

Volatile Organic Compound Emissions from Pesticides

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Background

Volatile organic compounds (VOCs) and nitrogen oxides (NOx) react with sunlight to form ground-level ozone, a major air pollutant. Many active and inert ingredients in pesticide products are VOCs. As required by the federal Clean Air Act, the Air Resources Board (ARB) and Air Pollution Control Districts (APCDs) are the lead agencies for preparing State Implementation Plans (SIPs) to reduce VOCs and NOx. The 1994 SIP requires the Department of Pesticide Regulation (DPR) to reduce VOC emissions from pesticides in five ozone nonattainment areas. Specifically, DPR must reduce the May – October pesticide VOC emissions by the following amounts of the 1990 base year:

South Coast: 20% by 2010

Southeast Desert: 20% by 2007

Ventura: 20% by 2005

Sacramento Metro: 20% by 2005

San Joaquin Valley: 12% by 1999

VOC Emission Inventory

To track and determine compliance, DPR maintains an inventory of VOC emissions from agricultural and commercial structural pesticide products. DPR estimates the VOC emissions for each product based on the VOC fraction (emission potential) of the product multiplied by the amount of product applied (from pesticide use reports). DPR calculates VOC emissions from agricultural and commercial structural applications for all years, beginning with the 1990 base year.

As of 2002, the South Coast and Sacramento Metro nonattainment areas meet their pesticide VOC reductions. As of 2002, the Southeast Desert, Ventura, and San Joaquin Valley nonattainment areas do not meet their pesticide VOC reductions. The San Joaquin Valley is currently out of compliance with the SIP because it does not meet its 1999 target reduction. VOC emissions patterns parallel pesticide use patterns, with areas and time periods of high pesticide use coinciding with high VOC emissions. Fumigants and pesticides formulated as emulsifiable concentrates account for most of the VOC emissions in all nonattainment area. Herbicides that make up a significant fraction of the emission inventory include: methyl isothiocyanate (metam), glyphosate, molinate, acrolein, thiobencarb, EPTC, oxyfluorfen, and trifluralin.

Key Regulatory and Legal Issues

DPR is no longer in compliance with the pesticide SIP for the San Joaquin Valley. Moreover, even if pesticides were in compliance the San Joaquin Valley would need to reduce all VOC emissions by approximately 30% to achieve the federal 1-hour ozone standard. In April of 2004 the U.S. Environmental Protection Agency (U.S. EPA) established a more stringent 8-hour ozone standard. Additional VOC reductions from all sources are needed to meet the new ozone standard by 2010 to 2021, depending on the nonattainment classification. DPR and ARB are also being sued for allegedly failing to meet the requirements of the 1994 SIP.

Current and Future Activities

DPR and ARB are preparing a new SIP to address the 8-hour ozone standard. ARB must submit a statewide SIP to U.S. EPA by June 2007. Research is needed to assist in preparing the new SIP. The following research is needed for the pesticide VOC emission inventory:

Determine emissions of pesticide VOCs under field conditions

Determine the speciation (specific chemical makeup) and reactivity (ability to create ozone) of pesticide VOCs

Research is needed to determine if the following measures reduce pesticide VOC emissions, the magnitude of reductions, and the feasibility:

Integrated Pest Management techniques focused on VOCs

Formulation changes and new pesticides

Application method changes, particularly for fumigants

Application rate reductions

Temporal changes (changing application date outside May – Oct, or night applications)

Research studies to investigate some of these issues will be initiated in 2005.

Due to the 1994 SIP requirements, DPR cannot wait until research is completed to implement regulatory measures. DPR plans to initiate a reevaluation and establish a new registration requirement mandating submittal of emission potential data by registrants. DPR is also considering VOC limits or other reduction measures for certain pesticide products.