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

* 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

* 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

VOC Emissions (tons/day)

2005 2006 2007 2008 2009 2010 2011 2012 2013

SIP goal 18.1 tons/day

Fumigant  Emulsifiable Conc  Other
Top pesticide VOC products for San Joaquin Valley, May-October 2013 (draft)

- Chlorpyrifos: 10%
- Abamectin: 10%
- 1,3-D: 10%
- Metam: 7%
- Glyphosate: 6%
- Oxyfluorfen: 5%
- Methyl bromide: 5%
- Fenpyroximate: 4%
- Gibberellins: 4%
- Bifenthrin: 3%
- Hexythiazox: 2%
- All other pesticides: 34%
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

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>VOC EP Threshold</th>
<th>Example High-VOC</th>
<th>VOC EP</th>
<th>Example Low-VOC</th>
<th>VOC EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abamectin</td>
<td>35%</td>
<td>Agri-Mek EC</td>
<td>55%</td>
<td>Agri-Mek SC</td>
<td>6%</td>
</tr>
<tr>
<td>Chlorpyrifos</td>
<td>25%</td>
<td>Lorsban 4E</td>
<td>50%</td>
<td>Lorsban Advanced</td>
<td>18%</td>
</tr>
<tr>
<td>Gibberellins</td>
<td>25%</td>
<td>Falgro 4L</td>
<td>94%</td>
<td>Falgro LV</td>
<td>18%</td>
</tr>
<tr>
<td>Oxyfluorfen</td>
<td>15%</td>
<td>Goal 2XL</td>
<td>62%</td>
<td>Goaltender</td>
<td>8%</td>
</tr>
</tbody>
</table>
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)
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
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
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
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))

• 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
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
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
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

VOC Emissions (tons/day)

2007 2008 2009 2010 2011 2012 2013

draft
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

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Example of Higher VOCs</th>
<th>VOC EP</th>
<th>Example of Lower VOCs</th>
<th>VOC EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bifenthrin</td>
<td>Fanfare 2EC</td>
<td>64%</td>
<td>Fanfare ES</td>
<td>6%</td>
</tr>
<tr>
<td>Fenpyroximate</td>
<td>Fujimite 5EC or XLO</td>
<td>&gt;39%</td>
<td>Akari 5SC or Miteus</td>
<td>~10%</td>
</tr>
<tr>
<td>Hexythiazox</td>
<td>Onager</td>
<td>&gt;39%</td>
<td>Hexyggon DF or Savey DF</td>
<td>~1%</td>
</tr>
</tbody>
</table>
Summary of dealer, grower and PCA nonfumigant requirements

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