



California Environmental Protection Agency
Department of Pesticide Regulation

Pesticide Air Initiative: Strategy to Reduce Toxic and Volatile Organic Compound Emissions from Agricultural and Commercial Structural Pesticides

August 2006

Agenda

- Overview of Policy and Process
- Background and Pesticide Emission Inventory
- Draft Concepts for Discussion
 - Fumigants
 - Liquid Emulsifiable Concentrates
 - Pest Management
 - Innovative Technologies
- Public Comments

Handouts provide details for many topics



Overview of Policy and Process

Paul Gosselin
Chief Deputy Director
DPR

Goals and Scope of Air Initiative

- **Address DPR's obligations to reduce volatile organic compound (VOC) emissions**
 - Current commitments of the 1994 State Implementation Plan (SIP)
 - Meet obligations of recent court decisions
- **Preparation of future commitments - 2007 SIP**
- **Reduce exposure to toxic air contaminants, particularly fumigants**
- **Reduce pesticide drift**

Approach to Improve Air Quality

- Reduce fumigant emissions
 - Regulations in 2008
- Reduce emulsifiable concentrate emissions
 - Reformulation decisions by 2007
- Improve pest management
- Adopt innovative technologies

Key Points

- Foundation will be built on regulatory actions over the next two years
- Long term strategy under consideration
- A long term, sustained commitment to research and implement emission reductions
- Meet the pest management needs of agriculture while achieving cleaner air
- We need your input on the direction we should take in developing our strategy

Timeline for the Air Initiative

- Informal workshops and public comment until September 1, 2006
- Fall 2006: Draft air initiative
 - Draft pesticide element of new SIP
 - Draft regulations
- Winter 2006-07: Formal public comment
 - Comment period for SIP and regulations
- Spring 2007: Finalize air initiative
 - Adoption of SIP by Air Resources Board
 - ARB sends SIP to EPA for review by 6/15/07



Background and Pesticide Emission Inventory

Randy Segawa
Program Supervisor
DPR – Environmental Monitoring

Background

- Volatile organic compounds (VOCs) and nitrogen oxides (NOx) react with sunlight to form ozone, a major air pollutant
- Many pesticide active and inert ingredients are VOCs
- As required by the Clean Air Act, Air Resources Board (ARB) and Air Pollution Control Districts (APCD) develop **State Implementation Plans (SIPs)** to reduce VOCs and NOx
- SIP requires the state to track VOC and NOx emissions, and reduce them by specified amounts in **nonattainment areas**

Major Sources of VOCs (San Joaquin Valley)

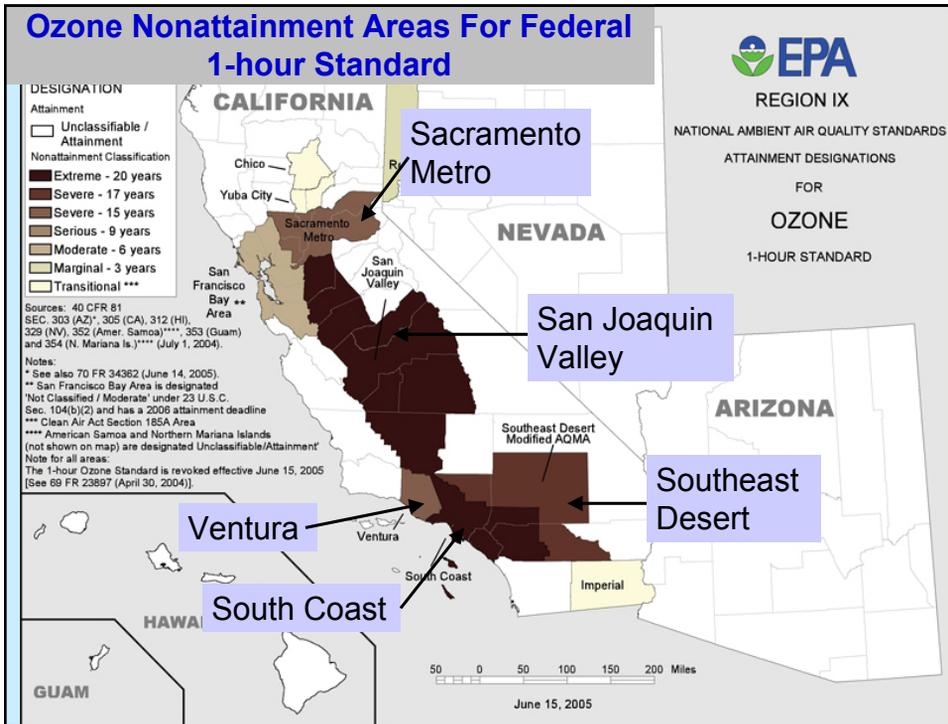
Category	% of 2004 Emissions
LIVESTOCK WASTE (DAIRY CATTLE)	9.6
LIGHT AND MEDIUM DUTY TRUCKS	9.1
LIGHT DUTY PASSENGER CARS	8.3
PRESCRIBED BURNING	7.5
OIL AND GAS PRODUCTION	7.4
PESTICIDES	6.3
CONSUMER PRODUCTS	6.2

Method for Estimating VOCs, NO_x, and Ozone

- ARB estimates VOC and NO_x emissions
- ARB uses computer modeling to estimate ozone concentrations based on VOC and NO_x emissions
- ARB verifies and adjusts modeling based on ozone air monitoring data

1994 SIP DPR Requirements

- Develop and maintain an inventory to track pesticide VOC emissions
- Implement regulations to achieve 20% reduction in five nonattainment areas (per court order)



Method for Estimating Pesticide VOCs

- DPR maintains an inventory of VOC emissions from agricultural and commercial structural applications of pesticide **products**
- VOC emission from a pesticide product is:

$$\text{emission} = \text{amount of product} \times \text{VOC fraction in product}$$
- *Amount of product* determined from pesticide use reports
- *VOC fraction (emission potential)* determined by:
 - Lab test (thermogravimetric analysis, TGA)
 - Water/inorganic subtraction
 - Confidential statement of formula
 - Default value

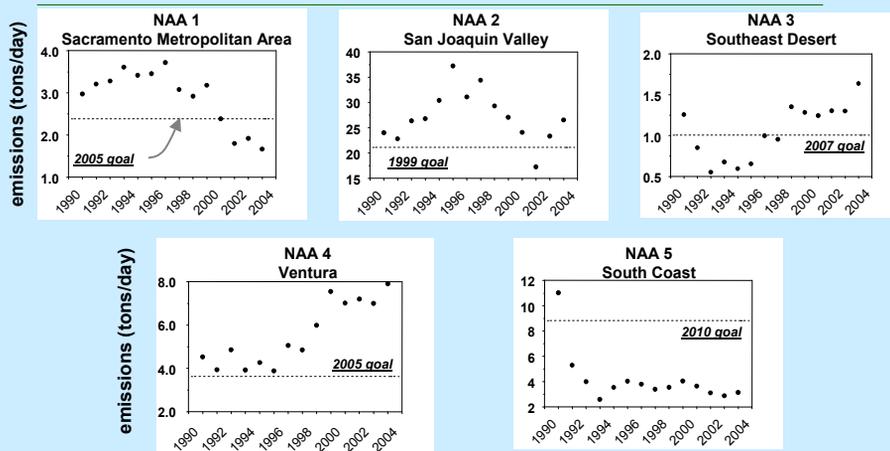
Emission Inventory Calculations

- DPR compiles an **emission inventory** of ag and commercial structural applications using emission potential and pesticide use data
- DPR calculates emissions for each year beginning with base year
- DPR updates each year of inventory annually based on most recent data
- Inventory focuses on:
 - May – Oct (peak ozone period) for each year
 - 5 nonattainment areas



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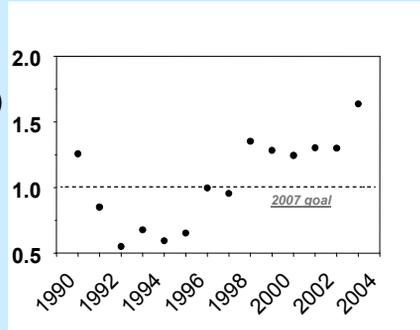
1990 - 2003 May - October Pesticide VOC Emissions



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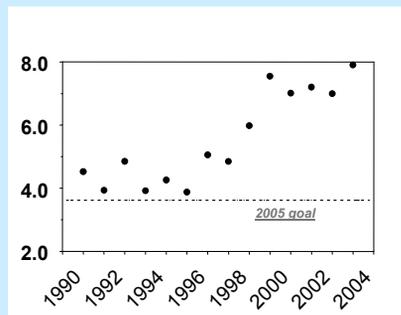
2003 Pesticide VOC Emissions in Southeast Desert Nonattainment Area

- Top “Primary” Active Ingredients (% of emissions)
 - Metam-sodium (49%)
 - Methyl bromide (17%)
 - Metam-potassium (7%)
 - Glyphosate (6%)
- Top Application Sites
 - Carrots (15%)
 - Peppers (15%)
 - Strawberries (13%)
 - Uncultivated ag (11%)



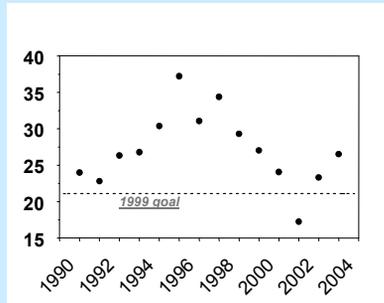
2003 Pesticide VOC Emissions in Ventura Nonattainment Area

- Top “Primary” Active Ingredients (% of emissions)
 - Methyl bromide (76%)
 - 1,3-dichloropropene (8%)
 - Metam-sodium (5%)
 - Chloropicrin (3%)
- Top Application Sites
 - Strawberries (83%)
 - Lemons (4%)
 - Tomatoes (3%)
 - Raspberries (2%)



2003 Pesticide VOC Emissions in San Joaquin Valley Nonattainment Area

- Top “Primary” Active Ingredients (% of emissions)
 - Metam-sodium (22%)
 - 1,3-Dichloropropene (15%)
 - Methyl bromide (11%)
 - Chlorpyrifos (11%)
- Top Application Sites
 - Carrots (18%)
 - Cotton (13%)
 - Almonds (12%)
 - Nursery-outdoor (5%)



Pesticide Emission Characteristics

- VOC emission patterns parallel pesticide use
- More than 90% of emissions from ag sources, except South Coast
- Fumigants are high contributors in all areas
- Emulsifiable concentrates are high contributors due to solvents in formulations

VOC Emissions by Product Type, San Joaquin Valley, May – Oct 2003

Pesticide Type	% of Pesticide VOC Emissions
Fumigant	51.5
Non-Fumigant	
Emulsifiable Concentrate	34.9
Other Liquid	5.8
Solid	3.9
Pressurized	3.8

Draft Strategy Discussion: Fumigants

Jerry Campbell
Assistant Director
DPR

Fumigation Methods



Fumigant Background and Goals

- Background
 - Fumigants are volatile pesticides applied at high rates
 - Fumigants are 50 – 90% of pesticide VOCs
 - Concerns with direct exposure
 - Reformulation not possible
- Goals
 - Reduce reliance on fumigants
 - Reduce emission rates
 - Reduce frequency and/or amount applied
 - Incorporate VOC reductions into risk management

Fumigant Reduction Status

- Current inventory assumes 100% VOC emission of fumigants
- Application method changes
 - Fumigation methods have changed since 1990 to reduce exposure
 - Future fumigant reductions will rely on additional changes to application methods
- Inventory needs to include adjustments for emissions under field conditions
- Research needed to modify application methods and other use practices



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Issue A-1: Fumigant Emission Reduction Regulations

- DPR will
 - Require certain low-emission application methods or prohibit certain high-emission methods
- DPR is considering
 - Requiring commodity fumigation facilities install capture systems
 - Requiring pest control businesses to employ controls as a condition of licensing
 - Requiring applicators to have a pest control operator license
 - Reducing subchronic exposure to methyl bromide



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Issue A-2: Future Fumigant Emission Reductions

- Research needed to identify future reductions
 - Several organizations funding and conducting research on alternative fumigation methods
- DPR is considering
 - Mandating registrants develop fumigant emission or application rate reduction plan
 - Requiring pest control businesses employ reduction measures as a licensing requirement

Issue A-3: Reducing Fumigant Emissions During Peak Season

- Peak ozone season occurs in May – October
- DPR is considering
 - Restricting fumigations in San Joaquin Valley, Southeast Desert, and Ventura during first two weeks in May and last two weeks in October
 - Allowing exceptions for emergency/critical uses

Issue A-4: Reducing Reliance on Fumigants - Alternatives

- Non-fumigant alternatives are moderately efficacious in some cases
 - Soil solarization
 - Crop rotation
 - Biological control
 - Resistant plant varieties
 - Cover crops
 - Organic soil amendments
 - Composted organic materials

Issues A-5, A-6, A-7, A-8: Reducing Reliance on Fumigants

- DPR is considering a more detailed evaluation of the need for individual fumigations and fumigation conditions
 - Quarantine/sanitation precautions
 - A demonstration that pests/diseases are at unacceptable levels prior to fumigation
 - A demonstration of an economic benefit of fumigation
 - Fumigant reactivity considerations; different fumigants create different amounts of ozone

Draft Strategy Discussion: Liquid Emulsifiable Concentrates

Randy Segawa
Program Supervisor
DPR – Environmental Monitoring

Emulsifiable Concentrate Background and Goals

- Background
 - Liquid pesticide products, particularly emulsifiable concentrates (ECs), contain VOC solvents
 - Liquid products contribute approx 35% of the pesticide VOC inventory in the San Joaquin Valley
- Goals
 - Reformulate products to lower VOC content
 - Under Pest Management element, reduce rate and frequency of application

Emulsifiable Concentrates

Current Status

- Until this year, approx 60% of the products in the pesticide VOC inventory had unknown VOC content (emission potential)
 - DPR requested a lab test (TGA) for approx 800 products in Feb 2005
 - This data call-in is essentially complete and the data is incorporated into the current inventory



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Emulsifiable Concentrates

Current Status*

- In May 2005, DPR requested plans to reformulate more than 700 products so that the emission potential is no greater than 20%
 - Most products dropped out for a variety of reasons, such as
 - TGA was <20%
 - No longer registered
 - Volatility essential for effectiveness (e.g. pheromones)
 - Due to failure to respond, DPR issued notices of cancellation for 15 products
 - DPR will complete the reformulation review and develop regulations by the end of 2006



*Details in handout

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Issue B-1: Reformulation

- Reformulation to an emission potential of 20% may not be achievable for many products
- DPR is considering
 - Identifying the lowest current emission potential for each active ingredient and require all liquid products with the AI to reformulate to that level
 - Reformulating with lower reactivity inert ingredients (chemicals that create less ozone)

Issue B-2: New Product Registration

- Reformulation actions address currently registered products
- As a requirement for the registration of new liquid products, DPR is considering
 - A VOC emission limit based on VOC content, application rate, and application frequency
 - Limiting the VOC content (emission potential) to the lowest amount feasible

Issue B-3: Evaluation of Reactivity

- Reactivity refers to the ability to create ozone
- Different chemicals can have very different reactivities, and create very different amounts of ozone
- DPR is considering accounting for reactivity in the inventory and reductions
 - Reactivity for most active ingredients is unknown
 - DPR would need to create a database of the inerts listed in the Confidential Statements of Formula



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Issue B-4: Low Vapor Pressure Exemption

- ARB exempts “low volatility” chemicals in consumer products
- DPR is reconsidering a low vapor pressure exemption for pesticides
 - This would account for recent lower volatility formulations to address transportation safety, as well as future reformulation
 - Some chemicals that meet the exemption criteria create ozone
 - Difficult to determine volatility of products used during the base year



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Issue B-5: Regulatory Consistency

- A registrant who offers to reformulate needs assurance that competitors must meet the same requirement
- DPR is considering limiting the availability of high-VOC products when low-VOC products are available

Issue B-6: Limit High-VOC Products to Critical Uses

- Emulsifiable concentrates may be critical for some crops/pests, but not all
- DPR is considering options to limit use of emulsifiable concentrates to critical needs

Issue B-7: Prioritize Label Amendments

- DPR is considering expediting review and approval of label amendments to add commodities or sites for low-VOC products

Draft Strategy Discussion: Changes to Pest Management

Pat Matteson
Pest Management Analysis and Planning
DPR

Changes to Pest Management

- Strategic partnerships
- Pest-resistant and tolerant crops
- Supporting pest exclusion
- Require Best Management Practices (BMP) evaluation as part of restricted material permit process
- Information driven pest management
- Promote change in commercially driven pesticide use



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Issue C-1: Strategic Partnerships

- Reestablish DPR's Pest Management Alliance program*
- Work with commodity groups to develop pest management alternatives
- Work with certification programs
 - Protected Harvest
 - Food Alliance
- Work with Natural Resources Conservation Service



*Details in handout

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Issue C-2: Pest-Resistant and Pest-Tolerant Crops

- Resistant crops can be very effective for some crops and pests
- Compatible with other IPM practices
- Cost effective
- Not available for all situations
- Development of new varieties takes years

Issue C-3: Supporting Pest Exclusion

- IPM practices can be disrupted when a new pest enters a region
- Create partnerships with federal, state, and county agriculture departments to strengthen measures to exclude pests
- Promote pest exclusion as an environmental issue

Issue C-4: Require Alternatives Evaluation in the Permitting Process

- DPR is considering
 - Requiring acknowledgement that the lowest VOC pesticide was considered when a pest control advisor makes a recommendation
 - Requiring pest control advisors to consider best management practices and UC IPM guidelines when making a recommendation

Issue C-5: Information Driven Pest Management

- An interactive website could integrate knowledge on pesticide environmental risks with emission rates, toxicity, efficacy and cost of pesticides

Issue C-6: Promote Change in Commercially Driven Pesticide Use

- Pesticide use is often affected by:
 - Agricultural lenders
 - Insurers
 - Shippers
 - Export/Import requirements

Draft Strategy Discussion: Adoption of Innovative Technologies

Pat Matteson
Pest Management Analysis and Planning
DPR

Adoption of Innovative Technologies: Precision Agriculture*

- Precision agriculture refers to better targeting of farm practices to make them more efficient. These technologies include:
 - Equipment designed to improve application efficiency and reduce waste (e.g. special nozzles)
 - Variable rate technologies that change the rate of application according to variations in field conditions
 - Remote sensing and mapping technologies that can reduce pesticide use by guiding variable rate application.



*Details in handout

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Issue D-1: Identify and Promote Adoption of Innovative technologies

- Create an inventory of the types of equipment and technologies that are available
- Promote adoption through incentives and/or requirements



Public Comment

Comments accepted until September 1, 2006.

Send comments to:

Department of Pesticide Regulation

Attn: Air Initiative

PO Box 4015

Sacramento, CA 95812-4015

AirInitiative@cdpr.ca.gov

Or contact Cheryl Langley

clangley@cdpr.ca.gov

(916) 324-4273