, no toxicology data are required per 40 CFR 158.2050(a)(2). Toxicology assessments will be conducted upon application of future EPs. Given the Agency's history with SCLPs, it is expected that future end use products containing n-tetradecyl acetate will demonstrate the same low toxicity as observed with all of the SCLPs that have preceded it.

2. Dose Response Assessment

Not applicable

3. Dietary Exposure and Risk Characterization

Not required per 40 CFR 158.2050(a)(2). Future risk characterization for EPs containing n-tetradecyl acetate will follow the reduced toxicology data requirements laid out in 40 CFR 158.2050.

4. Occupational and Residential Exposure

Risk characterizations are not applicable for the MP/TGAI (40 CFR 158.2050(a)(2)). Risk characterization depends on the information associated with applications for n-tetradecyl acetate EPs.

5. Drinking Water Exposure and Risk Characterization

Risk characterizations are not applicable for the MP/TGAI (40 CFR 158.2050(a)(2)). Risk characterization depends on the information associated with applications for n-tetradecyl acetate EPs.

6. Acute and Dietary Risks for Sensitive Subpopulations, Particularly Infants and Children

Analysis of 'Dietary Risks for Sensitive Subpopulations, Particularly Infants and Children' depends on information submitted with applications for n-tetradecyl acetate EPs (40 CFR 158.2050(a)(2)). Future analysis for EPs containing n-tetradecyl acetate will follow regular SCLP protocols laid out in 40 CFR 158.2050.

7. Aggregate Exposure from Multiple Routes Including Dermal, Oral and Inhalation

Risk characterizations are not applicable for the MP/TGAI (40 CFR 158.2050(a)(2)). Risk characterization depends on the information associated with applications for n-tetradecyl acetate EPs.

8. Cumulative Effects

Not applicable to the MP/TGAI (40 CFR 158.2050(a)(2)).

9. Endocrine System Effects

The Agency is required under the Federal Food, Drug, and Cosmetics Act (FFDCA), as amended by Food Quality Protection Act, to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) “may have an effect in humans that is similar to an effect produced by a naturally-occurring estrogen, or other such endocrine effects as the Administrator may designate.” Following the recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was scientific basis for including, as part of the program, the androgen- and thyroid-hormone systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC’s recommendation that the Program include evaluations of potential effects in wildlife. For pesticide chemicals, the Agency will use FIFRA and, to the extent that effects in wildlife may help determine whether a substance may have an effect in humans, FFDCA authority to require the wildlife evaluations. As the science develops and resources allow, screening of additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP).

Based on the weight of the evidence of available data, no endocrine system-related effects have been identified for n-tetradecyl acetate and none are expected. Available data further suggest that the active ingredient does not share any structural similarity to any known endocrine disruptor.

C. ENVIRONMENTAL ASSESSMENT

1. Ecological Effects Hazard Assessment

Ecological toxicology data are not required for MP/TGAI for SCLPs under 40 CFR 158.2060(a)(2). Future environmental assessments will be based on the information submitted in conjunction with applications for future end use products containing n-tetradecyl acetate. Those data requirements can be found in 40 CFR 158.2060.

2. Environmental Fate and Ground Water Data

Not applicable per the reason stated above.

3. Ecological Exposure and Risk Characterization

Not applicable. The required Environmental Hazard statement for MPs is considered sufficient to mitigate any exposure relative to this manufacturing use.

D. EFFICACY DATA

No efficacy data are required for the MP/TGAI.

IV. RISK MANAGEMENT DECISION

A. DETERMINATION OF ELIGIBILITY

Section 3(c)(5) of FIFRA provides for the unconditional registration of the manufacturing use product, n-Tetradecyl Acetate Technical Pheromone, containing the new active ingredient, n-tetradecyl acetate, if it is determined that (A) its composition is such as to warrant the proposed claims for it; (B) its labeling and other materials required to be submitted comply with the requirements of FIFRA; (C) it will perform its intended function without unreasonable adverse effects on the environment; and (D) when used in accordance with widespread and commonly recognized practice, it will not generally cause unreasonable adverse effects on the environment.

To satisfy criteria “A” above, products formulated from the use of this manufacturing use product are not expected to cause unreasonable adverse effects when used according to label instructions. Criteria “B” is satisfied by the current label and by data presented in this document. It is believed that n-tetradecyl acetate will not cause any unreasonable adverse effect, and is an effective biochemical pesticide for lepidopteran pests, satisfying Criteria “C.” Criteria “D” is satisfied in that the pesticide is not expected to cause unreasonable adverse effects when used as described on the label. Therefore, n-Tetradecyl Acetate Technical Pheromone, containing the new active ingredient, n-tetradecyl acetate, is eligible for an unconditional registration.

B. REGULATORY POSITION

1. Unconditional Registration

The data submitted are sufficient for unconditional registration of n-Tetradecyl Acetate Technical Pheromone (EPA Reg No.: 7969-282).

2. Tolerance Reassessment

MP/TGAIs are non-food uses. With regard to the prospects of n-tetradecyl acetate EPs that may contain food uses, it is noted that SCLPs are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

3. Codex Harmonization

There are no Codex harmonization considerations since there is currently no Codex tolerance for residues of n-tetradecyl acetate.

4. Nonfood Re/Registrations

This is a new active ingredient and, therefore, not the subject of reregistration at this time.

5. Risk Mitigation

There is minimal to negligible potential for risks to non-target organisms or for ground or surface water contamination through the proposed use of this active ingredient as an MP.

6. Endangered Species Statement

An Endangered Species Assessment is not applicable to the MP. An ESA will be conducted upon review of the applications for EPs.

C. LABELING RATIONALE

It is the Agency's position that the labeling for the MP/TGAI n-Tetradecyl Acetate Technical Pheromone (EPA Reg No.: 7969-282) containing 99.56% by weight n-tetradecyl acetate complies with the current pesticide labeling requirements.

1. Human Health Hazard

- a. **Worker Protection Standard:** This product label does not come under the provisions of the Worker Protection Standards (WPS).
- b. **Non-Worker Protection Standard:** There are no non-WPS human health hazard issues.
- c. **Precautionary Labeling:** The Agency has examined the toxicological database for n-tetradecyl acetate and concluded that the precautionary labeling required during this unconditional registration process (i.e. Signal Word, First Aid Statements, and other label statements) adequately mitigate the risks associated with the uses of an SCLP MP.

“CAUTION: Harmful if swallowed, inhaled, or absorbed through skin. Causes moderate eye. Avoid breathing vapor. Avoid contact with skin, eyes, or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove contaminated clothing and wash before reuse. Wear chemical resistant gloves and protective eyewear.”

- d. **Spray Drift Advisory:** No spray drift advisory statement is necessary for an MP.

2. Environmental Hazards Labeling

MP Environmental Hazards Labeling: The following statements are required on the label of this product: "**ENVIRONMENTAL HAZARDS:** Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit, and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA."

3. Application Rate

Not applicable for an MP..

D. LABELING

ACTIVE INGREDIENT:

n-Tetradecyl Acetate	99.56%
OTHER INGREDIENTS	0.44%
Total	100.0%

The end use product label shall comply with Agency labeling requirements and must contain the following information:

- Product name
- Ingredient statement
- Registration number
- "Keep out of reach of children"
- Signal word (CAUTION)
- Precautionary statements

V. ACTIONS REQUIRED BY REGISTRANTS

Registrants are required to provide reports of incidents of adverse effects to humans or domestic animals under FIFRA, Section 6(a)(2) and incidents of hypersensitivity under 40 CFR Part 158.690(c), guideline reference number 152-16. There are no data requirements, label changes and other responses necessary for the reregistration of the product since the product is being registered after November 1984 and is, therefore, not subject to reregistration. For the same reason, there are also no existing stocks provisions at this time.

VI. REFERENCES

Lepidopteran Pheromones Fact Sheet issued 09/01. U.S. EPA.

http://www.epa.gov/opbtpd1/biopesticides/ingredient/factsheets/factsheet_lep_pheromones.htm

Guidance for Registration Requirements for Pheromones and Semiochemicals Used for Arthropod Pest Control. OECD Series on Pesticides. No. 12. Feb. 26, 2002

[http://www.olis.oecd.org/olis/2001doc.nsf/43bb6130e5e86e5fc12569fa005d004c/bf8feefe7a272650c1256b0600364359/\\$FILE/JT00121481.PDF](http://www.olis.oecd.org/olis/2001doc.nsf/43bb6130e5e86e5fc12569fa005d004c/bf8feefe7a272650c1256b0600364359/$FILE/JT00121481.PDF)

Touhey, J.G. ca.1990. A review of the current bases for the United States Environmental Protection Agency's policies for the regulation of pheromones and other semiochemicals, together with a review of the available relevant data which may impact the assessment of risk for these classes of chemicals. Part No.1, Straight Chain Alcohols, Acetate Esters and Aldehydes. (Unpublished report, 474 pp.)

Amended SCLP Tolerance Exemption Final Rule published in the Federal Register 8/9/06

<http://www.epa.gov/fedrgstr/EPA-PEST/2006/August/Day-09/p12971.htm>

SCLP Tolerance Exemption Final Rule published in the Federal Register 8/9/95

<http://frwebgate3.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=3888857397+0+0+0&WAIAction=retrieve>

CHAPTER 3

9,11-TETRADECADIEN-1-OL, ACETATE, (9E,11E)
(PC Code 128000)

I. EXECUTIVE SUMMARY

A. IDENTITY

The active ingredient n-tetradecyl acetate is a synthetic straight-chained lepidopteran pheromone. This active ingredient comprises 94% of the Technical Grade Active Ingredient (TGAI) and Manufacturing Use Product (MP), Bedoukian e,e-9,11-Tetradecadienyl Acetate Technical Pheromone. The product chemistry data submitted by the registrant satisfy all the requirements for an SCLP MP product.

B. USE/USAGE

The TGAI/MP n-tetradecyl acetate is to be used for incorporation into end use products intended to control the Light Brown Apple Moth (*Epiphyas postvittana*).

The Light Brown Apple Moth (LBAM) is an invasive species native to Australia and is found in New Zealand, the United Kingdom, parts of the continental U.S. and Hawaii. The pest destroys, stunts, or deforms young seedlings, spoils the appearance of ornamental plants and injures fruit-tree crops.

C. RISK ASSESSMENT

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices (40 CFR 180.1153).

Toxicology and environmental data requirements for this pheromone product were not required per 40 CFR 158.2050(a)(2) and 158.2060(a)(2). This document reports that no risks to human health are expected from the use of lepidopteran pheromones based on the low toxicity in animal testing and the expected low exposure to humans. Furthermore, adverse effects on nontarget organisms are not expected because pheromones are released in very small quantities in the environment and act on a select group of insects. Appropriate precautionary labeling of end use products will further minimize potential exposure and mitigate risk to nontarget organisms.

The Agency has considered n-tetradecyl acetate in light of relevant safety factors in the Food Quality Protection Act (FQPA) of 1996 and under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and determined there will be no unreasonable adverse effects from the use of this product. The Agency is basing its risk management decision regarding the registration of Z-9-Tetradecen-1-yl acetate on the known low toxicity of lepidopteran pheromones, the limited exposure to humans, and the precautionary labeling that minimizes exposure and mitigates risk to nontarget organisms. The Agency believes that end use products containing n-tetradecyl acetate can be used without causing unreasonable adverse effects to humans or the environment.

D. DATA GAPS / LABELING RESTRICTIONS

There are no data gaps.

II. OVERVIEW

A. ACTIVE INGREDIENT OVERVIEW

Common Name:	E,E-9,11-Tetradecadienyl Acetate
Chemical Name:	n-tetradecyl acetate
Chemical Formula:	C ₁₆ H ₂₈ O ₂
Chemical Family:	Insect attractant, repellent and chemosterilant
Trade and Other Names:	Bedoukian E,E-9,11-Tetradecadienyl Acetate Technical Pheromone
CAS Registry Number:	54664-98-1
OPP Chemical Code:	128000
Manufacturer:	Bedoukian Research, Inc. 21 Finance Drive, Danbury, CT 06810-4192

B. USE PROFILE

The following is information on the proposed uses with an overview of use sites and application methods.

Type of Pesticide: Synthetic semiochemical insect attractant (mating disrupter)

Use Sites: From 2007-2008, part of a wide-area Section 18 treatment to contain the invasive LBAM pest. Directed applications targeted orchards, ornamental nurseries and vineyards.

Target Pests: Light Brown Apple Moth (*Epiphyas postvittana*).

Formulation Types: Liquid

Method and Rates of Application: This active ingredient is expected to be part of End Use Products (EP) that dispense the SCLP through passive dispensing, broadcast applications, caulking applications and other directed but non-retrievable applications.

Use Practice Limitations: Not to exceed 150 grams active ingredient per acre per year.

C. ESTIMATED USAGE

The compound, n-tetradecyl acetate, is expected to be part of many EPs intended to act as a mating disruptor for LBAM. As of 2007, the Light Brown Apple Moth has become a pest of significant concern for California. The LBAM infestation prompted an emergency exemption (Section 18), wherein the active ingredient was widely applied.

D. DATA REQUIREMENTS

The active ingredient, n-tetradecyl acetate- is considered as a straight-chain lepidopteran pheromone (SCLP) as defined by the Agency in 40 CFR 158.2000 (a)(2)(iii). A SCLP is a lepidopteran pheromone consisting of an unbranched aliphatic chain (between 9 and 18 carbons) ending in an alcohol, aldehyde, or acetate functional group and containing up to three double bonds in the aliphatic backbone. The product containing the pheromone is intended to be used in end-use products for control of the Light Brown Apple Moth (*Epiphyas postvittana*), which is a pest of many types of crops and ornamentals.

Product chemistry data are required for registration of the MP. Toxicology and non-target toxicology data are not required under 40 CFR 158.2050(a)(2) and 158.2060(a)(2), respectively. This active ingredient is exempt from the requirement of a tolerance under 40 CFR 180.1153 when applied at a rate ≤ 150 g a.i./acre/year. Toxicology and ecological effects data are not required based on the following background information: 1) low toxicity in animal testing, 2) expected low exposure to humans, 3) no expected risk to human health, 4) no reported and substantiated adverse effects during more than 10 years of use as pesticides, and 5) no expected adverse effects to nontarget organisms.

The data requirements for granting this registration under Section 3(c)(5) of FIFRA have been reviewed by the Biopesticides and Pollution Prevention Division (BPPD). Based on the submitted information, the Agency foresees no unreasonable adverse effects to human health and the environment from the use of n-tetradecyl acetate when used as labeled.

E. REGULATORY HISTORY

On January 18, 2008, the Agency received an application from Bedoukian Research, Inc. to register the MP Bedoukian E,E-9,11-Tetradecadienyl Acetate Technical Pheromone, containing n-tetradecyl acetate. A 'Notice of Receipt' of the application for registration of Bedoukian E,E-9,11-Tetradecadienyl Acetate Technical Pheromone for incorporation into EPs for mating disruption of the Light Brown Apple Moth was published in the Federal Register on May 16, 2008.

Prior to this application, in August of 2007, EPA reviewed and approved use of products containing n-tetradecyl acetate as authorized by Section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and under its own regulations at 40 CFR Part 166 (Ref 10). Under these provisions, a state or other federal agency may apply for emergency use of a new pesticide or use pattern in order to help respond to an urgent new pest problem, such as the discovery of an invasive and damaging insect pest like LBAM. This program for release of pheromones in mating disruption was considered a "quarantine" emergency.

LBAM is native to Australia and is found in New Zealand, Ireland, the United Kingdom, and Hawaii. The pest destroys, stunts, or deforms young seedlings, spoils the appearance of ornamental plants, and injures deciduous fruit-tree crops, citrus, and grapes. In countries, such as Australia, where the LBAM is endemic, they rely on the use of SCLPs and EPA is not aware of any adverse effects being reported as a result of these control programs. SCLPs

are also registered in the U.S. for crop use to control other pests, with a similar track record of safe use.

EPA notes that California agricultural officials have discontinued their wide-area LBAM pheromone applications in response to citizen complaints about possible health effects. As a result, an EPA review was conducted to characterize the specific risks of California's Section 18 LBAM applications. The review found the risks to human health and the environment associated with wide-area treatments to be negligible. More information on EPA's review can be found at <http://www.epa.gov/region09/pesticides/light-brown-moth.html>.

F. CLASSIFICATION

n-tetradecyl acetate is a synthetic Straight-chained Lepidopteran Pheromone (SCLP) and is classified as a biochemical pesticide.

G. FOOD CLEARANCES/TOLERANCES

Straight-chained Lepidopteran Pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

III. SCIENCE ASSESSMENT

A. PHYSICAL/CHEMICAL PROPERTIES ASSESSMENT

All product chemistry data requirements for n-tetradecyl acetate have been satisfied.

1. Product Identity and Mode of Action

a. Product Identity: The active ingredient, n-tetradecyl acetate, represents 94% by weight of the MP Bedoukian E,E-9,11-Tetradecadienyl Acetate Technical Pheromone, which is a colorless or light yellow transparent liquid with a mild, fruity odor.

b. Mode of Action: n-tetradecyl acetate is a synthetic lepidopteran pheromone. It is intended to disrupt the mating of the Light Brown Apple Moth (*Epiphyas postvittana*) by a non-toxic mode of action.

2. Food Clearances/Tolerances

Straight-chained Lepidopteran Pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices (40 CFR 180.1153).

3. Physical and Chemical Properties Assessment

The physical and chemical characteristics of n-tetradecyl acetate were submitted to support its registration. These are summarized in Table 1.

TABLE 1. Physical and Chemical Properties for Bedoukian e,e-9,11-Tetradecadienyl Acetate Technical Pheromone ^a		
Guideline Reference No./Property (To Fulfill 40 CFR 158.2000 (a)(2)(iii))	Description of Result	Methods
830.6302 Color	Colorless to light yellow	Visual inspection
830.6303 Physical State	Liquid at room temperature	Visual inspection
830.6304 Odor	Not established	Olfactory inspection
830.6313 Stability	Stable in contact with iron, iron acetate, aluminum, or aluminum acetate for 14 days at room temperature or at 54°C	OPPTS 830.6313
830.6314 Oxidation/Reduction: Chemical Incompatibility	Not applicable, product is not intended to contact strong oxidizing or reducing agents.	
830.6315 Flammability	>230°F	Pensky Martens closed cup
830.6316 Explodability	Not applicable, the product does not contain explosive ingredients	
830.6317 Storage Stability	Pending	
830.6319 Miscibility	Not applicable; the product is not to be mixed with petroleum solvents.	
830.6320 Corrosion Characteristics	Pending	
830.6321 Dielectric Breakdown Voltage	Not required for TGAI/MP	
830.7000 pH	Pending	
830.7050 UV/Visible Absorption	Maximum absorption is at ~250 nm.	
830.7100 Viscosity	7.48 cSt at 25°C	ASTM D445
830.7200 Melting Range	Not applicable, product is a liquid	
830.7220 Boiling Range	319.4°C 125°C at 0.5 mm Hg	EPISuite (adapted Stein & Brown method) Product knowledge
830.7300 Density/Relative Density/Bulk Density	Specific gravity = 0.889 at 25°C 7.4 lb/gal at 25°C	Anton Parr Density Meter
830.7550 Partition Coefficient	Log K _{ow} = 6.33	EPISuite (KowWin)
830.7840 Water Solubility	0.09058 mg/L	EPISuite (WSKOW v1.41)
830.7950 Vapor Pressure	0.000693 mm Hg	EPISuite (modified grain method)

^aData from MRID 47324604

B. HUMAN HEALTH ASSESSMENT

1. Toxicology Assessment

The active ingredient, n-tetradecyl acetate, is a synthetic Straight-chain Lepidopteran Pheromone (SCLP). While product chemistry data are required for the registration of a TGAI/ MP for a Straight-chain Lepidopteran Pheromone, no toxicology data are required per 40 CFR 158.2050(a)(2). Toxicology assessments will be conducted upon application of future EPs. Given the Agency's history with SCLPs, it is expected that future EPs for LBAM will demonstrate the same low toxicity as observed with all of the SCLPs that have preceded it.

2. Dose Response Assessment

Not applicable

3. Dietary Exposure and Risk Characterization

Not required per 40 CFR 158.2050(a)(2). Future risk characterization for EPs containing 9,11-tetradecadien-1-ol, 1-acetate will follow the reduced toxicology data requirements laid out in 40 CFR 158.2050.

4. Occupational and Residential Exposure

Risk characterizations are not applicable for the MP/TGAI (40 CFR 158.2050(a)(2)). Risk characterization depends on the information associated with applications for LBAM EPs.

5. Drinking Water Exposure and Risk Characterization

Risk characterizations are not applicable for the MP/TGAI (40 CFR 158.2050(a)(2)). Risk characterization depends on the information associated with applications for LBAM EPs.

6. Acute and Dietary Risks for Sensitive Subpopulations, Particularly Infants and Children

Analysis of 'Dietary Risks for Sensitive Subpopulations, Particularly Infants and Children' depends on information submitted with applications for LBAM EPs (40 CFR 158.2050(a)(2)). Future analysis for EPs containing n-tetradecyl acetate will follow regular SCLP protocols laid out in 40 CFR 158.2050.

7. Aggregate Exposure from Multiple Routes Including Dermal, Oral and Inhalation

Risk characterizations are not applicable for the MP/TGAI (40 CFR 158.2050(a)(2)). Risk characterization depends on the information associated with applications for LBAM EPs.

8. Cumulative Effects

Not applicable to the MP/TGAI (40 CFR 158.2050(a)(2)).

10. Endocrine System Effects

The Agency is required under the Federal Food, Drug, and Cosmetics Act (FFDCA), as amended by Food Quality Protection Act, to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) “may have an effect in humans that is similar to an effect produced by a naturally-occurring estrogen, or other such endocrine effects as the Administrator may designate.” Following the recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was scientific basis for including, as part of the program, the androgen- and thyroid-hormone systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC’s recommendation that the Program include evaluations of potential effects in wildlife. For pesticide chemicals, the Agency will use FIFRA and, to the extent that effects in wildlife may help determine whether a substance may have an effect in humans, FFDCA authority to require the wildlife evaluations. As the science develops and resources allow, screening of additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP).

Based on the weight of the evidence of available data, no endocrine system-related effects have been identified for n-tetradecyl acetate and none are expected. Available data further suggest that the active ingredient does not share any structural similarity to any known endocrine disruptor.

C. ENVIRONMENTAL ASSESSMENT

1. Ecological Effects Hazard Assessment

Ecological toxicology data are not required for MP/TGAIs for SCLPs under 40 CFR 158.2060(a)(2). Future environmental assessments will be based on the information submitted in conjunction with applications for LBAM EPs. Those data requirements can be found in 40 CFR 158.2060.

2. Environmental Fate and Ground Water Data

Not applicable per the reason stated above.

3. Ecological Exposure and Risk Characterization

Not applicable. The required Environmental Hazard statement for MPs is considered sufficient to mitigate any exposure relative to this manufacturing use.

D. EFFICACY DATA

No efficacy data are required for the MP/TGAI.

IV. RISK MANAGEMENT DECISION

A. DETERMINATION OF ELIGIBILITY

Section 3(c)(5) of FIFRA provides for the unconditional registration of the manufacturing use product, Bedoukian e,e-9,11-Tetradecadienyl Acetate Technical Pheromone, containing the new active ingredient, n-tetradecyl acetate, if it is determined that (A) its composition is such as to warrant the proposed claims for it; (B) its labeling and other materials required to be submitted comply with the requirements of FIFRA; (C) it will perform its intended function without unreasonable adverse effects on the environment; and (D) when used in accordance with widespread and commonly recognized practice, it will not generally cause unreasonable adverse effects on the environment.

To satisfy criteria “A” above, products formulated from the use of this manufacturing use product are not expected to cause unreasonable adverse effects when used according to label instructions. Criteria “B” is satisfied by the current label and by data presented in this document. It is believed that n-tetradecyl acetate will not cause any unreasonable adverse effect, and is an effective biochemical pesticide for lepidopteran pests, satisfying Criteria “C.” Criteria “D” is satisfied in that the pesticide is not expected to cause unreasonable adverse effects when used as described on the label. Therefore, Bedoukian e,e-9,11-Tetradecadienyl Acetate Technical Pheromone, containing the new active ingredient , n-tetradecyl acetate, is eligible for an unconditional registration. .

B. REGULATORY POSITION

1. Unconditional Registration

The data submitted are sufficient for unconditional registration of Bedoukian e,e-9,11-Tetradecadienyl Acetate Technical Pheromone (EPA Reg No.: 52991-22).

2. Tolerance Reassessment

MP/TGAIs are non-food uses. With regard to the prospects of LBAM EPs that may contain food uses, it is noted that SCLPs are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices (40 CFR 180.1153).

3. Codex Harmonization

There are no Codex harmonization considerations since there is currently no Codex tolerance for residues of n-tetradecyl acetate.

4. Nonfood Re/Registrations

This is a new active ingredient and, therefore, not the subject of reregistration at this time.

5. Risk Mitigation

There is minimal to negligible potential for risks to non-target organisms or for ground or surface water contamination through the proposed use of this active ingredient as an MP.

6. Endangered Species Statement

An Endangered Species Assessment is not applicable to the MP. An ESA will be conducted upon review of the applications for EPs.

C. LABELING RATIONALE

It is the Agency's position that the labeling for the MP/TGAI Bedoukian e,e-9,11-Tetradecadienyl Acetate Technical Pheromone (EPA Reg No.: 52991-22) containing 94% by weight n-tetradecyl acetate complies with the current pesticide labeling requirements.

1. Human Health Hazard

- a. **Worker Protection Standard:** This product label does not come under the provisions of the Worker Protection Standards (WPS).
- b. **Non-Worker Protection Standard:** There are no non-WPS human health hazard issues.
- c. **Precautionary Labeling:** The Agency has examined the toxicological database for n-tetradecyl acetate and concluded that the precautionary labeling required during this unconditional registration process (i.e. Signal Word, First Aid Statements, and other label statements) adequately mitigate the risks associated with the uses of an SCLP MP.
- d. **Spray Drift Advisory:** No spray drift advisory statement is necessary for an MP.

2. Environmental Hazards Labeling

MP Environmental Hazards Labeling: The following statements are required on the label of this product: "**ENVIRONMENTAL HAZARDS:** Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge

Elimination System (NPDES) permit, and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.”

3. Application Rate

Not applicable for an MP..

D. LABELING

ACTIVE INGREDIENT:

9,11-TETRADECADIEN-1-OL 1-ACETATE, (E9,E11)...	94.0%
OTHER INGREDIENTS	6.0%
Total	100.0%

The end use product label shall comply with Agency labeling requirements and must contain the following information:

- Product name
- Ingredient statement
- Registration number
- “Keep out of reach of children”
- Signal word (CAUTION)
- Precautionary statements

V. ACTIONS REQUIRED BY REGISTRANTS

Registrants are required to provide reports of incidents of adverse effects to humans or domestic animals under FIFRA, Section 6(a)(2) and incidents of hypersensitivity under 40 CFR Part 158.690(c), guideline reference number 152-16. There are no data requirements, label changes and other responses necessary for the reregistration of the product since the product is being registered after November 1984 and is, therefore, not subject to reregistration. For the same reason, there are also no existing stocks provisions at this time.

VI. REFERENCES

Lepidopteran Pheromones Fact Sheet issued 09/01. U.S. EPA.

http://www.epa.gov/oppbppd1/biopesticides/ingredient/factsheets/factsheet_lep_pheromones.htm

Guidance for Registration Requirements for Pheromones and Semiochemicals Used for Arthropod Pest Control. OECD Series on Pesticides. No. 12. Feb. 26, 2002

[http://www.olis.oecd.org/olis/2001doc.nsf/43bb6130e5e86e5fc12569fa005d004c/bf8feefe7a272650c1256b0600364359/\\$FILE/JT00121481.PDF](http://www.olis.oecd.org/olis/2001doc.nsf/43bb6130e5e86e5fc12569fa005d004c/bf8feefe7a272650c1256b0600364359/$FILE/JT00121481.PDF)

Touhey, J.G. ca.1990. A review of the current bases for the United States Environmental Protection Agency's policies for the regulation of pheromones and other semiochemicals, together with a review of the available relevant data which may impact the assessment of risk for these classes of chemicals. Part No.1, Straight Chain Alcohols, Acetate Esters and Aldehydes. (Unpublished report, 474 pp.)

Amended SCLP Tolerance Exemption Final Rule published in the Federal Register 8/9/06
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SCLP Tolerance Exemption Final Rule published in the Federal Register 8/9/95
<http://frwebgate3.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=3888857397+0+0+0&WAIAction=retrieve>

CHAPTER 4

Z-9-TETRADECEN-1-YL ACETATE (PC Code 129109)

I. EXECUTIVE SUMMARY

A. IDENTITY

The new active ingredient Z-9-Tetradecen-1-yl acetate is a synthetic straight-chained lepidopteran pheromone. This active ingredient is one of several active ingredients in the end use product Isomate-CM/LR TT which contains 4.34% by weight Z-9-Tetradecen-1-yl acetate. The product chemistry data submitted by the registrant satisfies the requirements for product.

B. USE/USAGE

Z-9-Tetradecen-1-yl acetate is used in the end use product (EP) Isomate-CM/LR TT. The active ingredient is used in an EP for the mating disruption codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosanus*).

C. RISK ASSESSMENT

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices (40 CFR 180.1153).

Toxicology and environmental data requirements for this pheromone product were waived per the OECD publication - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>). This document reports that no risks to human health are expected from the use of lepidopteran pheromones based on the low toxicity in animal testing and the expected low exposure to humans. Furthermore, adverse effects on nontarget organisms are not expected because these pheromones are released in very small quantities in the environment and act on a select group of insects. Appropriate precautionary labeling of end use products will further minimize potential exposure and mitigate risk to nontarget organisms.

The Agency has considered Z-9-Tetradecen-1-yl acetate in light of relevant safety factors in the Food Quality Protection Act (FQPA) of 1996 and under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and determined there will be no unreasonable adverse effects from the use of this product. The Agency is basing its risk management decision regarding the registration of Z-9-Tetradecen-1-yl acetate on the known low toxicity of lepidopteran pheromones, the limited exposure to humans, and the precautionary labeling that minimizes exposure and mitigates risk to nontarget organisms. The Agency believes that end use products containing Z-9-Tetradecen-1-yl acetate can be used without causing unreasonable adverse effects to humans or the environment.

D. DATA GAPS / LABELING RESTRICTIONS

There are no data gaps.

II. OVERVIEW

A. ACTIVE INGREDIENT OVERVIEW

Common Name:	Z-9-Tetradecen-1-yl Acetate; or (Z)-9-Tetradecenyl Acetate
Chemical Name:	Z-9-Tetradecen-1-yl acetate
Chemical Formula:	C ₁₆ H ₃₀ O ₂
Chemical Family:	Insect attractant, repellent and chemosterilant
Trade and Other Names:	Isomate CM/LR TT
CAS Registry Number:	16725-53-4
OPP Chemical Code:	129109
Manufacturer:	Pacific Biocontrol Corporation 14615 NE 13 th Court Suite A Vancouver, WA 98685

B. USE PROFILE

The following is information on the proposed uses with an overview of use sites and application methods.

Type of Pesticide: Synthetic semiochemical insect attractant (mating disrupter)

Use Sites: Apples, pears, quince and other pome fruits; peaches, plums, nectarines, cherries and other stone fruits; walnut, pecan and other nut crops.

Target Pests: codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosanus*).

Formulation Types: Liquid

Method and Rates of Application: This active ingredient is part of an end-use product (EP) that contains several other SCLP active ingredients. The application rate is 300 dispensers per acre. Do not exceed 150 grams active ingredient per acre per year.

Use Practice Limitations: “Do not exceed 150 grams active ingredient per acre per year.”

C. ESTIMATED USAGE

The compound, Z-9-Tetradecen-1-yl acetate, is part of an end-use product (EP) that contains several other SCLP active ingredients that act as a mating disruptor codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*).

D. DATA REQUIREMENTS

The Agency has supported the registrant's request for waivers from the requirements of studies/data for acute mammalian toxicity and for non-target organism testing. These data were waived based on the following criteria from the OECD publication - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>): 1) low toxicity in animal testing, 2) expected low exposure to humans, 3) no expected risk to human health, 4) no reported adverse effects during more than 10 years of use as pesticides, and 5) no expected adverse effects to nontarget organisms.

Product analysis data requirements for the end-use product were adequately satisfied.

The data requirements for granting this registration under Section 3(c)(5) of FIFRA have been reviewed by the Biopesticides and Pollution Prevention Division (BPPD). Based on the submitted information, the Agency foresees no unreasonable adverse effects to human health and the environment from the use of Z-9-Tetradecen-1-yl acetate as long as it is used as labeled.

E. REGULATORY HISTORY

On May 8, 2006, the Agency received an application from Pacific Biocontrol Corporation, to register the end use product Isomate-CM/LR TT, containing three new active ingredients, 4.34% by weight Z-9 Tetradecen-1-yl Acetate, 1.05% by weight Z-11-Tetradecen-1-ol, and 1.00% by weight Z-11-Tetradecenal. A notice of receipt of the application for registration of Isomate-CM/LR TT containing three new active ingredients, mentioned above, for an end use product for mating disruption codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*) was published in the Federal Register on July 26, 2006.

F. CLASSIFICATION

Z-9-tetradecen-1-yl acetate is a synthetic straight-chained lepidopteran pheromone and is classified as a biochemical pesticide.

G. FOOD CLEARANCES/TOLERANCES

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

III. SCIENCE ASSESSMENT

A. PHYSICAL/CHEMICAL PROPERTIES ASSESSMENT

All product chemistry data requirements for Z-9-tetradecen-1-yl acetate have satisfied.

1. Product Identity and Mode of Action

a. Product Identity:

The new active ingredient, Z-9-tetradecen-1-yl acetate, represents 4.34% by weight of the end use product Isomate-CM/LR TT, which is a colorless or light yellow transparent liquid with a mild, fatty-fruity odor.

b. Mode of Action:

Z-9-tetradecen-1-yl acetate is a synthetic lepidopteran pheromone. It is used in the end-use product, Isomate-CM/LR TT, to disrupt mating of codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*) by a non-toxic mode of action.

2. Food Clearances/Tolerances

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices (40 CFR 180.1153).

3. Physical and Chemical Properties Assessment

The physical and chemical characteristics of Z-9-tetradecen-1-yl acetate were submitted to support its registration. These are summarized in Table 1.

Table 1. Product chemistry data requirements			
Guideline No.	Study	Results	MRID No.
151-10 (OPPTS 880.1100)	Product identity	The submitted data satisfy the requirements for product identity.	46832301
151-11 (OPPTS 880.1200)	Manufacturing process	The submitted data satisfy the requirements for the manufacturing process.	46832301
151-12 (OPPTS 880.1400)	Discussion of formation of unintentional ingredients	The submitted data satisfy the requirements for the discussion of the formation of unintentional ingredients.	46832301
151-13 (OPPTS 830.1700)	Analysis of samples	The submitted data satisfy the requirements for the analysis of samples.	46832301
151-15 (OPPTS 830.1750)	Certification of limits	The submitted data satisfy the requirements for the certification of limits.	46832301
151-16 (OPPTS 830.1800)	Analytical method	An acceptable analytical method was submitted.	46832301
Physical/chemical Properties			
63-2 (OPPTS 830.6302)	Color	Colorless or light yellow, transparent	46832301
63-3 (OPPTS 830.6303)	Physical State	Liquid	46832301
63-4 (OPPTS 830.6304)	Odor	Mild, fatty-fruity	46832301
63-5 (OPPTS 830.7200)	Melting point	Not applicable, product is a liquid	46832301
63-6 (OPPTS 830.7220)	Boiling point	116-118 °C/130 Pa	46832301
63-7 (OPPTS 830.7300)	Density	Specific gravity = 0.875 at 20 °C	46832301

OPPTS Number	Property	Requirement	Registration Number
63-8 (OPPTS 830.7840)	Solubility	Less than 0.1 mg/liter water. Soluble in n-hexane, cyclohexane, benzene, toluene, acetone, methanol, ethanol, chloroform, acetonitrile, pyridine, aniline, DMF, etc. Insoluble in DMSO and ethylene glycol.	46832301
63-9 (OPPTS 830.7950)	Vapor Pressure	1.71x10 ⁻² Pa (20°C)	46832301
63-10 (OPPTS 830.7370)	Dissociation Constant	No dissociation constant	46832301
63-11 (OPPTS 830.7550)	Octanol/water partition coefficient	>6.2 (log P o/w at 20°C)	46832301
63-12 (OPPTS 830.7000)	pH	5.4	46832301
63-13 (OPPTS 830.6313)	Stability	Stable under normal conditions. Stable under sunlight and hydrolysis exposing water.	46832301
63-14 (OPPTS 830.6314)	Oxidation/reduction	Reaction does not occur under in normal conditions.	46832301
63-15 (OPPTS 830.6315)	Flammability	Flash point = 130°C	46832301
63-16 (OPPTS 830.6316)	Explodability	No explosion characteristics.	46832301
63-17 (OPPTS 830.6317)	Storage stability	Stable at 5°C conditions at least 5 years.	46832301
63-18 (OPPTS 830.7100)	Viscosity	5.34 c.s. (20°C)	46832301
63-19 (OPPTS 830.6319)	Miscibility	Miscible in most common organic solvents except DMSO and ethylene glycol.	46832301
63-20 (OPPTS 830.6320)	Corrosion characteristics	No corrosion characteristics.	46832301
63-21 (OPPTS 830.6321)	Dielectric breakdown voltage	No dielectric breakdown characteristics.	46832301
OPPTS 830.7050	UV/Visible absorption	Not required	

B. HUMAN HEALTH ASSESSMENT

1. Toxicology Assessment

The active ingredient, Z-9-tetradecen-1-yl acetate, is a synthetic lepidopteran pheromone. It is part of the end use product, Isomate-CM/LR TT, which contains several other SCLPs, which is used to disrupt mating of codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis*

limitata), and European leafroller (*Archips rosanus*). The registrant requested waivers for all Tier I mammalian toxicity studies (Guidelines 152-10 through 152-23).

The Agency has previously reviewed the mammalian toxicity data and other information submitted for the registrant’s substantially similar products and found it to be adequate for their registration. It is the Agency’s position that based on low toxicity in animal testing, and expected low exposure to humans, no risk to human health is expected from the use of lepidopteran pheromones, and consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). The Agency therefore granted the request for waivers for all Tier I mammalian toxicity studies (Table 2).

TABLE 2. Mammalian toxicity data requirements			
Guideline No.	Study	Results	MRID No.
152-10 (OPPTS 870.1100)	Acute oral toxicity	Waiver accepted	46832300
152-11 (OPPTS 870.1200)	Acute dermal toxicity	Waiver accepted	46823200
152-12 (OPPTS 870.1300)	Acute inhalation toxicity	Waiver accepted	46823200
152-13 (OPPTS 870.2400)	Primary eye irritation	Waiver accepted	46823200
152-14 (OPPTS 870.2500)	Primary dermal irritation	Waiver accepted	46823200
152-15 (OPPTS 870.2600)	Hypersensitivity	Waiver accepted	46823200
152-16 (885.3400)	Hypersensitivity incidents	Incidents must be reported.	46823200
152-17 (OPPTS 870.5100-5395)	Studies to determine genotoxicity	Waiver accepted	46823200
152-20 (OPPTS 870.3100)	90-Day feeding	Waiver accepted	46823200
152-21 (OPPTS 870.3250)	90-Day dermal	Waiver accepted	46823200
152-22 (OPPTS 870.3465)	90-Day inhalation	Waiver accepted	46823200
152-23 (OPPTS 870.3700)	Teratogenicity	Waiver accepted	46823200

2. Dose Response Assessment

Based on available information, no toxicity endpoints were identified.

3. Dietary Exposure and Risk Characterization

This active ingredient is part of the end-use product Isomate-CM/LR TT. The end use product is a dispenser placed in the lateral branches in the upper third of the trees canopy.

This active ingredient is a straight chain lepidopteran pheromone and is exempt from the requirement of a tolerance under 40 CFR 180.1153, and dietary exposure is not a concern. Data waivers were requested by the registrant for all mammalian toxicity studies (OPPTS Harmonized Guidelines 870/Guidelines 152-10 through 152-23) and were granted. Due to the low toxicity of lepidopteran pheromones in animal testing, and the expected low exposure to humans, no risk to human health is expected from the use of lepidopteran pheromones. Consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)).

4. Occupational and Residential Exposure

- a. Occupational Exposure and Risk Characterization:** The potential for dermal, eye, and inhalation exposures to the pesticide exists for handlers and applicators. Due to the low toxicity of lepidopteran pheromones in animal testing, no purposeful exposure to human skin, and no repeated inhalation exposure to the active ingredient at toxic levels, worker exposure data on Z-9-Tetradecen-1-yl acetate are not required. The Agency will require the appropriate signal word and precautionary statements to mitigate any risk from exposure via these routes.
- b. Residential, School and Daycare Exposure and Risk Characterization:** No indoor residential, school, or day care uses currently appear on the product label. Although accidental non-dietary exposure at sites where children are present may occur, the health risk is expected to be minimal based on low mammalian toxicity.

5. Drinking Water Exposure and Risk Characterization

This active ingredient is formulated into a dispenser which is placed on the lateral braches in the upper third of the tree canopy. No significant exposure is expected from an accumulation of Z-9-Tetradecen-1-yl acetate in the aquatic environment when it is used according to the precautionary label language.

6. Acute and Dietary Risks for Sensitive Subpopulations, Particularly Infants and Children

The Agency has concluded that the potential for Z-9-Tetradecen-1-yl acetate residues is not a dietary hazard to the general population, including infants and children. This decision was based on low toxicity in animal testing, expected low exposure to humans, no expected risk to human health, and no risk from consumption of food containing residues of these pheromones (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)).

7. Aggregate Exposure from Multiple Routes Including Dermal, Oral and Inhalation

Z-9-Tetradecen-1-yl acetate is a synthetic semiochemical that acts via a non-toxic mode of action on a specific insect pest. Due to the low toxicity of lepidopteran pheromones in animal testing, and the expected low exposure to humans, no risk to human health is expected. Consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). Based on this information, the Agency has concluded that aggregate exposure to Z-9-Tetradecen-1-yl acetate over a lifetime will not pose appreciable risks to human health. Moreover, the toxicity and exposure data are sufficiently complete to adequately address the potential for additional sensitivity of infants and children to residues of Z-9-Tetradecen-1-yl acetate. The Agency has considered the various routes of exposure and potential risks of the product and determined that the proposed use of the active ingredient does not pose significant risk to all populations, including infants and children.

8. Cumulative Effects

Section 408(b)(2)(D)(v) of the FFDCA requires the Agency to consider the cumulative effect of exposure to Z-9-Tetradecen-1-yl acetate and to other substances that have a common mechanism of toxicity. These considerations include the possible cumulative effects of such residues on infants and children. Z-9-Tetradecen-1-yl acetate has a non-toxic mode of action. Thus, there is no indication or any evidence to suggest that this biochemical pesticide shares any common mechanisms of toxicity with other substances. Therefore, cumulative exposure concerns are not anticipated.

9. Effects on the Immune and Endocrine Systems

EPA is required under the FFDCA, as amended by FQPA, to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) may have an effect in humans that is similar to an effect produced by a naturally-occurring estrogen, or other such endocrine effects as the Administrator may designate. Following the recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was scientific basis for including, as part of the program, the androgen and thyroid systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC's recommendation that the program include evaluations of potential effects in wildlife. For pesticide chemicals, EPA will use FIFRA and, to the extent that effects in wildlife may help determine whether a substance may have an effect in humans, FFDCA authority to require the wildlife evaluations. As the science develops and resources allow, screening of additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP).

The Agency is not requiring information on the endocrine effects of the active ingredient, Z-9-Tetradecen-1-yl acetate at this time. The Agency has considered, among other relevant factors, available information concerning whether the active ingredient may have an effect in humans similar to an effect produced by a naturally occurring estrogen or other endocrine effects. There is no known metabolite that acts as an "endocrine disrupter" produced by this

active ingredient. Based on the low potential exposure level associated with the proposed use of this pesticide, the Agency expects no incremental adverse effects to the endocrine or immune systems.

C. ENVIRONMENTAL ASSESSMENT

1. Ecological Effects Hazard Assessment

The registrant requested waivers for the following non-target organism toxicity requirements: Avian Acute Oral Toxicity (GLN 154-6 [OPPTS GLN 850.2100]), Acute Freshwater Fish (GLN 154-8 [OPPTS GLN 850.1075]), Acute Freshwater Invertebrate (GLN 154-9 [OPPTS 850.1010]). The registrant’s data for similar straight-chained lepidopteran pheromones show no toxicity issues for non-target organisms. The Agency has previously reviewed the registrant’s substantially similar products and found that the non-target organism data/information submitted was adequate to support their registration. It is the Agency’s position that adverse effects on non target organisms (mammals, birds, and aquatic organisms) are not expected because these straight-chained lepidopteran pheromones are released in very small amounts to the environment and act on a select group of insects (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). The Agency therefore granted the request for waivers for all non-target organism Tier I (Guidelines 154-6, 154-8 and 154-9) toxicity studies (Table 3). This active ingredient is being registered as part of an end-use product. Non-target organism toxicity testing is not required for end-use product registration. However, it is required for technical grade active ingredient registration. Based on the decision to waive Tier I data requirements, Tier II tests (Guidelines 155-4 through 155-14) and Tier III tests (Guidelines 154-12 through 154-15) were not required.

TABLE 3: Non-target organism toxicity requirements			
Guideline	Study	Results	MRID No.
154-6 (OPPTS 850.2100)	Avian acute oral toxicity	Waiver accepted	46823200
154-8 (OPPTS 850.1075)	Freshwater fish LC ₅₀	Waiver accepted	46823200
154-9 (OPPTS 850.1010)	Freshwater invertebrate LC ₅₀	Waiver accepted	46823200

2. Environmental Fate and Ground Water Data

The need for environmental fate and groundwater data [Tier II, 40 CFR 158.690(d)] was not triggered because the Tier I studies were waived. Risk is minimal due to lack of exposure, low toxicity, and the use pattern (dispensers placed on lateral branches in the upper third of the tree canopy).

3. Ecological Exposure and Risk Characterization

This active ingredient, Z-9-Tetradecen-1-yl acetate, is part of the end-use product Isomate-CM/LR TT. Z-9-Tetradecen-1-yl acetate is a synthetic lepidopteran pheromone that acts on a specific insect and has a non-toxic mode of action. As a result, no toxicology or environmental fate and effects data were deemed necessary for registration. The waiver requests for submitted data for non-target organisms are summarized in Table 3. In addition, mitigating label language will further reduce the risk to aquatic organisms. The precautionary labeling of Isomate-CM/LR TT is: "For terrestrial uses. Do not apply product directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of this product."

D. EFFICACY DATA

No efficacy data were required to be submitted to the Agency because no public health uses are involved.

IV. RISK MANAGEMENT DECISION

A. DETERMINATION OF ELIGIBILITY

Section 3(c)(5) of FIFRA provides for the unconditional registration of the end use product, Isomate-CM/LR TT, containing the new active ingredient, Z-9-Tetradecen-1-yl acetate, if it is determined that (A) its composition is such as to warrant the proposed claims for it; (B) its labeling and other materials required to be submitted comply with the requirements of FIFRA; (C) it will perform its intended function without unreasonable adverse effects on the environment; and (D) when used in accordance with widespread and commonly recognized practice, it will not generally cause unreasonable adverse effects on the environment.

To satisfy criteria "A" above, products formulated from the use of this manufacturing use product are not expected to cause unreasonable adverse effects when used according to label instructions. Criteria "B" is satisfied by the current label and by data presented in this document. It is believed that Z-9-Tetradecen-1-yl acetate will not cause any unreasonable adverse effect, and is an effective biochemical pesticide for lepidopteran pests, satisfying Criteria "C." Criteria "D" is satisfied in that the pesticide is not expected to cause unreasonable adverse effects when used as described on the label. Therefore, Isomate-CM/LR TT, containing the new active ingredient, Z-9-Tetradecen-1-yl acetate, is eligible for an unconditional registration. The end-use product will be used to control lepidopteran pests in/on agricultural commodities.

B. REGULATORY POSITION

1. Unconditional Registration

This is an unconditional registration. The data submitted are sufficient for unconditional registration of Isomate-CM/LR TT (EPA Reg No.: 53575-31).

2. Tolerance Reassessment

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

3. Codex Harmonization

There are no Codex harmonization considerations since there is currently no Codex tolerance for residues of Z-9-tetradecen-1-yl acetate.

4. Nonfood Re/Registrations

This is a new active ingredient and, therefore, not the subject of reregistration at this time.

5. Risk Mitigation

There is minimal to negligible potential for risks to non-target organisms (plants and wildlife) or for ground or surface water contamination through the proposed use of this active ingredient, as one of several SCLP active ingredients, is formulated into an end use product which is a dispenser placed on the lateral branches in the upper third of the tree canopy. Further, should any risks occur from occupational exposure to this active ingredient, appropriate mitigating labeling language for aquatic organisms is required.

6. Endangered Species Statement

The Agency has determined that the active ingredient Z-9-Tetradecen-1-yl acetate will not adversely effect threatened or endangered species when used according to label directions.

C. LABELING RATIONALE

It is the Agency's position that the labeling for the end use product Isomate-CM/LR TT containing 4.34% by weight Z-9-Tetradecen-1-yl acetate complies with the current pesticide labeling requirements.

1. Human Health Hazard

- a. **Worker Protection Standard:** This product does not come under the provisions of the Worker Protection Standards (WPS).
- b. **Non-Worker Protection Standard:** There are no non-WPS human health hazard issues.
- c. **Precautionary Labeling:** The Agency has examined the toxicological data base for Z-9-Tetradecen-1-yl acetate and concluded that the precautionary labeling required during this unconditional registration process (i.e. Signal Word, First Aid Statements, and other label statements) adequately mitigates the risks associated with the proposed uses.
- d. **End Use Product Precautionary Labeling:** For Isomate-CM/LR TT, "CAUTION." "Hazard to humans and domestic animals. Avoid contact with skin, eyes, and clothing. Harmful if absorbed through skin. Cause moderate eye irritation. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco."
- e. **Spray Drift Advisory** No spray drift advisory statement is necessary for this use.

2. Environmental Hazards Labeling

End-Use Product Environmental Hazards Labeling: The following statements are required on the label of this product: "For terrestrial use only. 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 water when disposing of this product."

3. Application Rate

300 dispensers per acre (3.82 fl.oz or 98.44 gm a.i. per application). Apply double rate of dispensers to edges of orchard. Do not exceed 150 gm a.i./acre/year (or 457 dispensers) per acre per year.

D. LABELING

ACTIVE INGREDIENT

(E,E)-8,10-Dodecadien-1-ol.....	38.62%
1-Dodecanol.....	6.00%
1-Tetradecanol.....	1.40%
Z-11-Tetradecen-1-yl Acetate.....	38.04%
Z-9-Tetradecen-1-yl Acetate.....	4.34%
Z-11-Tetradecen-1-ol.....	1.05%
Z-11-Tetradecenal.....	1.00%
Other ingredients.....	9.55%

Total.....100.00%

The end use product label shall comply with Agency labeling requirements and must contain the following information:

- Product name
- Ingredient statement
- Registration number
- “Keep out of reach of children”
- Signal word (CAUTION)
- Precautionary statements

V. ACTIONS REQUIRED BY REGISTRANTS

Registrants are required to provide reports of incidents of adverse effects to humans or domestic animals under FIFRA, Section 6(a)(2) and incidents of hypersensitivity under 40 CFR Part 158.690(c), guideline reference number 152-16. There are no data requirements, label changes and other responses necessary for the reregistration of the product since the product is being registered after November 1984 and is, therefore, not subject to reregistration. For the same reason, there are also no existing stocks provisions at this time.

VI. APPENDIX A

Table 4 lists the use sites for the product. The label for the product is also attached.

TABLE 4: End Use Registration/Reregistration	
Isomate-CM/LR TT <u>Use sites:</u> Apples, pears, quince and other pome fruits; peaches, prunes, plums, nectarines, cherries and other stone fruits; walnut, pecan and other tree nut crops.	Official date registered:

APPENDIX B – REFERENCES

Lepidopteran Pheromones Fact Sheet issued 09/01. U.S. EPA.

http://www.epa.gov/oppbppd1/biopesticides/ingredient/factsheets/factsheet_lep_pheromones.htm

Bolan, K.A. Application for Registration of Isomate-CM/LR TT: A Biochemical Mating Disruptant Twin Tube for Codling Moth and Leafroller moth, Volume 2 Product Properties for Biochemical Pesticides. Pacific Biocontrol Corporation, 14615 NE 13th Court, Suite A Vancouver, WA 98685. April 17, 2006. MRID 46832301.

Touhey, J.G. (1990) “A review of the current bases for the United States Environmental Protection Agency’s policies for the regulation of pheromones and other semiochemicals, together with a review of the available relevant data which may impact the assessment of risk for these classes of chemicals. Part No. 1, Straight Chain Alcohols, Acetate Esters and Aldehydes”. (Unpublished report, 474 pp.)

CHAPTER 5

Z-11-TETRADECEN-1-OL
(PC Code 129021)

I. EXECUTIVE SUMMARY

A. IDENTITY

The new active ingredient Z-11-tetradecen-1-ol is a synthetic straight-chained lepidopteran pheromone. This active ingredient is one of several straight chain lepidopteran pheromone (SCLP) active ingredients in the end use product Isomate-CM/LR TT which contains 1.05% by weight Z-11-tetradecen-1-ol. The product chemistry data submitted by the registrant satisfies the requirements for product.

B. USE/USAGE

Z-11-Tetradecen-1-ol is used in the end use product Isomate-CM/LR TT. The active ingredient is used in an EP for the mating disruption codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*).

C. RISK ASSESSMENT

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices (40 CFR 180.1153).

Toxicology and environmental data requirements for this pheromone product were waived per the OECD publication - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>). This document reports that no risks to human health are expected from the use of lepidopteran pheromones based on the low toxicity in animal testing and the expected low exposure to humans. Furthermore, adverse effects on nontarget organisms are not expected because these pheromones are released in very small quantities in the environment and act on a select group of insects. Appropriate precautionary labeling of end use products will further minimize potential exposure and mitigate risk to nontarget organisms.

The Agency has considered Z-11-Tetradecen-1-ol in light of relevant safety factors in the Food Quality Protection Act (FQPA) of 1996 and under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and determined there will be no unreasonable adverse effects from the use of this product. The Agency is basing its risk management decision regarding the registration of Z-11-Tetradecen-1-ol on the known low toxicity of lepidopteran pheromones, the limited exposure to humans, and the precautionary labeling that minimizes exposure and mitigates risk to nontarget organisms. The Agency believes that end use products containing Z-11-Tetradecen-1-ol can be used without causing unreasonable adverse effects to humans or the environment.

D. DATA GAPS / LABELING RESTRICTIONS

There are no data gaps.

II. OVERVIEW

A. ACTIVE INGREDIENT OVERVIEW

Common Name:	Z-11-Tetradecen-1-ol; or 11-tetradecen-1-ol (Z)-; or 11-(Z)-Tetradecen-1-ol
Chemical Name:	Z-11-Tetradecen-1-ol
Chemical Formula:	C ₁₄ H ₂₈ O
Chemical Family:	Insect attractant, repellent and chemosterilant
Trade and Other Names:	Isomate CM/LR TT
CAS Registry Number:	34010-15-6
OPP Chemical Code:	129021
Manufacturer:	Pacific Biocontrol Corporation 14615 NE 13 th Court, Suite A Suite A Vancouver, WA 98685

B. USE PROFILE

The following is information on the proposed uses with an overview of use sites and application methods.

Type of Pesticide: Synthetic semiochemical insect attractant (mating disrupter)

Use Sites: Apples, pears, quince and other pome fruits; peaches, prunes, plums, nectarines, cherries and other stone fruits; walnut, pecan and other nut crops.

Target Pests: codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosanus*).

Formulation Types: Liquid

Method and Rates of Application: This active ingredient is part of an end-use product (EP) that contains several other SCLP active ingredients. The application rate is 300 dispensers per acre. Do not exceed 150 grams active ingredient per acre per year.

Use Practice Limitations: “Do not exceed 150 grams active ingredient per acre per year.”

C. ESTIMATED USAGE

The compound, Z-11-Tetradecen-1-ol, is part of an end-use product (EP) that contains several other SCLP active ingredients that act as a mating disruptor codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*).

D. DATA REQUIREMENTS

The Agency has supported the registrant's request for waivers from the requirements of studies/data for acute mammalian toxicity and for non-target organism testing. These data were waived based on the following criteria from the OECD publication - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>): 1) low toxicity in animal testing, 2) expected low exposure to humans, 3) no expected risk to human health, 4) no reported adverse effects during more than 10 years of use as pesticides, and 5) no expected adverse effects to nontarget organisms.

Product analysis data requirements for the end-use product were adequately satisfied.

The data requirements for granting this registration under Section 3(c)(5) of FIFRA have been reviewed by the Biopesticides and Pollution Prevention Division (BPPD). Based on the submitted information, the Agency foresees no unreasonable adverse effects to human health and the environment from the use of Z-11-Tetradecen-1-ol as long as it is used as labeled.

E. REGULATORY HISTORY

On May 8, 2006, the Agency received an application from Pacific Biocontrol Corporation, to register the end use product Isomate-CM/LR TT, containing three new active ingredients, 4.34% by weight Z-9 Tetradecen-1-yl Acetate, 1.05% by weight Z-11-Tetradecen-1-ol, and 1.00% by weight Z-11-Tetradecenal. A notice of receipt of the application for registration of Isomate-CM/LR TT containing three new active ingredients, mentioned above, for an end use product for mating disruption codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*) was published in the Federal Register on July 26, 2006.

F. CLASSIFICATION

Z-11-Tetradecen-1-ol is a synthetic straight-chained lepidopteran pheromone and is classified as a biochemical pesticide.

G. FOOD CLEARANCES/TOLERANCES

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

III. SCIENCE ASSESSMENT

A. PHYSICAL/CHEMICAL PROPERTIES ASSESSMENT

All product chemistry data requirements for Z-11-Tetradecen-1-ol have been satisfied.

1. Product Identity and Mode of Action

a. Product Identity: The new active ingredient, Z-11-Tetradecen-1-ol, represents 1.05% by weight of the end use product Isomate-CM/LR TT, which is a light yellow transparent oily liquid with a mild, fatty-fruity odor.

b. Mode of Action: Z-11-Tetradecen-1-ol is a synthetic lepidopteran pheromone. It is used in the end-use product, Isomate-CM/LR TT, to disrupt mating of codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*) by a non-toxic mode of action. .

2. Food Clearances/Tolerances

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

3. Physical and Chemical Properties Assessment

The physical and chemical characteristics of Z-11-Tetradecen-1-ol were submitted to support its registration. These are summarized in Table 1.

Table 2. Product chemistry data requirements			
Guideline No.	Study	Results	MRID No.
151-10 (OPPTS 880.1100)	Product identity	The submitted data satisfy the requirements for product identity.	46832301
151-11 (OPPTS 880.1200)	Manufacturing process	The submitted data satisfy the requirements for the manufacturing process.	46832301
151-12 (OPPTS 880.1400)	Discussion of formation of unintentional ingredients	The submitted data satisfy the requirements for the discussion of the formation of unintentional ingredients.	46832301
151-13 (OPPTS 830.1700)	Analysis of samples	The submitted data satisfy the requirements for the analysis of samples.	46832301
151-15 (OPPTS 830.1750)	Certification of limits	The submitted data satisfy the requirements for the certification of limits.	46832301
151-16 (OPPTS 830.1800)	Analytical method	An acceptable analytical method was submitted.	46832301
Physical/chemical Properties for Z-11-Tetradecen-1-ol			
63-2 (OPPTS 830.6302)	Color	light yellow transparent	46832301
63-3 (OPPTS 830.6303)	Physical State	Oily Liquid	46832301
63-4 (OPPTS 830.6304)	Odor	Mild, fatty-fruity	46832301
63-5 (OPPTS 830.7200)	Melting point	Not applicable, product is a liquid	46832301
63-6 (OPPTS 830.7220)	Boiling point	138-140 °C/520 Pa	46832301
63-7 (OPPTS 830.7300)	Density	Specific gravity = 0.875 at 20 °C	46832301

OPPTS	Property	Requirement	Reference
63-8 (OPPTS 830.7840)	Solubility	Less than 0.0004g/liter water. Soluble in n-hexane, cyclohexane, benzene, toluene, methylene chloride, chloroform, ethyl ether, acetonitrile, THF, acetone, DMF, etc. Insoluble in DMSO and ethylene glycol.	46832301
63-9 (OPPTS 830.7950)	Vapor Pressure	0.16-0.20 Pa at 20°C	46832301
63-10 (OPPTS 830.7370)	Dissociation Constant	No dissociation constant	46832301
63-11 (OPPTS 830.7550)	Octanol/water partition coefficient	4.6 (Log Po/w; at 25°C)	46832301
63-12 (OPPTS 830.7000)	pH	6.0 (at 1000 g/liter of water)	46832301
63-13 (OPPTS 830.6313)	Stability	Stable against sunlight and hydrolysis exposing water.	46832301
63-14 (OPPTS 830.6314)	Oxidation/reduction	Reaction does not occur under normal conditions.	46832301
63-15 (OPPTS 830.6315)	Flammability	Flash point = 130°C	46832301
63-16 (OPPTS 830.6316)	Explodability	No explosion characteristics.	46832301
63-17 (OPPTS 830.6317)	Storage stability	Stable at 5°C conditions at least 5 years	46832301
63-18 (OPPTS 830.7100)	Viscosity	5.34 c.s. (20°C)	46832301
63-19 (OPPTS 830.6319)	Miscibility	Miscible in most common organic solvents except DMSO and ethylene glycol.	46832301
63-20 (OPPTS 830.6320)	Corrosion characteristics	No corrosion characteristics.	46832301
63-21 (OPPTS 830.6321)	Dielectric breakdown voltage	No dielectric breakdown characteristics.	46832301
OPPTS 830.7050	UV/Visible absorption	Not required	

B. HUMAN HEALTH ASSESSMENT

1. Toxicology Assessment

The active ingredient, Z-11-tetradecen-1-ol, is a synthetic lepidopteran pheromone. It is part of the end use product, Isomate-CM/LR TT, which contains several other SCLPs, which is used to disrupt mating of codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*). The registrant requested waivers for all Tier I mammalian

toxicity studies (OPPTS Harmonized Guidelines Series 870/Guidelines 152-10 through 152-23).

The Agency has previously reviewed the mammalian toxicity data and other information submitted for the registrant’s substantially similar products and found it to be adequate for their registration. It is the Agency’s position that based on low toxicity in animal testing, and expected low exposure to humans, no risk to human health is expected from the use of lepidopteran pheromones, and consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). The Agency therefore granted the request for waivers for all Tier I mammalian toxicity studies (Table 2).

TABLE 2. Mammalian toxicity data requirements			
Guideline No.	Study	Results	MRID No.
152-10 (OPPTS 870.1100)	Acute oral toxicity	Waiver accepted	46823200
152-11 (OPPTS 870.1200)	Acute dermal toxicity	Waiver accepted	46823200
152-12 (OPPTS 870.1300)	Acute inhalation toxicity	Waiver accepted	46823200
152-13 (OPPTS 870.2400)	Primary eye irritation	Waiver accepted	46823200
152-14 (OPPTS 870.2500)	Primary dermal irritation	Waiver accepted	46823200
152-15 (OPPTS 870.2600)	Hypersensitivity	Waiver accepted	46823200
152-16 (885.3400)	Hypersensitivity incidents	Incidents must be reported.	46823200
152-17 (OPPTS 870.5100-5395)	Studies to determine genotoxicity	Waiver accepted	46823200
152-20 (OPPTS 870.3100)	90-Day feeding	Waiver accepted	46823200
152-21 (OPPTS 870.3250)	90-Day dermal	Waiver accepted	46823200
152-22 (OPPTS 870.3465)	90-Day inhalation	Waiver accepted	46823200
152-23 (OPPTS 870.3700)	Teratogenicity	Waiver accepted	46823200

2. Dose Response Assessment

Based on available information, no toxicity endpoints were identified.

3. Dietary Exposure and Risk Characterization

This active ingredient is part of the end-use product Isomate-CM/LR TT. The end use product is a dispenser placed in the lateral branches in the upper third of the trees canopy.

This active ingredient is a straight chain lepidopteran pheromone and is exempt from the requirement of a tolerance under 40 CFR 180.1153, and dietary exposure is not a concern. Data waivers were requested by the registrant for all mammalian toxicity studies (Guidelines 152-10 through 152-23) and were granted. Due to the low toxicity of lepidopteran pheromones in animal testing, and the expected low exposure to humans, no risk to human health is expected from the use of lepidopteran pheromones. Consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)).

4. Occupational and Residential Exposure

- a. **Occupational Exposure and Risk Characterization:** The potential for dermal, eye, and inhalation exposures to the pesticide exists for handlers and applicators. Due to the low toxicity of lepidopteran pheromones in animal testing, no purposeful exposure to human skin, and no repeated inhalation exposure to the active ingredient at toxic levels, worker exposure data on Z-11-Tetradecen-1-ol are not required. The Agency will require the appropriate signal word and precautionary statements to mitigate any risk from exposure via these routes.
- b. **Residential, School and Daycare Exposure and Risk Characterization:** No indoor residential, school, or day care uses currently appear on the product label. Although accidental non-dietary exposure at sites where children are present may occur, the health risk is expected to be minimal based on low mammalian toxicity.

5. Drinking Water Exposure and Risk Characterization

This active ingredient is formulated into a dispenser which is placed on the lateral branches in the upper third of the tree canopy. No significant exposure is expected from an accumulation of Z-11-Tetradecen-1-ol in the aquatic environment when it is used according to the precautionary label language.

6. Acute and Dietary Risks for Sensitive Subpopulations, Particularly Infants and Children

The Agency has concluded that the potential for Z-11-Tetradecen-1-ol residues is not a dietary hazard to the general population, including infants and children. This decision was based on low toxicity in animal testing, expected low exposure to humans, no expected risk to human health, and no risk from consumption of food containing residues of these pheromones (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)).

7. Aggregate Exposure from Multiple Routes Including Dermal, Oral and Inhalation

Z-11-Tetradecen-1-ol is a synthetic semiochemical that acts via a non-toxic mode of action on a specific insect pest. Due to the low toxicity of lepidopteran pheromones in animal testing, and the expected low exposure to humans, no risk to human health is expected. Consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). Based on this information, the Agency has concluded that aggregate exposure to Z-11-Tetradecen-1-ol over a lifetime will not pose appreciable risks to human health. Moreover, the toxicity and exposure data are sufficiently complete to adequately address the potential for additional sensitivity of infants and children to residues of Z-11-Tetradecen-1-ol. The Agency has considered the various routes of exposure and potential risks of the product and determined that the proposed use of the active ingredient does not pose significant risk to all populations, including infants and children.

8. Cumulative Effects

Section 408(b)(2)(D)(v) of the FFDCA requires the Agency to consider the cumulative effect of exposure to Z-11-Tetradecen-1-ol and to other substances that have a common mechanism of toxicity. These considerations include the possible cumulative effects of such residues on infants and children. Z-11-Tetradecen-1-ol has a non-toxic mode of action. Thus, there is no indication or any evidence to suggest that this biochemical pesticide shares any common mechanisms of toxicity with other substances. Therefore, cumulative exposure concerns are not anticipated.

9. Effects on the Immune and Endocrine Systems

EPA is required under the FFDCA, as amended by FQPA, to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) may have an effect in humans that is similar to an effect produced by a naturally-occurring estrogen, or other such endocrine effects as the Administrator may designate. Following the recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was scientific basis for including, as part of the program, the androgen and thyroid systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC's recommendation that the program include evaluations of potential effects in wildlife. For pesticide chemicals, EPA will use FIFRA and, to the extent that effects in wildlife may help determine whether a substance may have an effect in humans, FFDCA authority to require the wildlife evaluations. As the science develops and resources allow, screening of additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP).

The Agency is not requiring information on the endocrine effects of the active ingredient, Z-11-Tetradecen-1-ol at this time. The Agency has considered, among other relevant

factors, available information concerning whether the active ingredient may have an effect in humans similar to an effect produced by a naturally occurring estrogen or other endocrine effects. There is no known metabolite that acts as an "endocrine disrupter" produced by this active ingredient. Based on the low potential exposure level associated with the proposed use of this pesticide, the Agency expects no incremental adverse effects to the endocrine or immune systems.

C. ENVIRONMENTAL ASSESSMENT

1. Ecological Effects Hazard Assessment

The registrant requested waivers for the following non-target organism toxicity requirements: Avian Acute Oral Toxicity (GLN 154-6 [OPPTS GLN 850.2100]), Acute Freshwater Fish (GLN 154-8 [OPPTS GLN 850.1075]), Acute Freshwater Invertebrate (GLN 154-9 [OPPTS 850.1010]) The registrant’s data for similar straight-chained lepidopteran pheromones show no toxicity issues for non-target organisms. The Agency has previously reviewed the registrant’s substantially similar products and found that the non-target organism data/information submitted was adequate to support their registration. It is the Agency’s position that adverse effects on non target organisms (mammals, birds, and aquatic organisms) are not expected because these straight-chained lepidopteran pheromones are released in very small amounts to the environment and act on a select group of insects (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). The Agency therefore granted the request for waivers for all non-target organism Tier I (Guidelines 154-6, 154-8 and 154-9) toxicity studies (Table 3). This active ingredient is being registered as part of an end-use product. Non-target organism toxicity testing is not required for end-use product registration. However, it is required for technical grade active ingredient registration. Based on the decision to waive Tier I data requirements, Tier II tests (Guidelines 155-4 through 155-14) and Tier III tests (Guidelines 154-12 through 154-15) were not required.

TABLE 3: Non-target organism toxicity requirements			
Guideline	Study	Results	MRID No.
154-6 (OPPTS 850.2100)	Avian acute oral toxicity	Waiver accepted	46823200
154-8 (OPPTS 850.1075)	Freshwater fish LC ₅₀	Waiver accepted	46823200
154-9 (OPPTS 850.1010)	Freshwater invertebrate LC ₅₀	Waiver accepted	46823200

2. Environmental Fate and Ground Water Data

The need for environmental fate and groundwater data [Tier II, 40 CFR 158.690(d)] was not triggered because the Tier I studies were waived. Risk is minimal due to lack of exposure, low toxicity, and the use pattern (dispensers placed on lateral branches in the upper third of the tree canopy).

3. Ecological Exposure and Risk Characterization

This active ingredient, Z-11-Tetradecen-1-ol, is part of the end-use product Isomate-CM/LR TT. Z-11-Tetradecen-1-ol is a synthetic lepidopteran pheromone that acts on a specific insect and has a non-toxic mode of action. As a result, no toxicology or environmental fate and effects data were deemed necessary for registration. The waiver requests for submitted data for non-target organisms are summarized in Table 3. In addition, mitigating label language will further reduce the risk to aquatic organisms. The precautionary labeling of Isomate-CM/LR TT “For terrestrial uses. Do not apply product directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of this product.”

D. EFFICACY DATA

No efficacy data were required to be submitted to the Agency because no public health uses are involved.

IV. RISK MANAGEMENT DECISION

A. DETERMINATION OF ELIGIBILITY

Section 3(c)(5) of FIFRA provides for the unconditional registration of the end use product, Isomate-CM/LR TT, containing the new active ingredient, Z-11-Tetradecen-1-ol, if it is determined that (A) its composition is such as to warrant the proposed claims for it; (B) its labeling and other materials required to be submitted comply with the requirements of FIFRA; (C) it will perform its intended function without unreasonable adverse effects on the environment; and (D) when used in accordance with widespread and commonly recognized practice, it will not generally cause unreasonable adverse effects on the environment.

To satisfy criteria “A” above, products formulated from the use of this manufacturing use product are not expected to cause unreasonable adverse effects when used according to label instructions. Criteria “B” is satisfied by the current label and by data presented in this document. It is believed that Z-11-Tetradecen-1-ol will not cause any unreasonable adverse effect, and is an effective biochemical pesticide for lepidopteran pests, satisfying Criteria “C.” Criteria “D” is satisfied in that the pesticide is not expected to cause unreasonable adverse effects when used as described on the label. Therefore, Isomate-CM/LR TT, containing the new active ingredient, Z-11-Tetradecen-1-ol, is eligible for an unconditional registration. The end-use product will be used to control lepidopteran pests in/on agricultural commodities.

B. REGULATORY POSITION

1. Unconditional Registration

The data submitted are sufficient for unconditional registration of Isomate-CM/LR TT (EPA Reg No.: 53575-31).

2. Tolerance Reassessment

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

3. Codex Harmonization

There are no Codex harmonization considerations since there is currently no Codex tolerance for residues of Z-11-Tetradecen-1-ol.

4. Nonfood Re/Registrations

This is a new active ingredient and, therefore, not the subject of reregistration at this time.

5. Risk Mitigation

There is minimal to negligible potential for risks to non-target organisms (plants and wildlife) or for ground or surface water contamination through the proposed use of this active ingredient, as one of several SCLP active ingredients, is formulated into and end use product which is a dispenser placed on the lateral branches in the upper third of the tree canopy. Further, should any risks occur from occupational exposure to this active ingredient, appropriate mitigating labeling language for aquatic organisms is required.

6. Endangered Species Statement

The Agency has determined that the active ingredient Z-11-Tetradecen-1-ol will not adversely effect threatened or endangered species when used according to label directions.

C. LABELING RATIONALE

It is the Agency's position that the labeling for the end use product Isomate-CM/LR TT containing 1.05% by weight Z-11-Tetradecen-1-ol complies with the current pesticide labeling requirements.

1. Human Health Hazard

- a. **Worker Protection Standard:** This product does not come under the provisions of the Worker Protection Standards (WPS).
- b. **Non-Worker Protection Standard:** There are no non-WPS human health hazard issues.
- c. **Precautionary Labeling:** The Agency has examined the toxicological data base for Z-11-Tetradecen-1-ol and concluded that the precautionary labeling required during this unconditional registration process (i.e. Signal Word, First Aid Statements, and other label statements) adequately mitigates the risks associated with the proposed uses.
- d. **End Use Product Precautionary Labeling:** For Isomate-CM/LR TT, "CAUTION." "Hazard to humans and domestic animals. Avoid contact with skin, eyes, and clothing. Harmful if absorbed through skin. Cause moderate eye irritation. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco."
- e. **Spray Drift Advisory** No spray drift advisory statement is necessary for this use.

2. Environmental Hazards Labeling

End-Use Product Environmental Hazards Labeling: The following statements are required on the label of this product: "For terrestrial use only. 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 water when disposing of this product."

3. Application Rate

300 dispensers per acre (3.82 fl.oz or 98.44 gm a.i. per application). Apply double rate of dispensers to edges of orchard. Do not exceed 150 gm a.i./acre/year (or 457 dispensers) per acre per year.

D. LABELING

ACTIVE INGREDIENT

(E,E)-8,10-Dodecadien-1-ol.....	38.62%
1-Dodecanol.....	6.00%
1-Tetradecanol.....	1.40%
Z-11-Tetradecen-1-yl Acetate.....	38.04%
Z-9-Tetradecen-1-yl Acetate.....	4.34%
Z-11-Tetradecen-1-ol.....	1.05%
Z-11-Tetradecenal.....	1.00%
Other ingredients.....	9.55%
Total.....	100.00%

The end use product label shall comply with Agency labeling requirements and must contain the following information:

- Product name
- Ingredient statement
- Registration number
- “Keep out of reach of children”
- Signal word (CAUTION)
- Precautionary statements

V. ACTIONS REQUIRED BY REGISTRANTS

Registrants are required to provide reports of incidents of adverse effects to humans or domestic animals under FIFRA, Section 6(a)(2) and incidents of hypersensitivity under 40 CFR Part 158.690(c), guideline reference number 152-16. There are no data requirements, label changes and other responses necessary for the reregistration of the product since the product is being registered after November 1984 and is, therefore, not subject to reregistration. For the same reason, there are also no existing stocks provisions at this time.

VI. APPENDIX A

Table 4 lists the use sites for the product. The label for the product is also attached.

TABLE 4: End Use Registration/Reregistration	
Isomate-CM/LR TT	Official date registered:
<u>Use sites:</u> Apples, pears, quince and other pome fruits; peaches, prunes, plums, nectarines, cherries and other stone fruits; walnut, pecan and other tree nut crops.	

APPENDIX B – REFERENCES

Lepidopteran Pheromones Fact Sheet issued 09/01. U.S. EPA.

http://www.epa.gov/oppbppd1/biopesticides/ingredient/factsheets/factsheet_lep_pheromones.htm

Bolan, K.A. Application for Registration of Isomate-CM/LR TT: A Biochemical Mating Disruptant Twin Tube for Codling Moth and Leafroller moth, Volume 2 Product Properties for Biochemical Pesticides. Pacific Biocontrol Corporation, 14615 NE 13th Court, Suite A Vancouver, WA 98685. April 17, 2006. MRID 46832301.

Touhey, J.G. (1990) “A review of the current bases for the United States Environmental Protection Agency’s policies for the regulation of pheromones and other semiochemicals, together with a review of the available relevant data which may impact the assessment of risk for these classes of chemicals. Part No. 1, Straight Chain Alcohols, Acetate Esters and Aldehydes”. (Unpublished report, 474 pp.)

CHAPTER 6

Z-11-TETRADECENAL
(PC Code 120011)

I. EXECUTIVE SUMMARY

A. IDENTITY

The new active ingredient Z-11-Tetradecenal is a synthetic straight-chained lepidopteran pheromone. This active ingredient is one of several straight chain lepidopteran pheromone (SCLP) active ingredients in the end use product Isomate-CM/LR TT which contains 1.05% by weight Z-11-Tetradecenal. The product chemistry data submitted by the registrant satisfies the requirements for product.

B. USE/USAGE

Z-11-Tetradecenal is used in the end use product Isomate-CM/LR TT. The active ingredient is used in an EP for the mating disruption codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*).

C. RISK ASSESSMENT

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices (40 CFR 180.1153).

Toxicology and environmental data requirements for this pheromone product were waived per the OECD publication - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>). This document reports that no risks to human health are expected from the use of lepidopteran pheromones based on the low toxicity in animal testing and the expected low exposure to humans. Furthermore, adverse effects on nontarget organisms are not expected because these pheromones are released in very small quantities in the environment and act on a select group of insects. Appropriate precautionary labeling of end use products will further minimize potential exposure and mitigate risk to nontarget organisms.

The Agency has considered Z-11-Tetradecenal in light of relevant safety factors in the Food Quality Protection Act (FQPA) of 1996 and under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and determined there will be no unreasonable adverse effects from the use of this product. The Agency is basing its risk management decision regarding the registration of Z-11-Tetradecenal on the known low toxicity of lepidopteran pheromones, the limited exposure to humans, and the precautionary labeling that minimizes exposure and mitigates risk to nontarget organisms. The Agency believes that end use products containing Z-11-Tetradecenal can be used without causing unreasonable adverse effects to humans or the environment.

D. DATA GAPS / LABELING RESTRICTIONS

There are no data gaps.

II. OVERVIEW

A. ACTIVE INGREDIENT OVERVIEW

Common Name:	Z-11-Tetradecenal or (Z)-11-Tetradecenal; or 11-tetradecenal (Z)-
Chemical Name:	Z-11-Tetradecenal
Chemical Formula:	C ₁₄ H ₂₆ O
Chemical Family:	Insect attractant, repellent and chemosterilant
Trade and Other Names:	Isomate CM/LR TT
CAS Registry Number:	35237-64-0
OPP Chemical Code:	120011
Manufacturer:	Pacific Biocontrol Corporation 14615 NE 13 th Court Suite A Vancouver, WA 98685

B. USE PROFILE

The following is information on the proposed uses with an overview of use sites and application methods.

Type of Pesticide: Synthetic semiochemical insect attractant (mating disrupter)

Use Sites: Apples, pears, quince and other pome fruits; peaches, prunes, plums, nectarines, cherries and other stone fruits; walnut, pecan and other nut crops.

Target Pests: codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosanus*).

Formulation Types: Liquid

Method and Rates of Application: This active ingredient is part of an end-use product (EP) that contains several other SCLP active ingredients. The application rate is 300 dispensers per acre. Do not exceed 150 grams active ingredient per acre per year.

Use Practice Limitations: “Do not exceed 150 grams active ingredient per acre per year.”

C. ESTIMATED USAGE

The compound, Z-11-Tetradecenal, is part of an end-use product (EP) that contains several other SCLP active ingredients that act as a mating disruptor codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*).

D. DATA REQUIREMENTS

The Agency has supported the registrant's request for waivers from the requirements of studies/data for acute mammalian toxicity and for non-target organism testing. These data were waived based on the following criteria from the OECD publication - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>): 1) low toxicity in animal testing, 2) expected low exposure to humans, 3) no expected risk to human health, 4) no reported adverse effects during more than 10 years of use as pesticides, and 5) no expected adverse effects to nontarget organisms.

Product analysis data requirements for the end-use product were adequately satisfied.

The data requirements for granting this registration under Section 3(c)(5) of FIFRA have been reviewed by the Biopesticides and Pollution Prevention Division (BPPD). Based on the submitted information, the Agency foresees no unreasonable adverse effects to human health and the environment from the use of Z-11-Tetradecenal as long as it is used as labeled.

E. REGULATORY HISTORY

On May 8, 2006, the Agency received an application from Pacific Biocontrol Corporation, to register the end use product Isomate-CM/LR TT, containing three new active ingredients, 4.34% by weight Z-9 Tetradecen-1-yl Acetate, 1.05% by weight Z-11-Tetradecenal, and 1.00% by weight Z-11-Tetradecenal. A notice of receipt of the application for registration of Isomate-CM/LR TT containing three new active ingredients, mentioned above, for an end use product for mating disruption codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*) was published in the Federal Register on July 26, 2006.

F. CLASSIFICATION

Z-11-Tetradecenal is a synthetic straight-chained lepidopteran pheromone and is classified as a biochemical pesticide.

G. FOOD CLEARANCES/TOLERANCES

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

III. SCIENCE ASSESSMENT

A. PHYSICAL/CHEMICAL PROPERTIES ASSESSMENT

All product chemistry data requirements for Z-11-Tetradecenal have been satisfied.

1. Product Identity and Mode of Action

a. Product Identity: The new active ingredient, Z-11-Tetradecenal, represents 1.00% by weight of the end use product Isomate-CM/LR TT, which is a light yellow transparent oily liquid with a mild, fatty-fruity odor.

b. Mode of Action: Z-11-Tetradecenal is a synthetic lepidopteran pheromone. It is used in the end-use product, Isomate-CM/LR TT, to disrupt mating of codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European leafroller (*Archips rosamus*) by a non-toxic mode of action. .

2. Food Clearances/Tolerances

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

3. Physical and Chemical Properties Assessment

The physical and chemical characteristics of Z-11-Tetradecenal were submitted to support its registration. These are summarized in Table 1.

Table 3. Product chemistry data requirements			
Guideline No.	Study	Results	MRID No.
151-10 (OPPTS 880.1100)	Product identity	The submitted data satisfy the requirements for product identity.	46832301
151-12 (OPPTS 880.1400)	Discussion of formation of unintentional ingredients	The submitted data satisfy the requirements for the discussion of the formation of unintentional ingredients.	46832301
151-13 (OPPTS 830.1700)	Analysis of samples	The submitted data satisfy the requirements for the analysis of samples.	46832301
151-15 (OPPTS 830.1750)	Certification of limits	The submitted data satisfy the requirements for the certification of limits.	46832301
151-16 (OPPTS 830.1800)	Analytical method	An acceptable analytical method was submitted.	46832301
Physical/chemical Properties for Z-11-Tetradecenal			
63-2 (OPPTS 830.6302)	Color	light yellow transparent	46832301
63-3 (OPPTS 830.6303)	Physical State	Oily Liquid	46832301
63-4 (OPPTS 830.6304)	Odor	Mild, fatty-fruity	46832301
63-5 (OPPTS 830.7200)	Melting point	Not applicable, product is a liquid	46832301
63-6 (OPPTS 830.7220)	Boiling point	116-122 °C/390 Pa	46832301
63-7 (OPPTS 830.7300)	Density	Specific gravity = 0.848 at 20 °C	46832301

Product ID	Property	Requirement	Reference
63-8 (OPPTS 830.7840)	Solubility	Less than 0.004g/liter water. Soluble in n-hexane, cyclohexane, benzene, toluene, methylene chloride, chloroform, ethyl ether, acetonitrile, THF, acetone, DMF, etc. Insoluble in DMSO and ethylene glycol.	46832301
63-9 (OPPTS 830.7950)	Vapor Pressure	2.0-2.6 Pa at 20°C	46832301
63-10 (OPPTS 830.7370)	Dissociation Constant	No dissociation constant	46832301
63-11 (OPPTS 830.7550)	Octanol/water partition coefficient	More than 4.0 (Log Po/w; at 25°C)	46832301
63-12 (OPPTS 830.7000)	pH	6.0 (at 1000 g/liter of water)	46832301
63-13 (OPPTS 830.6313)	Stability	Stable against sunlight and hydrolysis exposing water.	46832301
63-14 (OPPTS 830.6314)	Oxidation/reduction	Reaction does not occur in normal conditions.	46832301
63-15 (OPPTS 830.6315)	Flammability	Flash point = 136°C	46832301
63-16 (OPPTS 830.6316)	Explodability	No explosion characteristics	46832301
63-17 (OPPTS 830.6317)	Storage stability	Stable at 5°C conditions at least 1 year.	46832301
63-18 (OPPTS 830.7100)	Viscosity	5.34 c.s. (20°C)	46832301
63-19 (OPPTS 830.6319)	Miscibility	Miscible in most common organic solvents except DMSO and ethylene glycol.	46832301
63-20 (OPPTS 830.6320)	Corrosion characteristics	No corrosion characteristics	46832301
63-21 (OPPTS 830.6321)	Dielectric breakdown voltage	No dielectric breakdown characteristics.	46832301
OPPTS 830.7050	UV/Visible absorption	Not required	

B. HUMAN HEALTH ASSESSMENT

1. Toxicology Assessment

The active ingredient, Z-11-Tetradecenal, is a synthetic lepidopteran pheromone. It is part of the end use product, Isomate-CM/LR TT, which contains several other SCLPs, which is used to disrupt mating of codling moth (*Cydia pomonella*), obliquebanded leafroller (*Choristoneura rosaceana*), pandemis leafroller (*Pandemis pyrusana*), fruittree leafroller (*Archips argyrospilus*), threelined leafroller (*Pandemis limitata*), and European

leafroller (*Archips rosamus*). The registrant requested waivers for all Tier I mammalian toxicity studies (Guidelines 152-10 through 152-23).

The Agency has previously reviewed the mammalian toxicity data and other information submitted for the registrant’s substantially similar products and found it to be adequate for their registration. It is the Agency’s position that based on low toxicity in animal testing, and expected low exposure to humans, no risk to human health is expected from the use of lepidopteran pheromones, and consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). The Agency therefore granted the request for waivers for all Tier I mammalian toxicity studies (Table 2).

TABLE 2. Mammalian toxicity data requirements			
Guideline No.	Study	Results	MRID No.
152-10 (OPPTS 870.1100)	Acute oral toxicity	Waiver accepted	46823200
152-11 (OPPTS 870.1200)	Acute dermal toxicity	Waiver accepted	46823200
152-12 (OPPTS 870.1300)	Acute inhalation toxicity	Waiver accepted	46823200
152-13 (OPPTS 870.2400)	Primary eye irritation	Waiver accepted	46823200
152-14 (OPPTS 870.2500)	Primary dermal irritation	Waiver accepted	46823200
152-15 (OPPTS 870.2600)	Hypersensitivity	Waiver accepted	46823200
152-16 (885.3400)	Hypersensitivity incidents	Incidents must be reported.	46823200
152-17 (OPPTS 870.5100-5395)	Studies to determine genotoxicity	Waiver accepted	46823200
152-20 (OPPTS 870.3100)	90-Day feeding	Waiver accepted	46823200
152-21 (OPPTS 870.3250)	90-Day dermal	Waiver accepted	46823200
152-22 (OPPTS 870.3465)	90-Day inhalation	Waiver accepted	46823200
152-23 (OPPTS 870.3700)	Teratogenicity	Waiver accepted	46823200

2. Dose Response Assessment

Based on available information, no toxicity endpoints were identified.

3. Dietary Exposure and Risk Characterization

This active ingredient is part of the end-use product Isomate-CM/LR TT. The end use product is a dispenser placed in the lateral branches in the upper third of the trees canopy.

This active ingredient is a straight chain lepidopteran pheromone and is exempt from the requirement of a tolerance under 40 CFR 180.1153, and dietary exposure is not a concern. Data waivers were requested by the registrant for all mammalian toxicity studies (OPPTS Harmonized Guidelines Series 870/Guidelines 152-10 through 152-23) and were granted. Due to the low toxicity of lepidopteran pheromones in animal testing, and the expected low exposure to humans, no risk to human health is expected from the use of lepidopteran pheromones. Consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)).

4. Occupational and Residential Exposure

- a. Occupational Exposure and Risk Characterization:** The potential for dermal, eye, and inhalation exposures to the pesticide exists for handlers and applicators. Due to the low toxicity of lepidopteran pheromones in animal testing, no purposeful exposure to human skin, and no repeated inhalation exposure to the active ingredient at toxic levels, worker exposure data on Z-11-Tetradecenal are not required. The Agency will require the appropriate signal word and precautionary statements to mitigate any risk from exposure via these routes.
- b. Residential, School and Daycare Exposure and Risk Characterization:** No indoor residential, school, or day care uses currently appear on the product label. Although accidental non-dietary exposure at sites where children are present may occur, the health risk is expected to be minimal based on low mammalian toxicity.

5. Drinking Water Exposure and Risk Characterization

This active ingredient is formulated into a dispenser which is placed on the lateral braches in the upper third of the tree canopy. No significant exposure is expected from an accumulation of Z-11-Tetradecenal in the aquatic environment when it is used according to the precautionary label language.

6. Acute and Dietary Risks for Sensitive Subpopulations, Particularly Infants and Children

The Agency has concluded that the potential for Z-11-Tetradecenal residues is not a dietary hazard to the general population, including infants and children. This decision was based on low toxicity in animal testing, expected low exposure to humans, no expected risk to human health, and no risk from consumption of food containing residues of these pheromones (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)).

7. Aggregate Exposure from Multiple Routes Including Dermal, Oral and Inhalation

Z-11-Tetradecenal is a synthetic semiochemical that acts via a non-toxic mode of action on a specific insect pest. Due to the low toxicity of lepidopteran pheromones in animal testing, and the expected low exposure to humans, no risk to human health is expected. Consumption of food containing residues of these pheromones presents no risk (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). Based on this information, the Agency has concluded that aggregate exposure to Z-11-Tetradecenal over a lifetime will not pose appreciable risks to human health. Moreover, the toxicity and exposure data are sufficiently complete to adequately address the potential for additional sensitivity of infants and children to residues of Z-11-Tetradecenal. The Agency has considered the various routes of exposure and potential risks of the product and determined that the proposed use of the active ingredient does not pose significant risk to all populations, including infants and children.

8. Cumulative Effects

Section 408(b)(2)(D)(v) of the FFDCA requires the Agency to consider the cumulative effect of exposure to Z-11-Tetradecenal and to other substances that have a common mechanism of toxicity. These considerations include the possible cumulative effects of such residues on infants and children. Z-11-Tetradecenal has a non-toxic mode of action. Thus, there is no indication or any evidence to suggest that this biochemical pesticide shares any common mechanisms of toxicity with other substances. Therefore, cumulative exposure concerns are not anticipated.

9. Effects on the Immune and Endocrine Systems

EPA is required under the FFDCA, as amended by FQPA, to develop a screening program to determine whether certain substances (including all pesticide active and other ingredients) may have an effect in humans that is similar to an effect produced by a naturally-occurring estrogen, or other such endocrine effects as the Administrator may designate. Following the recommendations of its Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), EPA determined that there was scientific basis for including, as part of the program, the androgen and thyroid systems, in addition to the estrogen hormone system. EPA also adopted EDSTAC's recommendation that the program include evaluations of potential effects in wildlife. For pesticide chemicals, EPA will use FIFRA and, to the extent that effects in wildlife may help determine whether a substance may have an effect in humans, FFDCA authority to require the wildlife evaluations. As the science develops and resources allow, screening of additional hormone systems may be added to the Endocrine Disruptor Screening Program (EDSP).

The Agency is not requiring information on the endocrine effects of the active ingredient, Z-11-Tetradecenal at this time. The Agency has considered, among other relevant factors, available information concerning whether the active ingredient may have an effect in

humans similar to an effect produced by a naturally occurring estrogen or other endocrine effects. There is no known metabolite that acts as an "endocrine disrupter" produced by this active ingredient. Based on the low potential exposure level associated with the proposed use of this pesticide, the Agency expects no incremental adverse effects to the endocrine or immune systems.

C. ENVIRONMENTAL ASSESSMENT

1. Ecological Effects Hazard Assessment

The registrant requested waivers for the following non-target organism toxicity requirements: Avian Acute Oral Toxicity (GLN 154-6 [OPPTS GLN 850.2100]), Acute Freshwater Fish (GLN 154-8 [OPPTS GLN 850.1075]), Acute Freshwater Invertebrate (GLN 154-9 [OPPTS 850.1010]) The registrant’s data for similar straight-chained lepidopteran pheromones show no toxicity issues for non-target organisms. The Agency has previously reviewed the registrant’s substantially similar products and found that the non-target organism data/information submitted was adequate to support their registration. It is the Agency’s position that adverse effects on non target organisms (mammals, birds, and aquatic organisms) are not expected because these straight-chained lepidopteran pheromones are released in very small amounts to the environment and act on a select group of insects (OECD - Guidance for Registration Requirements for Pheromones and Other Semiochemicals Used for Pest Control (<http://www.epa.gov/pesticides/biopesticides/regtools/index.htm>)). The Agency therefore granted the request for waivers for all non-target organism Tier I (Guidelines 154-6, 154-8 and 154-9) toxicity studies (Table 3). This active ingredient is being registered as part of an end-use product. Non-target organism toxicity testing is not required for end-use product registration. However, it is required for technical grade active ingredient registration. Based on the decision to waive Tier I data requirements, Tier II tests (Guidelines 155-4 through 155-14) and Tier III tests (Guidelines 154-12 through 154-15) were not required.

TABLE 3: Non-target organism toxicity requirements			
Guideline	Study	Results	MRID No.
154-6 (OPPTS 850.2100)	Avian acute oral toxicity	Waiver accepted	46823200
154-8 (OPPTS 850.1075)	Freshwater fish LC ₅₀	Waiver accepted	46823200
154-9 (OPPTS 850.1010)	Freshwater invertebrate LC ₅₀	Waiver accepted	46823200

2. Environmental Fate and Ground Water Data

The need for environmental fate and groundwater data [Tier II, 40 CFR 158.690(d)] was not triggered because the Tier I studies were waived. Risk is minimal due to lack of exposure, low toxicity, and the use pattern (dispensers placed on lateral branches in the upper third of the tree canopy).

3. Ecological Exposure and Risk Characterization

This active ingredient, Z-11-Tetradecenal, is part of the end-use product Isomate-CM/LR TT. Z-11-Tetradecenal is a synthetic lepidopteran pheromone that acts on a specific insect and has a non-toxic mode of action. As a result, no toxicology or environmental fate and effects data were deemed necessary for registration. The waiver requests for submitted data for non-target organisms are summarized in Table 3. In addition, mitigating label language will further reduce the risk to aquatic organisms. The precautionary labeling of Isomate-CM/LR TT “For terrestrial uses. Do not apply product directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of this product.”

D. EFFICACY DATA

No efficacy data were required to be submitted to the Agency because no public health uses are involved.

IV. RISK MANAGEMENT DECISION

A. DETERMINATION OF ELIGIBILITY

Section 3(c)(5) of FIFRA provides for the unconditional registration of the end use product, Isomate-CM/LR TT, containing the new active ingredient, Z-11-Tetradecenal, if it is determined that (A) its composition is such as to warrant the proposed claims for it; (B) its labeling and other materials required to be submitted comply with the requirements of FIFRA; (C) it will perform its intended function without unreasonable adverse effects on the environment; and (D) when used in accordance with widespread and commonly recognized practice, it will not generally cause unreasonable adverse effects on the environment.

To satisfy criteria “A” above, products formulated from the use of this manufacturing use product are not expected to cause unreasonable adverse effects when used according to label instructions. Criteria “B” is satisfied by the current label and by data presented in this document. It is believed that Z-11-Tetradecenal will not cause any unreasonable adverse effect, and is an effective biochemical pesticide for lepidopteran pests, satisfying Criteria “C.” Criteria “D” is satisfied in that the pesticide is not expected to cause unreasonable adverse effects when used as described on the label. Therefore, Isomate-CM/LR TT, containing the new active ingredient, Z-11-Tetradecenal, is eligible for an unconditional registration. The end-use product will be used to control lepidopteran pests in/on agricultural commodities.

B. REGULATORY POSITION

1. Unconditional Registration

The data submitted are sufficient for unconditional registration of Isomate-CM/LR TT (EPA Reg No.: 53575-31).

2. Tolerance Reassessment

Straight-chained lepidopteran pheromones are exempt from the requirement of a tolerance in or on all raw agricultural commodities when applied to growing crops at a rate not to exceed 150 grams of active ingredient/acre/year in accordance with good agricultural practices and indoor post-harvest treatment in or on all stored food commodities when applied/used at a rate not to exceed 3.5 grams active ingredient (AI)/1,000 square feet/year (equivalent of 150 grams AI/acre/year) in accordance with good agricultural practices use practices (40 CFR 180.1153).

3. Codex Harmonization

There are no Codex harmonization considerations since there is currently no Codex tolerance for residues of Z-11-Tetradecenal.

4. Nonfood Re/Registrations

This is a new active ingredient and, therefore, not the subject of reregistration at this time.

5. Risk Mitigation

There is minimal to negligible potential for risks to non-target organisms (plants and wildlife) or for ground or surface water contamination through the proposed use of this active ingredient, as one of several SCLP active ingredients, is formulated into an end use product which is a dispenser placed on the lateral branches in the upper third of the tree canopy. Further, should any risks occur from occupational exposure to this active ingredient, appropriate mitigating labeling language for aquatic organisms is required.

6. Endangered Species Statement

The Agency has determined that the active ingredient Z-11-Tetradecenal will not adversely effect threatened or endangered species when used according to label directions.

C. LABELING RATIONALE

It is the Agency's position that the labeling for the end use product Isomate-CM/LR TT containing 1.00% by weight Z-11-Tetradecenal complies with the current pesticide labeling requirements.

1. Human Health Hazard

- a. **Worker Protection Standard:** This product does not come under the provisions of the Worker Protection Standards (WPS).
- b. **Non-Worker Protection Standard:** There are no non-WPS human health hazard issues.
- c. **Precautionary Labeling:** The Agency has examined the toxicological data base for Z-11-Tetradecenal and concluded that the precautionary labeling required during this unconditional registration process (i.e. Signal Word, First Aid Statements, and other label statements) adequately mitigates the risks associated with the proposed uses.
- d. **End Use Product Precautionary Labeling:** For Isomate-CM/LR TT, "CAUTION." "Hazard to humans and domestic animals. Avoid contact with skin, eyes, and clothing. Harmful if absorbed through skin. Cause moderate eye irritation. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco."
- e. **Spray Drift Advisory** No spray drift advisory statement is necessary for this use.

2. Environmental Hazards Labeling

End-Use Product Environmental Hazards Labeling: The following statements are required on the label of this product: "For terrestrial use only. 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 water when disposing of this product."

3. Application Rate

300 dispensers per acre (3.82 fl.oz or 98.44 gm a.i. per application). Apply double rate of dispensers to edges of orchard. Do not exceed 150 gm a.i./acre/year (or 457 dispensers) per acre per year.

D. LABELING

ACTIVE INGREDIENT

(E,E)-8,10-Dodecadien-1-ol.....	38.62%
1-Dodecanol.....	6.00%
1-Tetradecanol.....	1.40%
Z-11-Tetradecen-1-yl Acetate.....	38.04%
Z-9-Tetradecen-1-yl Acetate.....	4.34%
Z-11-Tetradecen-1-ol.....	1.05%
Z-11-Tetradecenal.....	1.00%
Other ingredients.....	9.55%
Total.....	100.00%

The end use product label shall comply with Agency labeling requirements and must contain the following information:

- Product name
- Ingredient statement
- Registration number
- “Keep out of reach of children”
- Signal word (CAUTION)
- Precautionary statements

V. ACTIONS REQUIRED BY REGISTRANTS

Registrants are required to provide reports of incidents of adverse effects to humans or domestic animals under FIFRA, Section 6(a)(2) and incidents of hypersensitivity under 40 CFR Part 158.690(c), guideline reference number 152-16. There are no data requirements, label changes and other responses necessary for the reregistration of the product since the product is being registered after November 1984 and is, therefore, not subject to reregistration. For the same reason, there are also no existing stocks provisions at this time.

VI. APPENDIX A

Table 4 lists the use sites for the product. The label for the product is also attached.

TABLE 4: End Use Registration/Reregistration	
Isomate-CM/LR TT	Official date registered:
<u>Use sites:</u> Apples, pears, quince and other pome fruits; peaches, prunes, plums, nectarines, cherries and other stone fruits; walnut, pecan and other tree nut crops.	

APPENDIX B – REFERENCES

Lepidopteran Pheromones Fact Sheet issued 09/01. U.S. EPA.

http://www.epa.gov/oppbppd1/biopesticides/ingredient/factsheets/factsheet_lep_pheromones.htm

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