California Environmental Protection Agency
Department of Pesticide Regulation

Volatile Organic Compound Regulations

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Overview

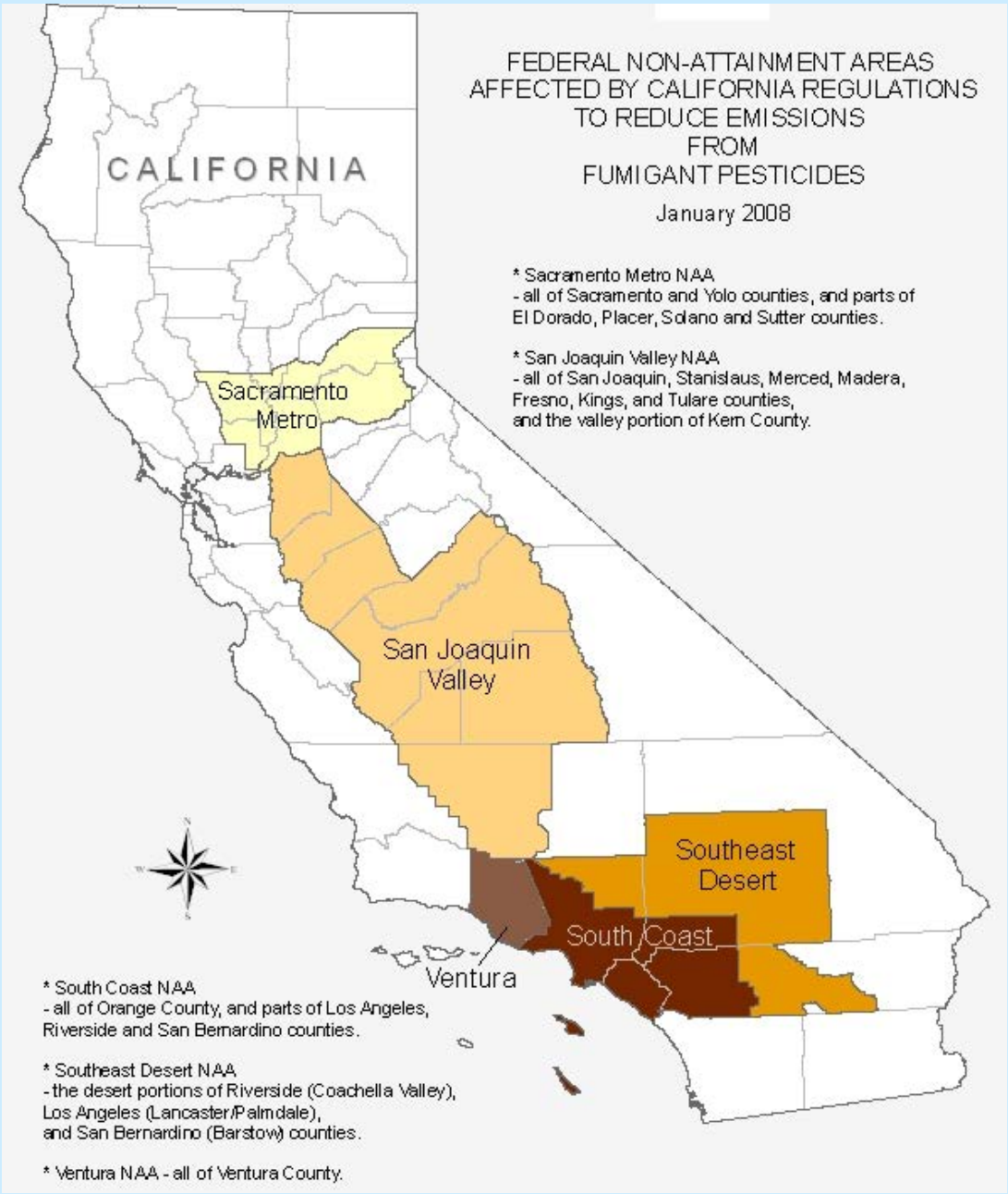
- Background
- Pesticide VOC emissions inventory
- Fumigant regulations
- Nonfumigant regulations

Background

- Volatile organic compounds (VOCs) and nitrogen oxides (NOx) 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 NOx to achieve ozone standard
- Pesticides contribute to VOCs, but have negligible NOx emissions

State implementation plan

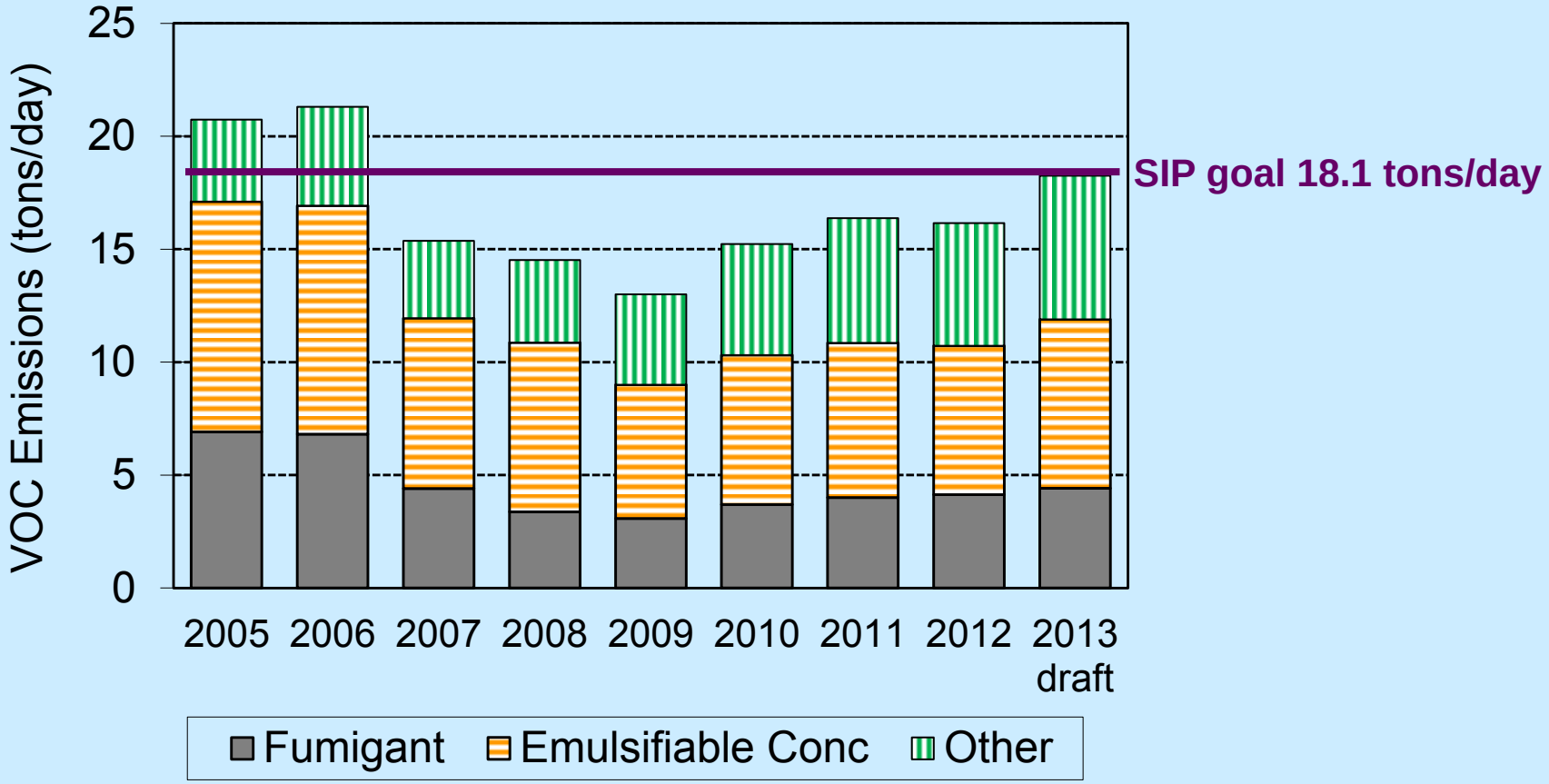
- SIP requires DPR to
  - Develop and maintain an emission inventory to track pesticide VOC emissions for five nonattainment areas, based on pesticide use reports
  - Reduce pesticide emissions by specified amounts during May-Oct peak ozone season
  - Implement low-emitting fumigation methods – completed 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
CALIFORNIA
* Sacramento Metro NAA
- all of Sacramento and Yolo counties, and parts of
El Dorado, Placer, Solano and Sutter counties.
* San Joaquin Valley NAA
- all of San Joaquin, Stanislaus, Merced, Madera,
Fresno, Kings, and Tulare counties,
and the valley portion of Kern County.
Sacramento
Metro
San Joaquin
Valley
Southeast
Desert
South Coast
Ventura
* South Coast NAA
- all of Orange County, and parts of Los Angeles,
Riverside and San Bernardino counties.
* Southeast Desert NAA
- the desert portions of Riverside (Coachella Valley),
Los Angeles (Lancaster/Palmdale),
and San Bernardino (Barstow) counties.
* Ventura NAA - all of Ventura County.

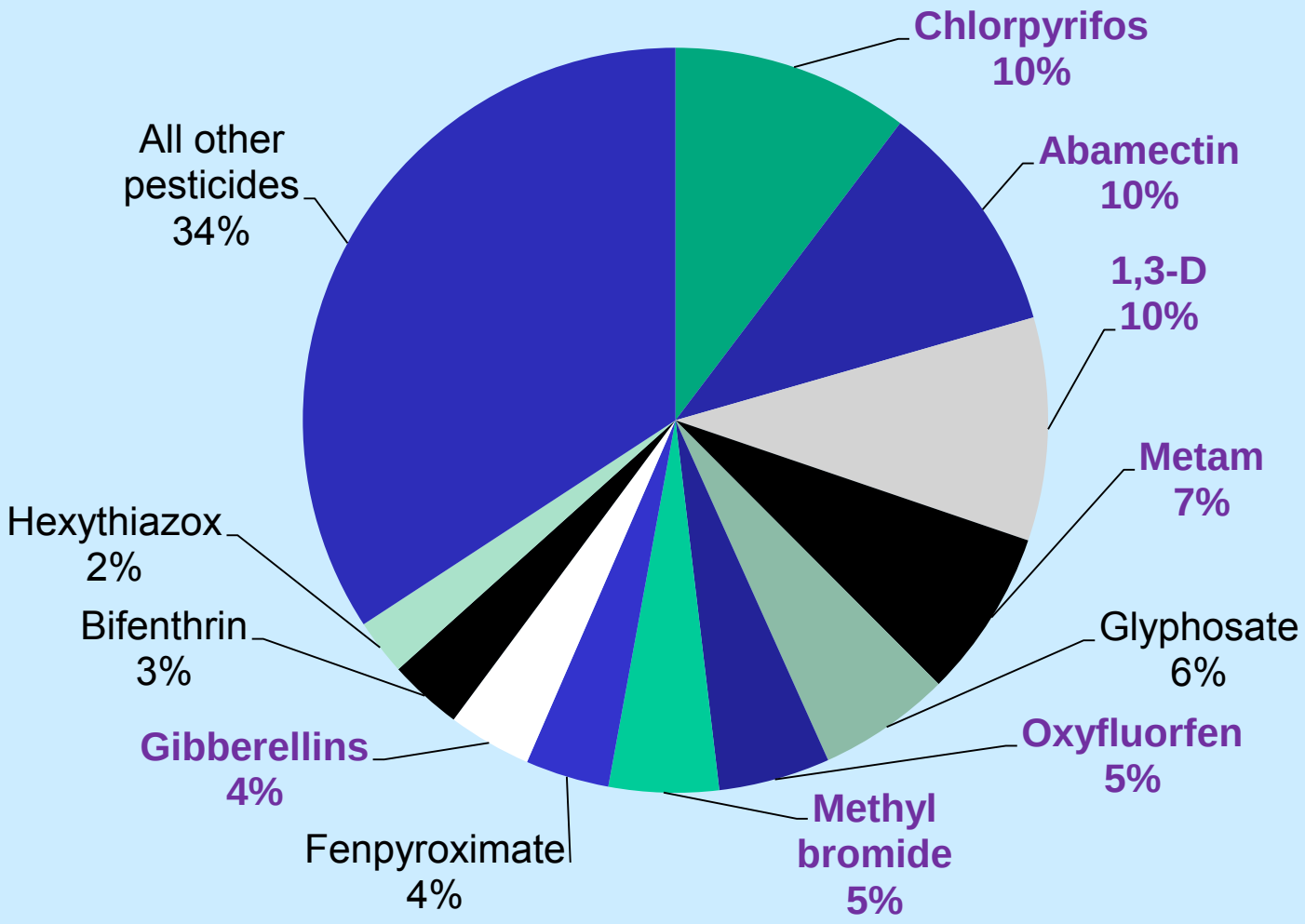
Estimating pesticide VOC emissions

- 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

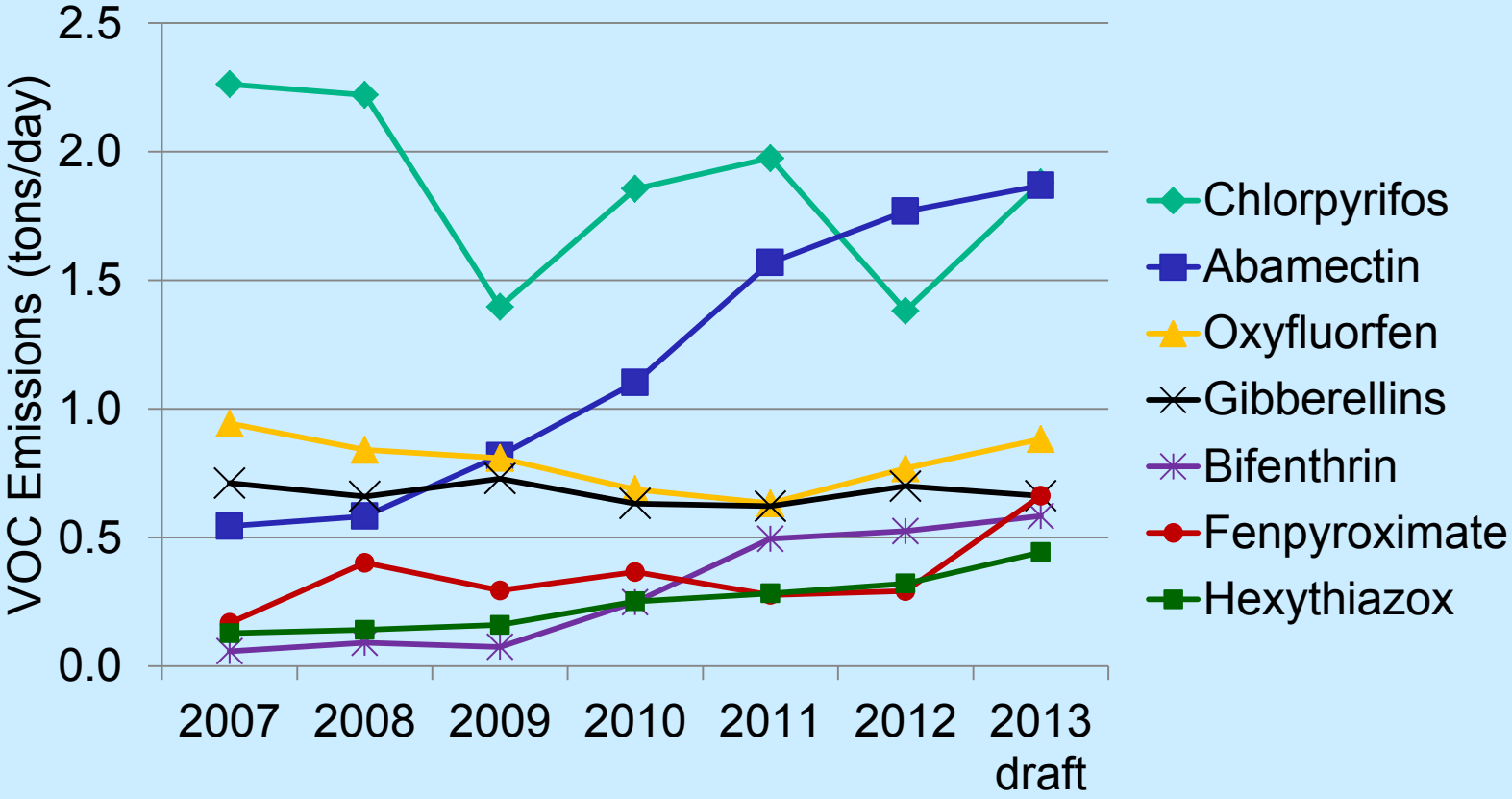
Pesticide VOC emissions inventory for San Joaquin Valley, May-October



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%

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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 ≤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 ≤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 ≤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 ≤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

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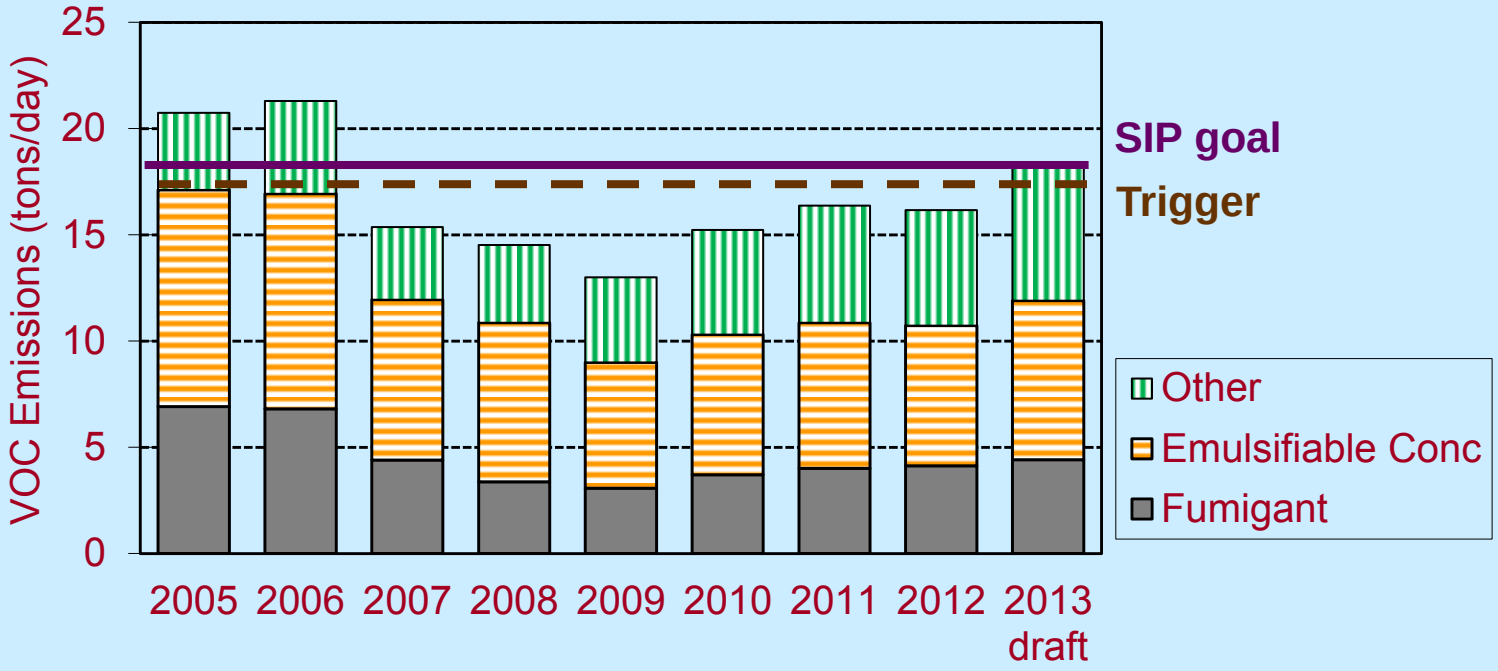
Backup measure: trigger for high-VOC prohibitions (3 CCR 6452.2(f))

- 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 ≤16 grams active ingredient/acre
  - Oxyfluorfen applied at ≤0.125 (1/8) pounds active ingredient/acre
  - Section 18 or 24(c) applications
  - USDA/CDFA 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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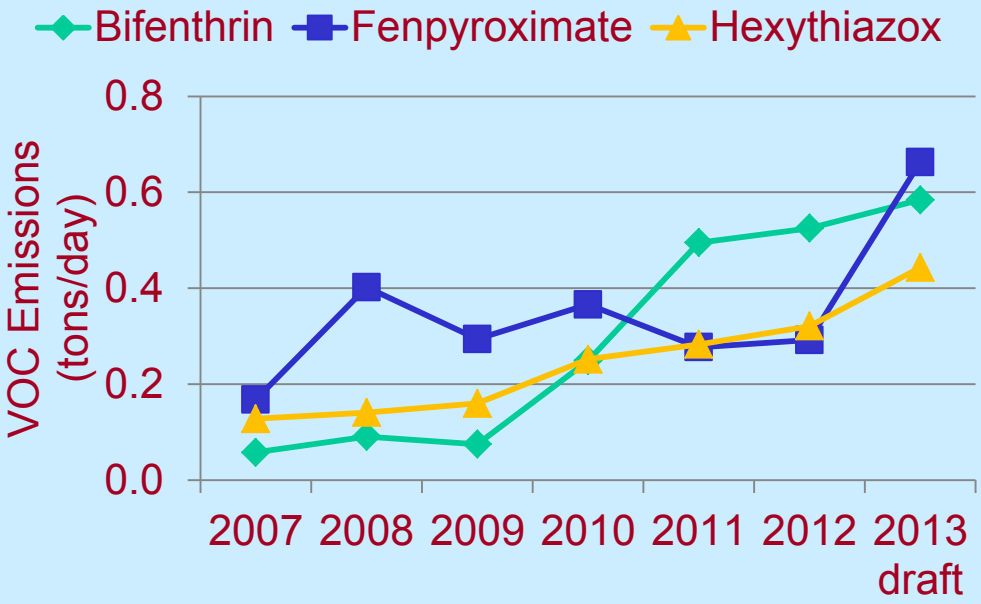
PCA requirements (3 CCR 6558)

- 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

Active Ingredient	Example of Higher VOCs	VOC EP	Example of Lower VOCs	VOC EP
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%

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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 not 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**
  - “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
  - Pam Wofford, Environmental Program Manager
  - 916-324-4297, Pam.Wofford@cdpr.ca.gov