

# Volatile Organic Emissions from Non-Fumigant Pesticides



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**What are V.O.C.'s?**

**Volatile organic compounds**



**What is the problem with V.O.C.'s?**

**V.O.C.'s contribute to the formation  
of ground level ozone (smog)**

**So, what is the issue?**



**The Federal Clean Air Act requires each state to submit a State Implementation Plan (SIP) for achieving and maintaining federal ambient air quality standards, including the standard for ozone.**

**The California areas which did not meet the federal or state ambient air quality standards are called Non-Attainment Areas (NAAs)**

**California's Air Resources Board (ARB) and DPR developed a plan to track and reduce pesticidal sources of VOC's in NAAs.**

**DPR is responsible for agricultural and commercial structural pesticide products, and ARB is responsible for pesticides in consumer products.**



**Where are the NAA's ?**

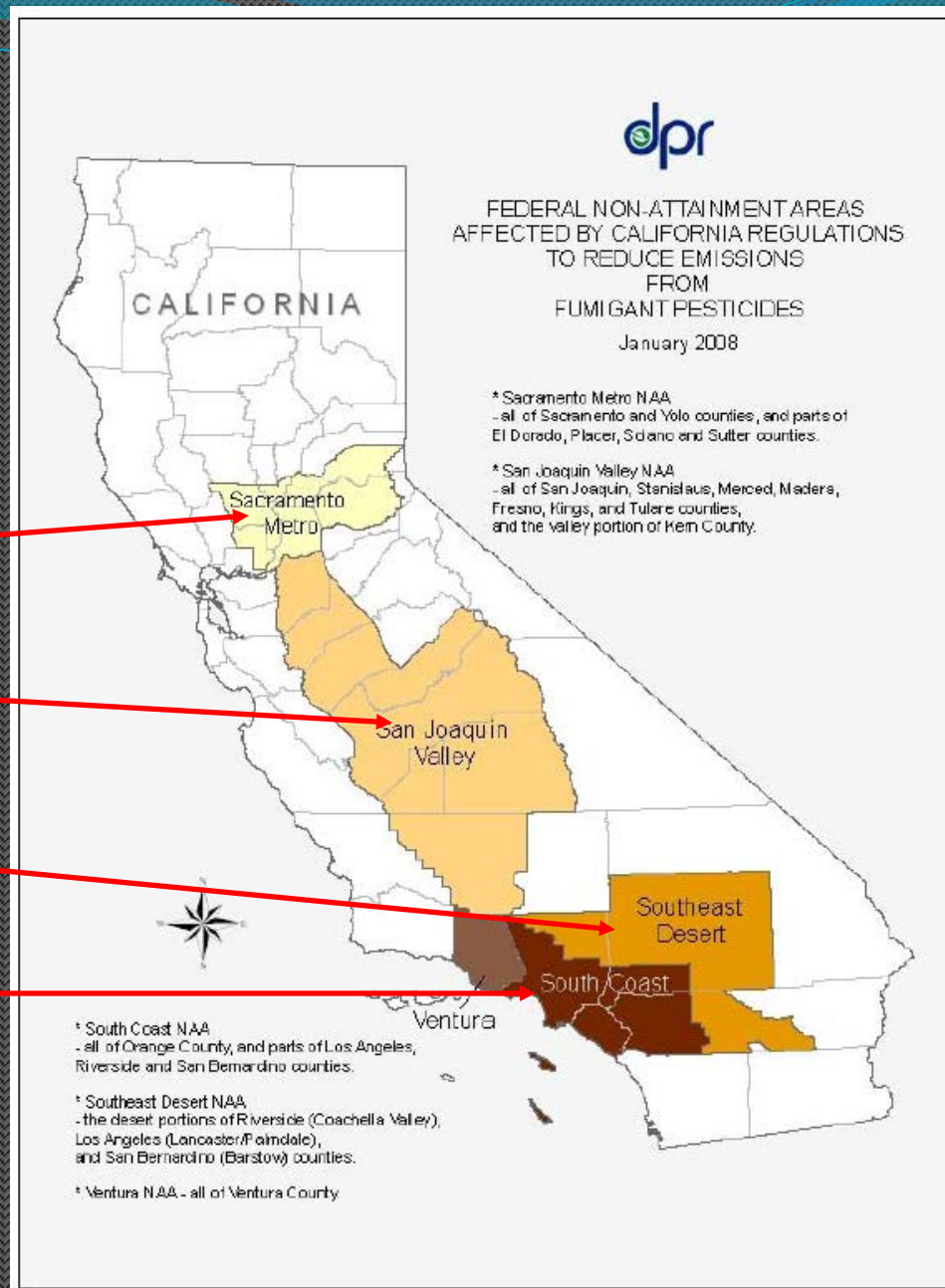
There are four  
Non-Attainment Areas:

Sacramento Metro

San Joaquin Valley

Southeast Desert

South Coast



# What has DPR done so far to have agriculture comply with the Clean Air Act?

**Implemented regulations to limit V.O.C. emissions in field soil fumigants in the NAA's such as:**

**Designed regulations to maintain V.O.C below a target level from May until October.**



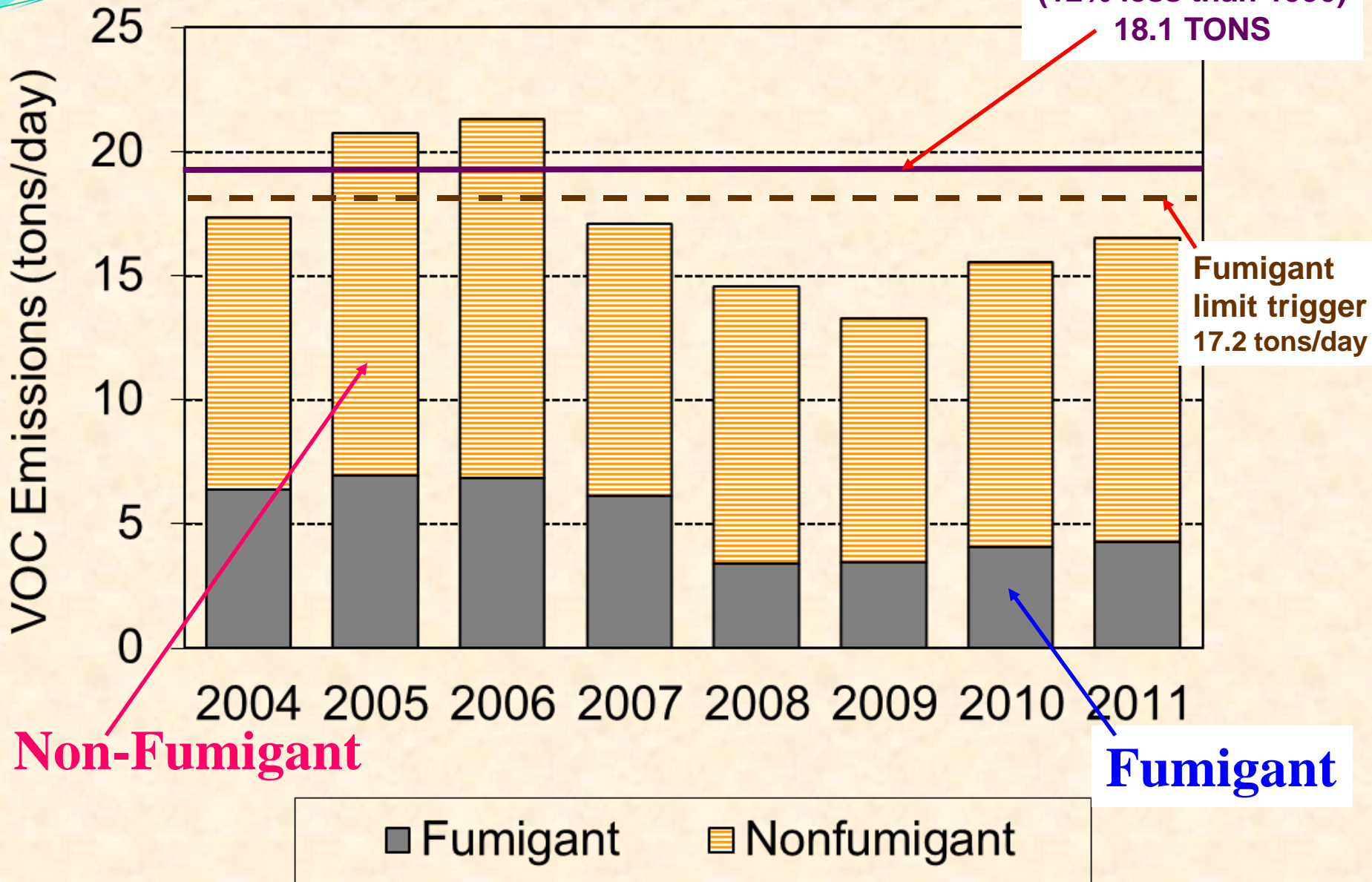
**Certain high emission application methods are prohibited while allowing low emission methods.**

**How much does the State Implementation Plan expect California to reduce pesticidal V.O.C.'s?**

**12 - 20% depending on the NAA from 1990 levels or 18.1 tons per day.**

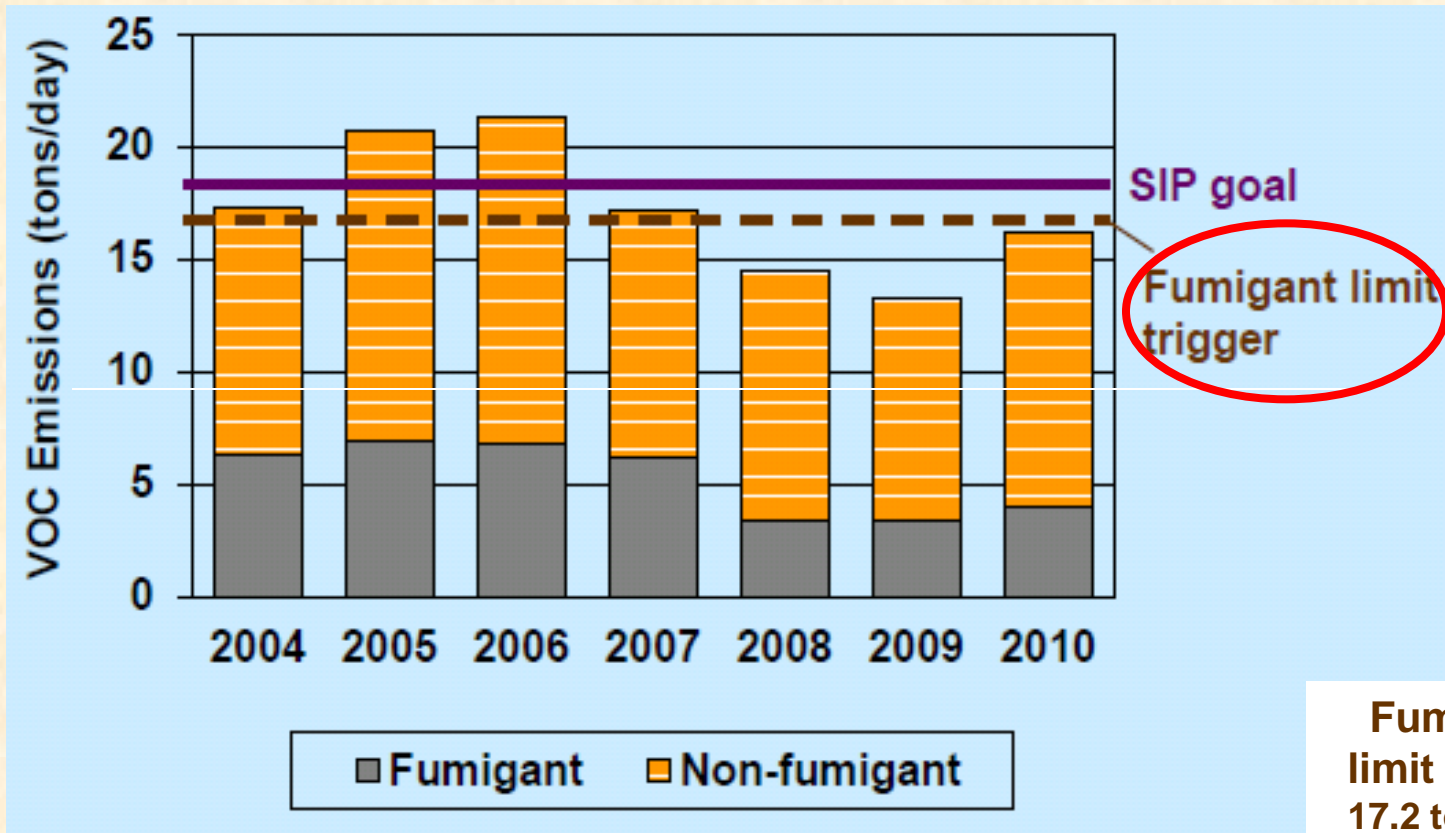


**How does the San Joaquin Valley stand in compliance with V.O.C. emission Compliance?**



**In order to avoid fumigant prohibitions, the tons per day of fumigant use must be below the trigger level.**

**If above the trigger level, DPR will implement allocations on usage of the regulated V.O.C pesticides**





# What are **NON-FUMIGANT V.O.C. pesticides**?



Pesticides formulations, such as emulsifiable concentrates, that contain solvents which have higher V.O.C. emissions.



**Which non-fumigant V.O.C. pesticides does DPR designate as a high V.O.C. product?**

**Products with the active ingredients of:**

**Abamectin**

**Chlorpyrifos**

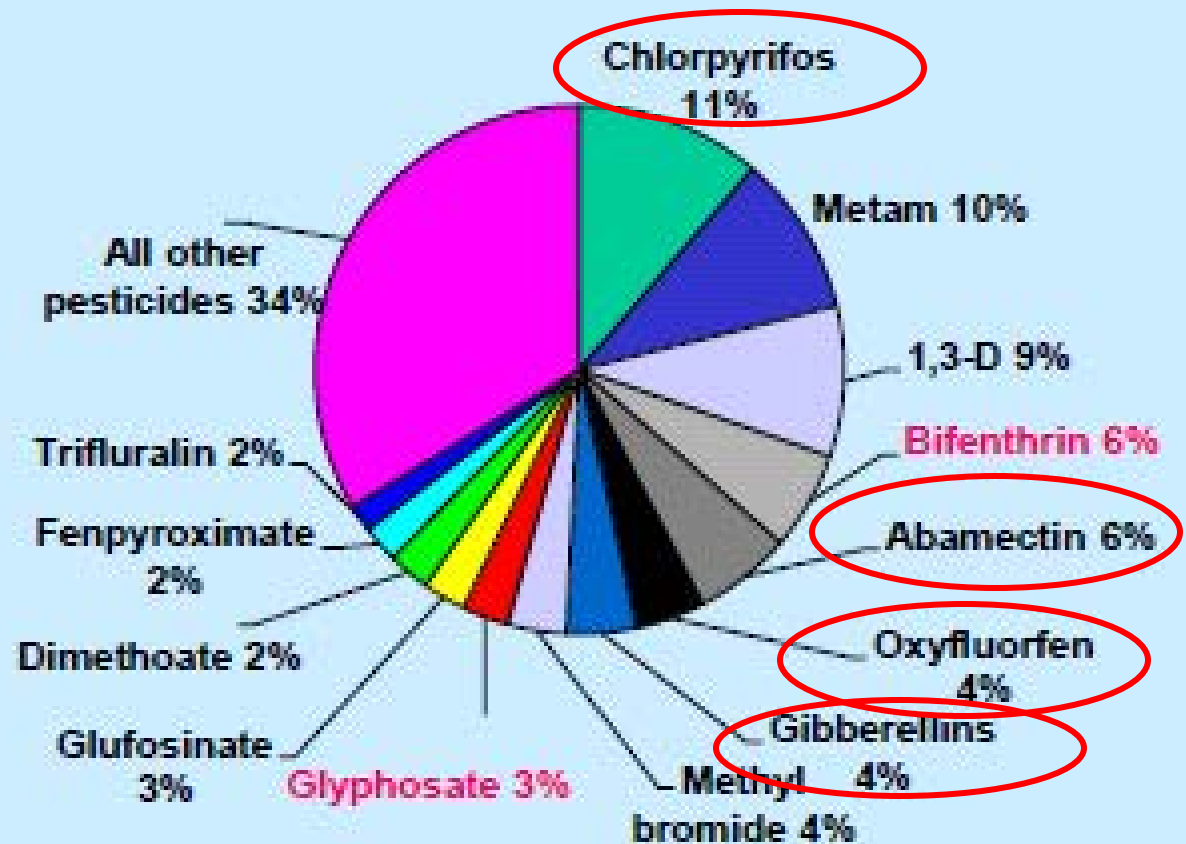
**(Lorsban, Lock-On)**

**Gibberellins**

**Oxyfluorfen (Goal)**


# Top VOC pesticides for San Joaquin Valley 2010

How Much of  
these products  
are used in the  
San Joaquin  
Valley?



**Are all of the pesticides with these active ingredients affected?**

**NO, only those high V.O.C. products that exceed the Emission Potential Threshold.**



<b>Primary Active Ingredient</b>	<b>Emission Potential (EP) Threshold (%)</b>
Abamectin	35
Chlorpyrifos	25
Gibberellins	25
Oxyfluorfen	15

# Is there a list of the high and low V.O.C. products and where can I find it?

**YES, go to the DPR Home page and click on the A-Z Index, then click on VOC Non-fumigant regulations**

[A](#) | [B](#) | [C](#) | [D](#) | [E](#) | [F](#) | [G](#) | [H](#) | [I](#) | [J](#) | [K](#) | [L](#) | [M](#) | [N](#) | [O](#) | [P](#) | [Q](#) | [R](#) | [S](#) | [T](#) | [U](#) | [V](#) | [W](#)

## V

[Violations, licensee administrative and civil penalties](#)

[VOC nonfumigant regulations](#)

→ [List of high-VOC, low-VOC, and excluded products](#)

[VOC fumigant regulations](#)

[Volatile Organic Compound \(VOC\) Emissions from Pesticides Project](#)

[Voluntary cancellation form \(registration\), PDF](#)

YES, go to the DPR Home page and click on the A-Z Index, then click on VOC Non-fumigant regulations. Click on Criteria and Lists of High-V.O.C., Low V.O.C., and excluded products

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### Reducing VOC Emissions from Nonfumigant Pesticide Products

[Back to Volatile Organic Compound \(VOC\) Emissions from Pesticides](#)

[Subscribe](#) to receive periodic e-mail updates on activities of DPR's VOC Program.

**NEW** Beginning November 1, 2013, regulations to reduce emissions of volatile organic compounds (VOCs) from nonfumigant pesticides apply to high-VOC products containing abamectin, chlorpyrifos, gibberellins, or oxyfluorfen when used in the San Joaquin Valley ozone nonattainment area. The regulations do not apply to low-VOC products for any active ingredients.

#### General Information

- [Fact sheet, PDF](#) (67 kb) with overview of regulations
- The San Joaquin Valley ozone nonattainment area includes all of the following counties: Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare, and  
→ Parts of Kern County - [large map, PDF](#) (648 kb); [detailed map, PDF](#) (431 kb); [list, PDF](#) (10 kb) of township-range-section
- [Regulations associated with reducing VOC emissions from nonfumigant products](#)

**Products designated as high-VOC, low-VOC, or excluded** – Products containing abamectin, chlorpyrifos, gibberellins, or oxyfluorfen are designated as either high-VOC, low-VOC, or excluded from the regulations. VOC requirements pertain only to high-VOC products. The designation for a specific product is based on the active and inert ingredients in the product, the amounts of the ingredients, and if the label includes agricultural uses.

- [Criteria and lists of high-VOC, low-VOC, and excluded products, PDF](#) (205 kb) Updated August 5, 2013.

**Sales and use requirements for high-VOC products** – The regulations include requirements for pest control dealers selling a high-VOC product for use in the San Joaquin Valley. The regulations also include requirements for agricultural pest control advisers and growers prior to using a high-VOC product between May 1 and October 31 in the San Joaquin Valley for the following seven crops: alfalfa, almonds, citrus, cotton, grapes, pistachios, or walnuts. There are no VOC requirements to sell or use low-VOC or excluded products.

- [Pest control dealers fact sheet, PDF](#) (67 kb)
- [Agricultural pest control advisers fact sheet, PDF](#) (70 kb)
- [Growers fact sheet, PDF](#) (69 kb)

**Possible use prohibitions for high-VOC products** – DPR tracks VOC emissions on an annual basis based on pesticide use reports. If this pesticide VOC emissions inventory exceeds a specified trigger level, most uses of high-VOC products are prohibited for the seven crops during May-October in the San Joaquin Valley. If triggered, the high-VOC prohibitions must remain in effect for at least two years.

- Status of high-VOC prohibitions for May 1 to October 31, 2013: High-VOC prohibitions are not in effect.
- Status of high-VOC prohibitions for May 1 to October 31, 2014: DPR's **NEW** [preliminary estimate of 2012 pesticide VOC emissions, PDF](#) (129 kb) indicates that prohibitions are unlikely to be triggered for 2014.

Criteria and lists of high-VOC, low-VOC, and excluded products, PDF

# Low V.O.C./High-V.O.C. Products

## Low-VOC Abamectin Products, EP ≤ 35.0% (21)

## Total Abamectin products

Product Name	Registration Number	Registrant	Formulation	EP (%)
Abacide 2	7946-27-AA	J.J. Mauget Co.	Solution/Liquid	0.00
Abacide 2 HP	7946-30-AA	J.J. Mauget Co.	Solution/Liquid	0.00
Epi-Mek SCL	100-1439-AA	Syngenta Crop Protection, Inc.	Other (Liquid Suspension)	3.08
Award II Fire Ant Bait	100-1452-AA	Syngenta Crop Protection, Inc.	Granular/Flake	3.70
Clinch Ant Bait	10965-50068-AA	California Dept. of Food & Ag.	Granular/Flake	3.70
Clinch Ant Bait	100-894-ZA	Syngenta Crop Protection, Inc.	Granular/Flake	3.70
Clinch Ant Bait	100-894-ZB	Syngenta Crop Protection, Inc.	Granular/Flake	3.70
Optigard Fire Ant Bait	100-893-ZB	Syngenta Crop Protection, Inc.	Granular/Flake	3.70
Optigard Fire Ant Bait	100-893-ZC	Syngenta Crop Protection, Inc.	Granular/Flake	3.70
Prescription Treatment Brand Advance Granular	499-370-AA	Whitmire Micro-Gen Research	Granular/Flake	3.70
Prescription Treatment Brand Ascend Fire Ant Bait	499-370-ZA	Whitmire Micro-Gen Research	Granular/Flake	3.70
Prescription Treatment Brand Advance Granular	499-370-ZB	Whitmire Micro-Gen Research	Granular/Flake	3.70
Prescription Treatment Brand Advance 375A Select	499-370-ZC	Whitmire Micro-Gen Research	Granular/Flake	3.70
Prescription Treatment Brand Avert Dry Flowable	499-294-ZA	Whitmire Micro-Gen Research	Dust/Powder	5.55
Agri-Mek SC Miticide/Insecticide	100-1351-AA	Syngenta Crop Protection, Inc.	Aqueous Suspension	5.63
Agri-Mek SC Miticide/Insecticide	100-1351-ZA	Syngenta Crop Protection, Inc.	Aqueous Suspension	5.63
Agmectin 0.15EC Insecticide/Miticide	84229-2-ZA	Tide International USA, Inc.	Emulsifiable Concentrate	29.75
Merlin	81943-29-AA	Phoenix Environmental Care LLC	Emulsifiable Concentrate	29.75

## High-VOC Abamectin Products, EP > 35.0% (22)

Product Name	Registration Number	Registrant	Formulation	EP (%)
Aracinate	74779-1-AA	Rainbow Treecare Scientific	Other (Liquid)	55.10
Greyhound Insecticide	69117-2-AA	Arborsystems	Solution/Liquid	55.10
Agri-Mek 0.15 EC Miticide/Insecticide	100-898-ZA	Syngenta Crop Protection, Inc.	Emulsifiable Concentrate	55.10
Agri-Mek 0.15 EC Miticide/Insecticide	100-898-ZB	Syngenta Crop Protection, Inc.	Emulsifiable Concentrate	55.10
Avid 0.15EC Miticide/Insecticide	100-896-ZA	Syngenta Crop Protection, Inc.	Emulsifiable Concentrate	55.10
Avid 0.15EC Miticide/Insecticide	100-896-ZD	Syngenta Crop Protection, Inc.	Emulsifiable Concentrate	55.10
Epi-Mek 0.15 EC Miticide/Insecticide	100-1154-AA	Syngenta Crop Protection, Inc.	Emulsifiable Concentrate	55.10
Epi-Mek 0.15 EC Miticide/Insecticide	100-1154-ZA	Syngenta Crop Protection, Inc.	Emulsifiable Concentrate	55.10
Ardent 0.15 EC Miticide/Insecticide	100-896-ZB	Syngenta Crop Protection, Inc.	Emulsifiable Concentrate	55.10
Ardent 0.15 EC Miticide/Insecticide	100-896-ZC	Syngenta Crop Protection, Inc.	Emulsifiable Concentrate	55.10
Abacus Agricultural Miticide/Insecticide	83100-4-AA-83979	Rotam North America, Inc.	Emulsifiable Concentrate	60.54
Lucid Ornamental Miticide/Insecticide	83100-5-AA-83979	Rotam North America, Inc.	Emulsifiable Concentrate	60.54
Solera Abamectin Agricultural Miticide/Insecticide	83100-4-AA-82542	Source Dynamics, LLC	Emulsifiable Concentrate	60.54
Zoro Miticide/Insecticide	67760-71-AA	Cheminova, Inc.	Emulsifiable Concentrate	61.20
Temprano	67760-71-AA-400	Chemtura Corporation	Emulsifiable Concentrate	61.20
Abba 0.15 EC	66222-139-AA	Makhteshim-Agan of North America	Emulsifiable Concentrate	62.62
Quali-Pro Abamectin 0.15 EC Miticide/Insecticide	66222-210-AA	Makhteshim-Agan of North America	Emulsifiable Concentrate	62.62
Nufarm Abamectin 0.15 EC Insecticide	228-658-AA	Nufarm Americas Inc.	Emulsifiable Concentrate	70.50
Nufarm Abamectin SPC 0.15 EC Insecticide	228-657-AA	Nufarm Americas Inc.	Emulsifiable Concentrate	70.50
Vivid II	64014-10-AA	Florida Silvics Inc., DBA Tree	Solution/Liquid	71.77
Reaper 0.15 EC	34704-923-AA	Loveland Products, Inc.	Emulsifiable Concentrate	73.33
Reaper Advance	34704-923-ZA	Loveland Products, Inc.	Emulsifiable Concentrate	73.33

# Are all crops affected by the **NON-FUMIGANT** V.O.C. regulations affect? **NO**

**7 crops are affected:**

**Alfalfa**

**Almonds**



**Citrus**

**Cotton**



**Grapes**

**Pistachios**



**Walnuts**



**Again only during the time period from May 1<sup>st</sup> to  
October 31<sup>st</sup>.**

**When do these regulations go  
into effect?**

**November 1, 2013**

**When do the use restrictions go  
into effect?**

**From May 1<sup>st</sup> to October 31<sup>st</sup>**

**What can GROWERS do to reduce V.O.C. emissions from May 1<sup>st</sup> to October 31<sup>st</sup> in order to avoid the triggers and product allocations?**

- Use of Low V.O.C products or formulations**
- Use of solid or granular formulations**
- Spot treatments or target sensing equipment**

**Target Sensing Equipment** senses that the object to be treated is not present and shuts down until object is sensed .



# Low-VOC vs. High VOC products emissions potential (EP)

Active Ingredient	VOC EP Threshold	Example High-VOC	VOC EP	Example Low-VOC	VOC EP
Abamectin	35%	Agri-Mek EC	55%	Agri-Mek SC	6%
Chlorpyrifos	25%	Lorsban 4E	50%	Lorsban Advanced	18%
Gibberellins	25%	Pro-Gibb	94%	Progibb Water Soluble Granules	4%
Oxyfluorfen	15%	Goal 2XL	62%	Goaltender	8%

# DPR has developed a Web-based tool for calculating VOC emissions. It calculates single or multiple products and applications.

*(“simple to use” - L.G.)*

The screenshot shows the website for the California Department of Pesticide Regulation (DPR). The header includes the DPR logo and navigation links: Home, Health & Safety, Enforcement, Pest Management, Licensing, Registration, Monitoring, and Laws/Regulations. A search bar is located in the top right corner.

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**VOC Emissions Calculator**

[Back to Volatile Organic Compound \(VOC\) Emissions from Pesticides](#)

**HOW TO CALCULATE NON-FUMIGANT VOC EMISSIONS**

DPR has developed a Web-based tool for calculating volatile organic compound (VOC) emissions from agricultural applications of nonfumigant pesticides. You can calculate VOC emissions from single or multiple pesticide products and applications. (DPR also has an [Excel-based tool](#) for calculating VOC emissions from fumigants.)

The VOC emissions calculated here rely on the product's emission potential (EP). EP is the percentage of the product assumed to potentially contribute to atmospheric VOCs. The benchmark method for estimating EPs is a laboratory test called thermogravimetric analysis (TGA). DPR has alternative methods for estimating EPs in the absence of TGA data. These are standardized reproducible methods for determining product EPs, and so provide the ability to accurately assess relative changes in VOC emissions from year to year. EPs may overestimate the absolute value of VOC emissions under certain circumstances because they do not account for other factors that can influence emissions, such as application method or soil adsorption.

Beginning November 1, 2013, regulations by DPR to reduce VOC emissions from certain nonfumigant pesticide products go into effect. The regulations are designed to keep VOC emissions below a specified goal from May to October in the San Joaquin Valley. Designated high-VOC products containing abamectin, chlorpyrifos, gibberellins, or oxyfluorfen have restrictions on sales and use. The high-VOC products are identified when queried. The web page on [Reducing VOC Emissions from Nonfumigant Pesticide Products](#) has detailed information on these regulations.

→ [Start a VOC emission calculation](#)

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## VOC Emissions Calculator

How would you like to add products to the calculation scenario?

Find product by product name (enter partial product name to search for)

Please enter at least 3 characters that appear in the product name you're looking for.

Search

### SEARCH RESULTS

Your search for goal returned the following results.

Hold down the Ctrl key to select multiple products

GOAL 2XL [ 62719- 424-AA ]  
GOALTENDER [ 62719- 447-ZA ]

Next Step -->

*Type in product name,  
and select your product*

*Next step, type in rate and  
amount per acre, Then click  
"Review Selections."*

*If okay, click "Calculate."*

[Introduction](#) → [Start](#) → [Add Product\(s\)](#)

## Add Product(s)

Please enter production application details.

GOAL 2XL [ 62719- 424-AA ]

gallons/acre

pints/acre

fluid ounces/acre

Application Rate

Acres Treated

No. of Applications

[Add Another Product/Site -->](#)

or [Review Selection\(s\) -->](#)

or [Cancel](#)

[Introduction](#) → [Start](#) → [Select Product\(s\)](#) → [Review](#)

## Review Selection(s)

The following products have been added to the VOC Emissions Calculation scenario.

[Calculate](#)

or

[Add Another Product](#)

or

[Clear All Products](#)

GOAL 2XL

Application Rate: 2 pints/acre

Acres: 20

Applications: 1

[Delete](#)

# *If “RED” font shows-up, ask the PCA what restrictions may be in place*

## VOC Emissions Calculation Report

For additional crop information please visit the [UC IPM website](#).

**IMPORTANT NOTICE – THIS IS A HIGH-VOC PRODUCT**  
**Restrictions begin November 2013**

A written recommendation from a licensed agricultural pest control adviser (PCA) is required prior to application, if you are planning to use this product

- in the San Joaquin Valley; AND
- on alfalfa, almond, citrus, cotton, grape, pistachio, or walnut; AND
- during May 1- October 31.

The PCA will know if additional VOC use restrictions are in effect.

Growers and applicators should use low-VOC products whenever possible. They have no VOC restrictions.

Product #1	GOAL 2XL
CA Registration #	62719- 424-AA
VOC Emission Potential	62.30
Primary Active Ingredient	OXYFLUORFEN
Formulation Type	EMULSIFIABLE CONCENTRATE
Application Rate	2 pints/acre
Acres Treated	20
Number of Applications	1
Total VOC Emissions	28.04 lbs
VOC Emission Rate	1.40 lbs/acre/application

Total VOC Emissions for this scenario: 28.04 lbs

Export to Excel -->

Run Another VOC Calculation -->

*If no “**RED**” font shows-up, then there are no restrictions in place*

[Introduction](#) --> [Start](#) --> Select Product(s) --> [Review](#) --> [Report](#)

## VOC Emissions Calculation Report

For additional crop information please visit the [UC IPM website](#).

<b>Product #1</b>	GOALTENDER
<b>CA Registration #</b>	62719- 447-ZA
<b>VOC Emission Potential</b>	8.28
<b>Primary Active Ingredient</b>	OXYFLUORFEN
<b>Formulation Type</b>	FLOWABLE CONCENTRATE
<b>Application Rate</b>	2 pints/acre
<b>Acres Treated</b>	20
<b>Number of Applications</b>	1
<b>Total VOC Emissions</b>	4.10 lbs
<b>VOC Emission Rate</b>	0.21 lbs/acre/application

**Total VOC Emissions for this scenario: 4.1 lbs**

Export to Excel -->

Run Another VOC Calculation -->

# Are there exceptions to the Non-fumigant regulations?

Yes,

**High V.O.C applications are allowed:**

**Chlorpyrifos to control aphids in cotton**

**Gibberellins at no more than 16grams A.I./acre**

**Oxyfluorfen at no more than 0.125 (1/8)lb. A.I./Ac**

**Emergency exemptions (Section 18's)**

**Special Local Need registration (24c)**

**USDA, CDFR, or CAC to control, suppress,  
or eradicate pests**

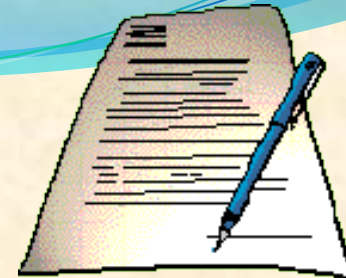
**Precision application sprayer**







## **-Grower Requirements-**



Growers who make applications of **HIGH- VOC products** of abamectin, chlorpyrifos, gibberellins, or oxyfluorfen between **May 1 to October 31** in the San Joaquin NAA onto alfalfa, almond, citrus, cotton, grape, pistachio, and walnut **must**:

**Obtain a written recommendation from a licensed PCA.**

If the V.O.C. emissions S.I.P goal has been exceeded (**determined from previous years V.O.C. report**), then the High V.O.C. application is prohibited. A Low V.O.C. application is allowable.

# How do growers know if High V.O.C. prohibitions are in effect?



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**Partial screen-shot  
DPR Home page**

- **Sign up on the DPR V.O.C. e-mail list**  
(go to DPR home page and click on “Join E-List”)
- **Contact your Ag. Commissioner’s office**
- **Ask your P.C.A.**



# -PCA Requirements-

**A recommendation for all application of High V.O.C. products begins May 1<sup>st</sup> 2014 and is effect every year between May 1<sup>st</sup> and October 31<sup>st</sup>.**

## What should the PCA know?

- Know which products are affected.
- Know which crops are affected.
- Know which are High and Low V.O.C. products.
- Know if prohibitions are in effect.
- Know the restricted time period.
- Know the exceptions to the regulations.



## **- Review -**

**Which crops are affected?**

**Alfalfa, Almonds, Citrus, Cotton,  
Grape, Pistachio, and Walnut**

**Which products are affected?**

**High V.O.C.- Abamectin, Chlorpyrifos,  
Giberellins, and Oxyfluorfen**

**Which are the High and Low V.O.C. products?**

**Get on DPR's Home Page and "Join E-List"**



## **-Review-**

**When is the High V.O.C.  
restricted time period?**

**Between May 1<sup>st</sup> and  
October 31<sup>st</sup>**



**When are prohibitions in effect and how long?**

**If report by DPR determines V.O.C. emissions  
exceeded, prohibitions are in effect for 2 years.**



## - Review -

**What are the exceptions to the regulations?**

Chlorpyrifos to control aphids in cotton

Gibberellins at no more than 16grams A.I./acre

Oxyfluorfen at no more than 0.125 (1/8)lb. A.I./Ac

Precision application sprayer

Section 18's and SLN's (24c)

USDA, CDFR, and Ag Commissioners pest programs.

## **- Review -**

**Low and High V.O.C. products may continue to be used all year long but a recommendation is required for the High V.O.C. products from May 1<sup>st</sup> – Oct. 31<sup>st</sup> .**

**When the trigger is met, NO High V.O.C. products may be used from May 1<sup>st</sup> – Oct. 31<sup>st</sup> ,Low V.O.C. products may still be used and certain exceptions allow use of the high V.O.C.'s**

## **- Current Status -**

### **Status of High-VOC prohibitions for May 1 to October 31, 2014:**

**DPR's estimates of 2012 pesticide VOC emissions indicated that prohibitions will not be triggered for 2014.**

**DPR encourages PCA's to consider and recommend low V.O.C. products when feasible even if the high V.O.C.'s prohibitions are not in effect.**

**Voluntary use of low V.O.C. products will assist in keeping emissions below the trigger level for high V.O.C.'s.**

# The End

## Questions



# The Abrams Tank