



California Environmental Protection Agency  
Department of Pesticide Regulation

# **Volatile Organic Compound Regulations**

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# Overview

- Background
- Pesticide VOC emissions inventory
- Fumigant regulations
- Nonfumigant regulations

# Background

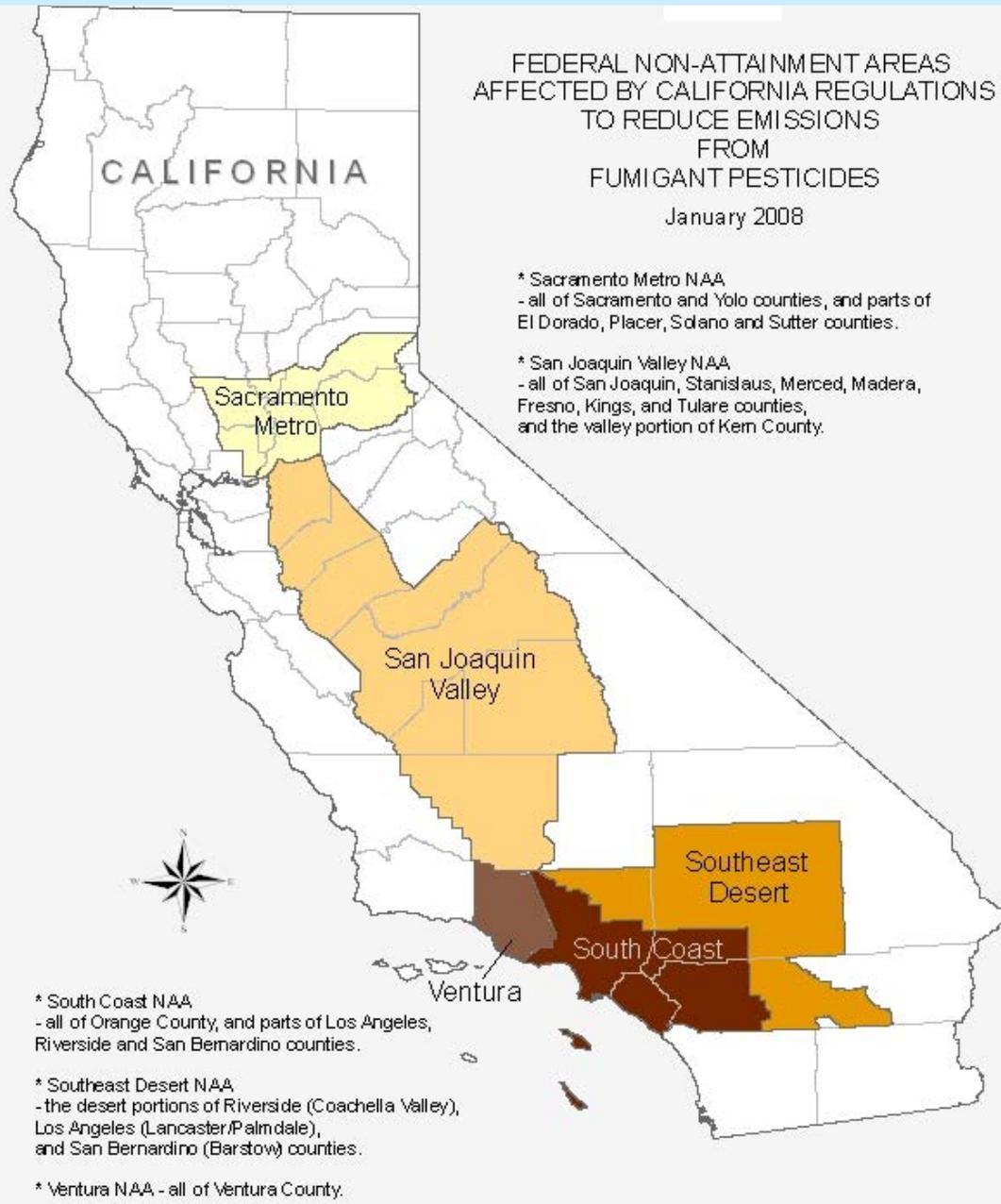
- Volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>) react with sunlight to form ozone, causing
  - Inflammation and irritation of lungs
  - Increases in premature deaths of elderly people with lung and circulatory diseases
  - Compromised immune system
- As required by Clean Air Act, the state implementation plan (SIP) describes measures to reduce VOCs and NO<sub>x</sub> to achieve ozone standard
- Pesticides contribute to VOCs, but have negligible NO<sub>x</sub> emissions

# State implementation plan

- SIP requires DPR to
  - Develop and maintain an emission inventory to track pesticide VOC emissions for five nonattainment areas, based on pesticide use reports
  - Reduce pesticide emissions by specified amounts during May-Oct peak ozone season
  - Implement low-emitting fumigation methods – completed in 2008
  - Implement restrictions on nonfumigant (inert ingredients) products for San Joaquin Valley – completed in 2013

FEDERAL NON-ATTAINMENT AREAS  
AFFECTED BY CALIFORNIA REGULATIONS  
TO REDUCE EMISSIONS  
FROM  
FUMIGANT PESTICIDES

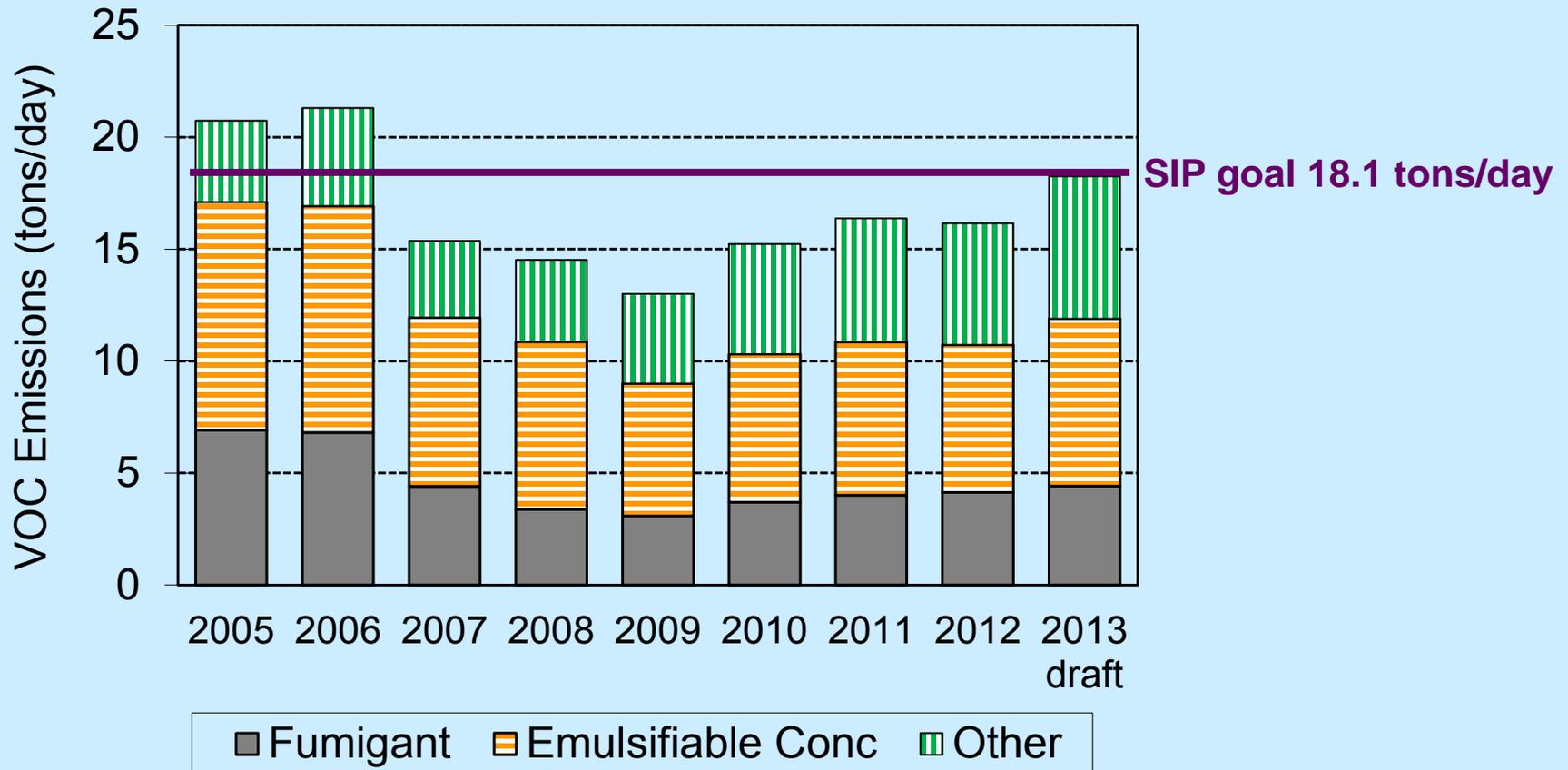
January 2008



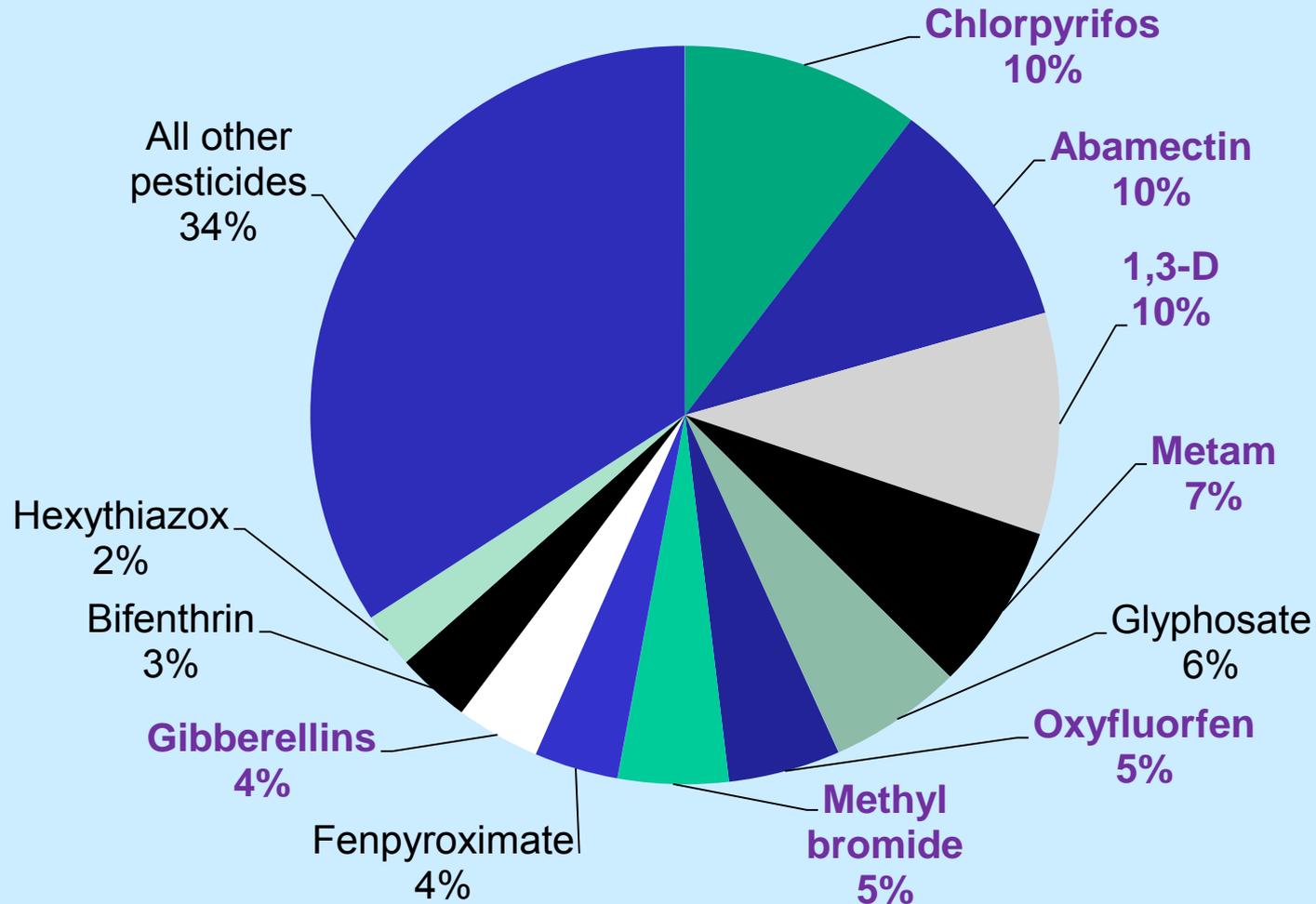
# Estimating pesticide VOC emissions

- VOC emissions from a pesticide product are calculated from:
  - Amount of product applied (from pesticide use reports)
  - VOC fraction in product (emission potential, EP), determined by thermogravimetric analysis (TGA) or other methods
- Fumigants are adjusted by an additional factor to account for emissions under field conditions
  - Insufficient data to estimate nonfumigant VOC emissions under field conditions
- Most pesticide VOC emissions are from fumigants and inert ingredients in emulsifiable concentrates

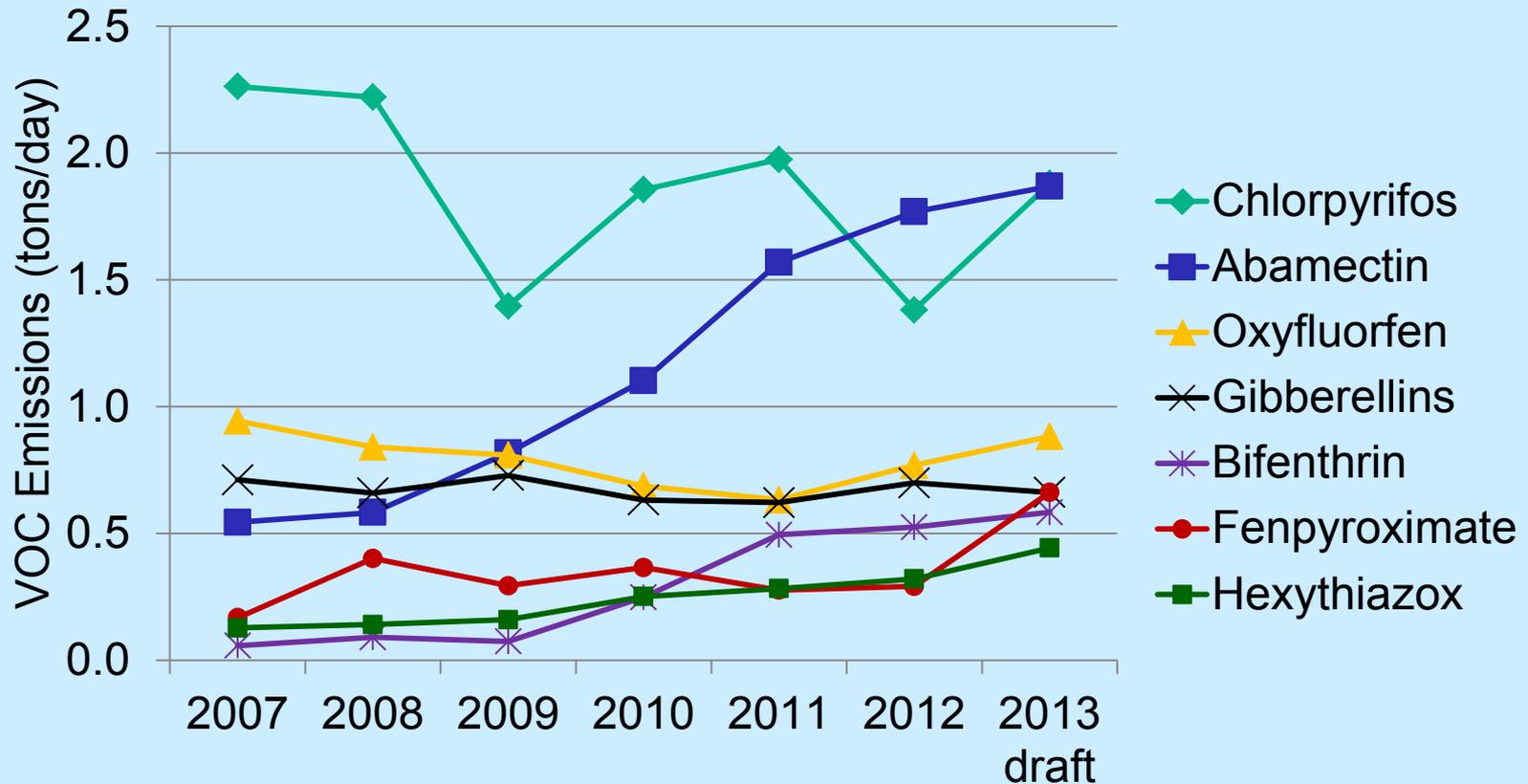
# Pesticide VOC emissions inventory for San Joaquin Valley, May-October



# Top pesticide VOC products for San Joaquin Valley, May-October 2013 (draft)



# Top nonfumigant VOC products for San Joaquin Valley, May-October\*



\*Glyphosate not shown because all products likely have low EPs

# 2008 fumigant VOC regulations

- “Low-emission” fumigation methods required during May-Oct ozone season in San Joaquin Valley, Southeast Desert, Ventura
  - NEW – Methods using tarps with 60% buffer credit (totally impermeable film, TIF) approved
- Backup measure if trigger level (95% of SIP goal) exceeded
- DPR required to publish annual pesticide VOC emissions inventory report, including determination if trigger level exceeded

# Overview of nonfumigant regulations (Title 3, CA Code of Regulations (3 CCR))

- VOC content (emission potential, EP) thresholds specified to designate certain agricultural products as “high-VOC” or “low-VOC”
- For high-VOC products used in San Joaquin Valley
  - Pesticide dealer required to provide information to purchasers
  - Growers required to obtain a pest control adviser (PCA) recommendation for some applications
- Backup measure if trigger level exceeded in San Joaquin Valley: prohibition of several uses of high-VOC nonfumigant products
  - **NEW – Backup measure likely triggered, final determination in Mar/Apr 2015**

# Active ingredients and VOC EP thresholds (3 CCR 6880)

- Restrictions on agricultural products containing top 4 nonfumigant VOC contributors in San Joaquin Valley
  - Low-VOC products feasible for most uses
  - Switching to low-VOC products achieves target reductions

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%	Falgro 4L	94%	Falgro LV	18%
Oxyfluorfen	15%	Goal 2XL	62%	Goaltender	8%

# Types of products designated as high-VOC or low-VOC (3 CCR 6880)

- VOC regulations include products containing abamectin, chlorpyrifos, gibberellins, or oxyfluorfen as the
  - “Primary” active ingredient; and
  - Labeled for agricultural uses
- All other products are excluded from VOC regulations
- DPR publishes a list of specific low-VOC and high-VOC products in annual emission inventory report, and posts to website

# Abamectin products

- 23 low-VOC products (primary AI in ag product with EP  $\leq$ 35%)
  - 9 solids (dust, powder, granule)
  - 14 liquids from 8 registrants
- 21 high-VOC products (primary AI in ag product with EP  $>$ 35%)
- 25 excluded products (non-ag product or secondary AI)

# Chlorpyrifos products

- 19 low-VOC products (primary AI in ag product with EP  $\leq$ 25%)
  - 10 solids (dust, powder, granule)
  - 9 liquids from 5 registrants
- 18 high-VOC products (primary AI in ag product with EP  $>$ 25%)
- 14 excluded products (non-ag product or secondary AI)

# Gibberellins products

- 11 low-VOC products (primary AI in ag product with EP  $\leq$ 25%)
  - 8 solids (dust, powder, granule)
  - 3 liquids
    - Falgro LV
    - Falgro 2X LV
    - Progibb LV
- 14 high-VOC products (primary AI in ag product with EP >25%)
- 2 excluded products (non-ag product or secondary AI)

# Oxyfluorfen products

- 11 low-VOC products (primary AI in ag product with EP  $\leq$ 15%)
  - 6 solids (dust, powder, granule)
  - 5 liquids
    - Galigan H2O
    - Goaltender
    - Oxystar 4L
    - Pindar GT
    - Willowood Oxyflo 4 SC
- 7 high-VOC products (primary AI in ag product with EP >15%)
- 14 excluded products (non-ag product or secondary AI)

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# Pesticide dealer requirements (3 CCR 6577, 6886)

- Always in effect
- Dealer must provide specified VOC information in writing to purchaser if selling
  - High-VOC product containing abamectin, chlorpyrifos, gibberellins, or oxyfluorfen; and
  - For use in San Joaquin Valley, as indicated by operator ID number
- **NEW – DPR recommends that dealers inform purchasers of high-VOC products of prohibitions**
- Dealer must indicate on retained invoice that VOC information was provided
- No requirements for sale of low-VOC products

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# Grower (property operator) requirements (3 CCR 6883)

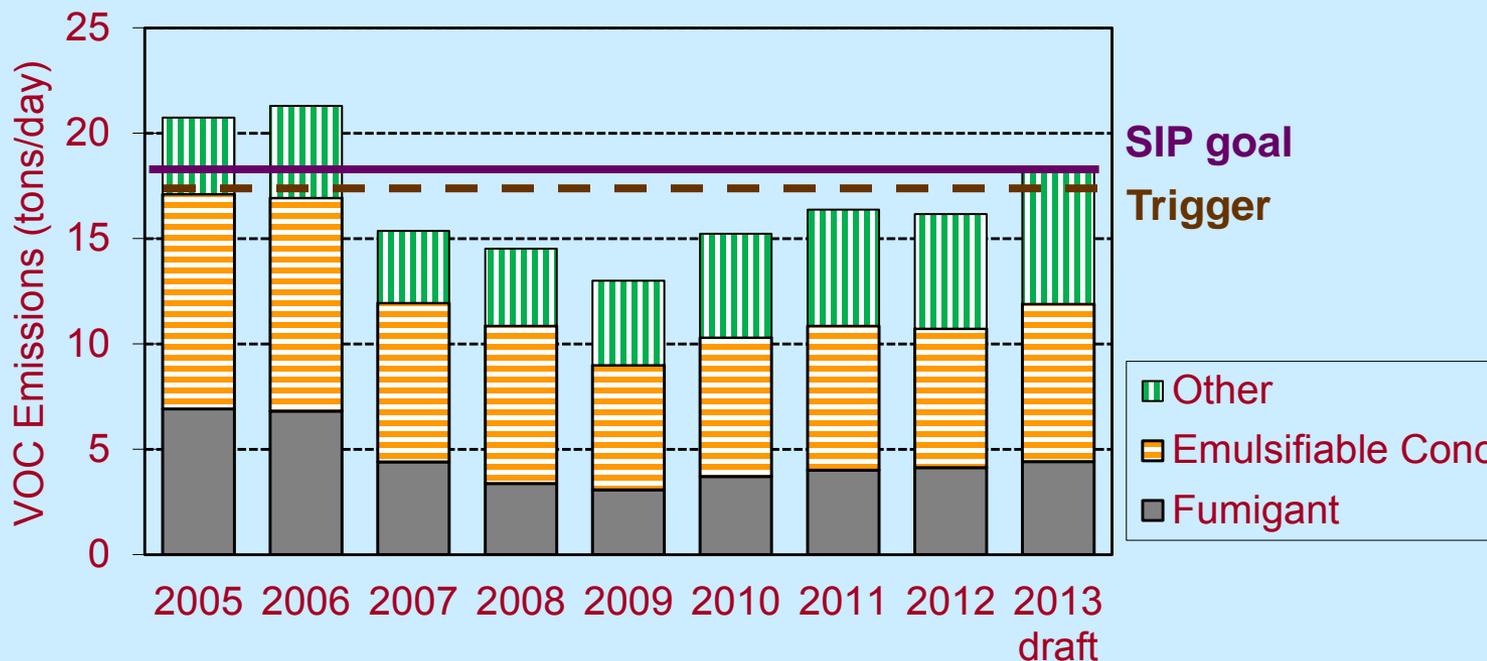
- Grower must obtain a PCA recommendation if
  - Use a high-VOC product containing abamectin, chlorpyrifos, gibberellins, or oxyfluorfen; and
  - Applied in San Joaquin Valley during May 1 - Oct 31; and
  - Application to
    - Alfalfa
    - Almonds
    - Citrus
    - Cotton
    - Grapes
    - Pistachio
    - Walnuts
    - **These crops account for >90% of emissions from the 4 AIs**
    - **Switching to low-VOC products achieves VOC target emissions**
    - **Feasibility of low-VOC products for other crops uncertain**
- Grower must retain high-VOC recommendation for 2 years

# Overview of nonfumigant regulations (Title 3, CA Code of Regulations (3 CCR))

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# Backup measure: trigger for high-VOC prohibitions (3 CCR 6452.2(f))

- DPR annual emission inventory report used to determine if nonfumigant prohibitions are triggered
  - Example: Fall 2014 report uses 2013 data to determine if high-VOC prohibitions triggered in May 2015
  - Trigger level is 17.2 tons/day (95% of SIP goal)



# Backup measure: high-VOC prohibitions (3 CCR 6884)

- If emissions exceed trigger level, high-VOC use prohibited for
  - Abamectin, chlorpyrifos, gibberellins, or oxyfluorfen products; and
  - In San Joaquin Valley during May 1 – October 31; and
  - Application to alfalfa, almond, citrus, cotton, grape, pistachio, or walnut
  - At least 2 years
- **NEW – High-VOC prohibitions will likely be in effect for May-Oct 2015 and May-Oct 2016, final determination in Mar/Apr 2015**
  - DPR can lift prohibitions after two years if specific criteria are met
- Low-VOC products never prohibited

# Exceptions if high-VOC prohibitions triggered (3 CCR 6884)

- Low-VOC products are not always feasible
- With PCA recommendation, high-VOC products can be used for
  - Chlorpyrifos to control aphids on cotton
  - Gibberellins applied at  $\leq 16$  grams active ingredient/acre
  - Oxyfluorfen applied at  $\leq 0.125$  (1/8) pounds active ingredient/acre
  - Section 18 or 24(c) applications
  - USDA/CDFR invasive pest requirements
  - Applications with precision sprayer (NRCS criteria)
- DPR can use annual report to add exceptions if specific criteria are met

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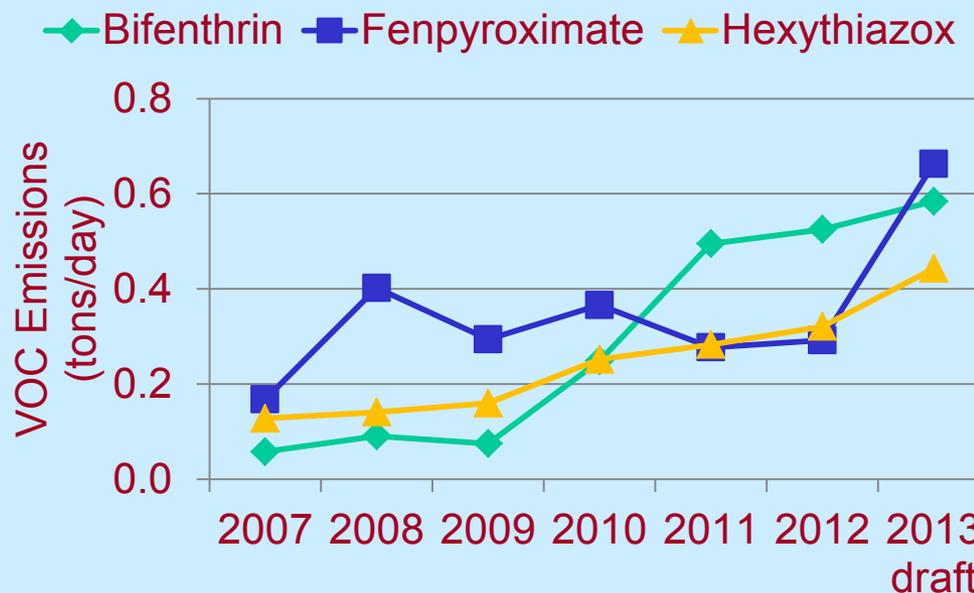
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# PCA requirements (3 CCR 6558)

- If emissions do not exceed trigger level, PCA must still consider low-VOC alternatives (3 CCR 6556-no changes)
- If emissions exceed trigger level, PCA cannot recommend a high-VOC product
  - Containing abamectin, chlorpyrifos, gibberellins, oxyfluorfen
  - Applied in San Joaquin Valley during May-October; and
  - Applied to alfalfa, almonds, citrus, cotton, grapes, pistachios, walnuts
  - PCA can recommend high-VOC product for an exception listed in regulations. Recommendation must document which exception applies
- PCA responsible for knowing low-VOC and high-VOC products, and what prohibitions are in effect (annual report)
- PCA recommendation must be retained for 2 years

# Key issues

- Compliance
- Inappropriate use of exceptions
- Switching to other active ingredients with higher VOC products
- Increasing use of certain products
  - Glyphosate
  - Bifenthrin
  - Fenpyroximate
  - Hexythiazox





# Voluntary measures and compliance assistance

- Consult with county agricultural commissioners
- Read DPR conservation management practices guide for VOCs
- Switch to products with lower VOCs when feasible
  - VOC calculator – Web-based tool for calculating VOC emissions from agricultural applications of nonfumigant pesticides

<b>Active Ingredient</b>	<b>Example of Higher VOCs</b>	<b>VOC EP</b>	<b>Example of Lower VOCs</b>	<b>VOC EP</b>
Bifenthrin	Fanfare 2EC	64%	Fanfare ES	6%
Fenpyroximate	Fujimite 5EC or XLO	>39%	Akari 5SC or Miteus	~10%
Hexythiazox	Onager	>39%	Hexygon DF or Savey DF	~1%

# Summary of dealer, grower and PCA nonfumigant requirements

Regulation Issue	Dealer Sale Requirements	Grower and PCA Use Requirements
Sales and uses with requirements		
Products affected	High-VOC abamectin, chlorpyrifos, gibberellins, oxyfluorfen products	High-VOC abamectin, chlorpyrifos, gibberellins, oxyfluorfen products
Area affected	Sold for use in SJV	Use in SJV
Time period affected	Year-round	May 1 – Oct 31
Crops affected	All agricultural crops	Alfalfa, almond, citrus, cotton, grape, pistachio, walnut
Requirements if trigger level <u>not</u> exceeded	Provide VOC information to purchaser	PCA recommendation required prior to use
Requirements if trigger level exceeded	Provide VOC information to purchaser	PCA recommendation required prior to use High-VOC applications prohibited, with exceptions

# Additional information and questions

- **DPR web site: [www.cdpr.ca.gov](http://www.cdpr.ca.gov)**
  - “Join E-Lists” link at top of page
  - Quick Links tab, “VOCs” link
- DPR contacts
  - Randy Segawa, Special Advisor
  - 916-324-4137, [Randy.Segawa@cdpr.ca.gov](mailto:Randy.Segawa@cdpr.ca.gov)
  
  - Pam Wofford, Environmental Program Manager
  - 916-324-4297, [Pam.Wofford@cdpr.ca.gov](mailto:Pam.Wofford@cdpr.ca.gov)