

**State of California**



**California Environmental Protection Agency**

**AIR RESOURCES BOARD**

**Staff Report on the  
San Joaquin Valley Smoke Management  
Program and Consideration of Modifications  
to Agricultural Burning Requirements**

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## EXECUTIVE SUMMARY

The Air Resources Board (ARB or Board) is required under state law to review the implementation process for the phase-out of agricultural burning by the San Joaquin Valley Air Pollution Control District (District). The last phase of program implementation begins June 1, 2010, provided ARB concurs that the District has complied with specific statutory criteria. The phase-out of most agricultural burning is being accomplished through a schedule for specific types of agricultural waste established by SB 705 (Statutes of 2003, Florez; Health and Safety Code Sections 41855.5 and 41855.6). The law provides for postponement of the statutory schedules under certain conditions.

The requirements of SB 705 are being implemented in conjunction with California's longstanding smoke management programs adopted by air districts consistent with ARB regulations. ARB's statewide regulations for smoke management were comprehensively updated in 2000, and air districts were required to strengthen their smoke management programs. The combined effect of both sets of requirements has been an almost 70% reduction in total acreage of agricultural materials burned since 2002 in the San Joaquin Valley.

The first three phases of SB 705 addressed field crops, prunings, weed abatement, diseased crops, and orchards removals. This final phase for Board consideration would address phase-out of vineyard removal materials, prunings from almonds, walnuts, pecans, grape vines and canes, raisin trays, and other agricultural related materials (brooder paper, deceased goats, and diseased beehives). The District proposes some postponements as part of the final phase-out. The proposed Board action also includes continuation of previously approved postponements, with three modifications. The threshold for postponement for small orchard removals is lowered from 20 to 15 acres, fig orchards are now subject to the limits for orchard removals, and the phase-out for rice straw will remain at 30% until 2015.

The District may postpone the phase-out of burning for any of the materials if all of the following conditions are met:

- There is no economically feasible alternative means of eliminating the waste;
- There is no long-term federal or State funding commitment for the continued operation of biomass facilities in the San Joaquin Valley or development of alternatives to burning; and
- The continued issuance of permits will not cause, or substantially contribute to, a violation of an applicable federal air quality standard (standard).
- ARB concurs that the above requirements have been met.

Depending upon the commodity and specific waste material, the proposed postponements are based on either economic or technical infeasibility. The primary reasons for technical infeasibility are need for disease control and lack of alternatives.

To establish a basis for assessing economic feasibility, the District used analyses conducted by economic consultants and information obtained from the U.C Davis Cooperative Extension. The District used a return on sales (ROS) metric to set a threshold for economic feasibility of alternatives. That threshold is a 10% impact on profit.

Historically, ARB has used a 10% threshold of return on equity (ROE), not sales, to decide if alternatives are economically feasible. This methodology was established in a 1995 ARB report<sup>1</sup> by Dr. Peter Berck of UC Berkley. However, data on equity in the agricultural sector can be hard to find and is often outdated. When sufficient data cannot be found to calculate ROE, ROS can be used as a proxy. The District has a precedent of using the ROS approach with a 10% cut off for economic feasibility when developing District rules. This methodology and the 10% threshold are discussed in the publication *Socioeconomic Analysis Program Impact Screening and Analysis Procedures* which was prepared by Decision Economics, Inc. for the District in 1994.

From an air quality and public health perspective, the most important pollutant associated with agricultural burning is PM2.5. The District's smoke management program limits burning to avoid contributing to violations of the daily PM2.5 standard. The phase-out assists in reducing PM2.5 emissions that contribute to the annual PM2.5 standard. The combination of ARB's statewide smoke management regulation, the District's smoke management program, and the SB 705 phase-outs in 2005 and 2007 have resulted in about a 65% reduction in PM2.5 emissions from burning of agricultural materials since 2002.

The ARB staff has evaluated the potential for the limited remaining agricultural burning to contribute to measured PM2.5. Analyses were done for Fresno and Bakersfield using emissions inventory data and speciated monitoring data. Based on the District expected action on May 20, 2010, the estimated contribution of remaining burning to measured PM2.5 air quality levels is less than 3% in both Fresno and Bakersfield. Staff is proposing that, contingent on final action by the District Board on May 20, 2010, the Board concurs that the District has met the required statutory criteria.

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<sup>1</sup> Berck, P., 1995. *Development of a Methodology to Assess the Economic Required by SB513/AB969*. Available at [http://www.arb.ca.gov/research/apr/past/econ.htm#Economic\\_Impacts](http://www.arb.ca.gov/research/apr/past/econ.htm#Economic_Impacts)

# I. INTRODUCTION

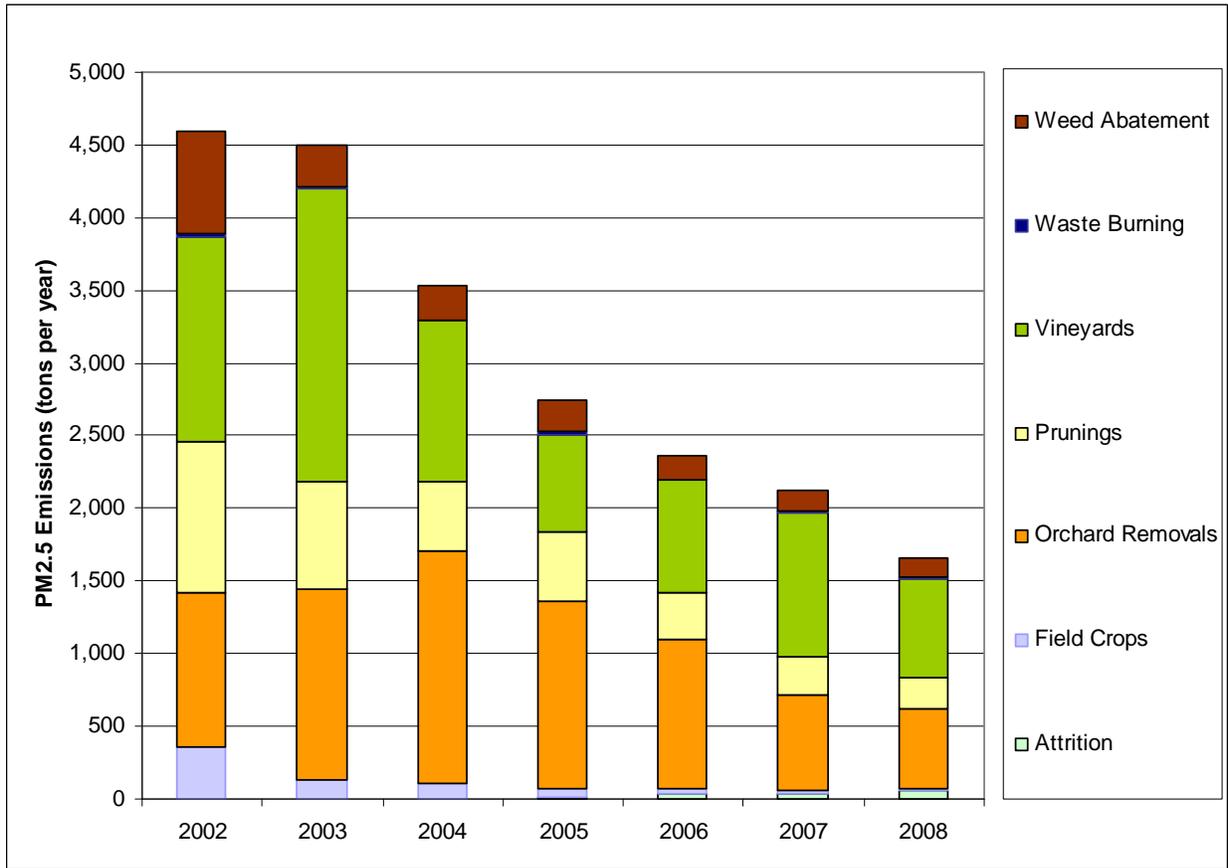
## Management of Agricultural Burning in the San Joaquin Valley

Two State law requirements govern the management of agricultural burning in the San Joaquin Valley. In March 2000, the Air Resources Board (ARB or Board) adopted amendments to the State's Smoke Management Guidelines (Guidelines) to minimize the impacts from agricultural and prescribed burning on ambient air. The Guidelines emphasize effective planning, coordination among burners and air quality managers, and use of the most technically advanced air quality and meteorology burn management tools. The Guidelines required air districts to develop smoke management programs for ARB review and approval. In addition, in 2003 Senate Bill 705 was enacted requiring the District to develop a phase-out schedule for agricultural burning.

In response to the Guidelines, the San Joaquin Valley Air Pollution District (District) has developed an updated Smoke Management System (System) to minimize the impacts of agricultural burning on ambient air quality in the San Joaquin Valley. The System establishes 103 zones in the Valley based on topographical, geological, and meteorological conditions. Through predicted meteorological conditions, the System sets burning allocations in each zone to amounts that would not cause a public nuisance, impact smoke sensitive areas, or create or contribute to an exceedance of federal 8-hour ozone or 24-hour PM<sub>2.5</sub> and PM<sub>10</sub> standards. Agricultural burn allocations are made on a first come, first serve basis up to the day's cap. Burners who do not receive an allocation or a partial allocation are placed on a waiting list for a future day. Due to the structure of the system, on any given day, burning may be allowed in many zones, however the total amount of acreage allowed in each zone is limited to prevent air quality impacts.

While the San Joaquin Valley's System carefully regulates and effectively caps allowable agricultural burning, the District has further limited the types of agricultural materials that can be burned through implementation of SB 705. As a result, due to the parallel implementation of both the District's Smoke Management System and SB 705, significant progress in reducing the impacts of agricultural burning in the San Joaquin Valley has been achieved (Figure 1). Based on yearly data of acreage burned, these practices have reduced the total acreage of agricultural materials burned since 2002 by approximately 70%, which reduced particulate matter (PM<sub>2.5</sub>) emissions by almost 65%. In 2008, the remaining agricultural burning contributed approximately five percent to the total PM<sub>2.5</sub> emissions in the San Joaquin Valley.

**Figure 1. Decrease in Annual PM2.5 Emissions for Agricultural Burning in the San Joaquin Valley**



Source: District Permit Data

### **Overview of SB 705 Implementation**

As discussed in the previous section, SB 705 was codified in the California Health and Safety Code (sections 41855.5 and 41855.6) in 2003 requiring the District to further phase-out the open burning of agricultural crops and waste in the San Joaquin Valley. SB 705 also requires the District to establish best management practices for the control of other weeds; and to develop and adopt rules to regulate the burning of diseased crops through the issuance of conditional crop burning permits. The following schedule specifies the dates for SB 705 requirements and for commencement of burn prohibitions:

June 1, 2005

- Start of burn prohibitions for field crops, prunings, and weed abatement;
- Establish best management practices for the control of other weeds and maintenance; and
- Regulate the burning of diseased crops.

June 1, 2007

- Start of burn prohibitions for orchard removals.

June 1, 2010

- Start of burn prohibitions for vineyard removal materials, prunings from surface harvested crops, and other materials.

The District may postpone any of the prohibitions if the District determines all the following conditions apply:

- There is no economically feasible alternative means of eliminating the waste;
- There is no long-term federal or State funding commitment for the continued operation of biomass facilities in the San Joaquin Valley or development of alternatives to burning; and
- The continued issuance of permits will not cause, or substantially contribute to, a violation of an applicable federal air quality standard (standard).
- ARB concurs that the above requirements have been met.

The District addressed the SB 705 requirements for the first two deadlines through previous amendments to their Open Burning rule (Rule 4103). In September of 2004, the District amended rule 4103 to allow for conditional permitting to authorize the burning of diseased crops (Phase I). The rule was further amended in May of 2005 to eliminate burning of waste from field crops, prunings, and weed abatement operations, and to establish best management practices for other weeds (Phase II). On May 17, 2007, the District again amended rule 4103 to prohibit burning of orchard removal matter (Phase III). Postponements were adopted for some crops per SB 705 criteria. ARB staff concurred with these postponements.

The District is adopting the final phase (Phase IV) of the SB 705 prohibitions in two steps. On April 15, 2010, the District amended Rule 4103 to incorporate all SB 705 provisions. The amended rule requires the District to develop a report with recommendations on agricultural burning and to re-evaluate the report at least once every five years. On May 20, 2010, the District will consider the ***Proposed Staff Report Recommendations of Agricultural Burning*** (Report), documenting the assessment of the economic feasibility of alternative modes of disposal for the materials

with a June 1, 2010 burn prohibition date. In this phase, the District is:

- Assessing prohibitions for
  - Vineyard removal materials;
  - Surface harvested prunings (almonds, walnuts, pecans), grape vines, vineyard materials including grape canes and raisin trays; and
  - Other materials (brooder paper, deceased goats, and diseased beehives).
  
- Revisiting previously adopted postponements for
  - Orchard removals of citrus, fig, apple, pear, and quince crops;
  - Orchard removal of less than 20 acres at a single location;
  - Prunings from fig, apple, pear, and quince crops;
  - Weed abatement affecting waterways (ponding and levee banks); and
  - Phase-down of rice straw burning.

Some of the largest crops (by acreage) affected by the burn rule include almonds, grapes, citrus, walnuts, and apples. Recent poor economic conditions coupled with water shortages in the San Joaquin Valley has resulted in a decrease in acreage for all of these crops with the exception of almonds. Table 1 below shows the total acres planted for these crops in 2002 and 2007 in the San Joaquin Valley. Grapes, citrus, walnuts, and apples all saw a decrease in acreage over this time period. The amount of acres planted in almonds increased over this period, most likely do to very high almond prices from 2003 to 2007.

**Table 1. Change in Crop Acreage in the San Joaquin Valley**

	<b>2002 (acres)</b>	<b>2007 (acres)</b>	<b>Change (acres)</b>
<b>Almonds</b>	543,840	627,336	83,496
<b>Grapes</b>	585,626	557,549	-28,077
<b>Citrus</b>	227,624	214,215	-13,409
<b>Walnuts</b>	133,163	117,906	-15,257
<b>Apples</b>	20,436	10,230	-10,206

Source: USDA, National Agriculture Statistics Service

There has also been a decrease in the number of operations growing each crop, with the exception of almonds, as shown in Table 2. However, the small increase in almond operations does not compensate for the loss of operations in the other crops. The decreases in acres planted and number of operations of these crops provides an indication of the profitability of growing them.

**Table 2. Change in Number of Operations in the San Joaquin Valley**

	2002	2007	Change
<b>Almonds</b>	4,956	4,978	22
<b>Grapes</b>	5,132	4,512	-620
<b>Citrus</b>	3,166	2,872	-294
<b>Walnuts</b>	2,937	2,470	-467
<b>Apples</b>	421	294	-127

Source: USDA, National Agriculture Statistics Service

## **II. ASSESSMENT OF DISTRICT STAFF PROPOSED PHASE-OUT**

### **Overview**

This section presents ARB staff's assessment of the District's staff's recommendations for agricultural burning prohibitions beginning in June 2010. For the purpose of determining concurrence as required by State law, the ARB staff review is focused on whether the District's determinations are consistent with the criteria specified in SB 705. ARB staff's assessment is based upon the version of the ***Proposed Staff Report Recommendations of Agricultural Burning*** released by the District staff on April 20 for consideration at the District's May 20, 2010 Board meeting.

State law requires the District to evaluate whether there are economically feasible alternatives to burning in order to postpone any burn prohibition. As a first step in the evaluation, the District must determine if there are technically feasible alternatives to the burning for the crops being addressed. The District must then determine if such alternatives are economically feasible. Table 3 presents a summary of the resulting District staff proposal. Since feasible alternatives are available, beginning on June 1, 2010, open burning of grape vine, grape cane, and fig crop prunings, as well as brooder paper and diseased goats will be prohibited. No technologically feasible alternatives were found for raisin trays; diseased beehives; pome fruit (apple, pear and quince) orchard removal and pruning materials; and for weed abatement affecting surface waterways. Thus, the District staff proposes that the burning of these materials be allowed. Although there are technically feasible alternatives for the remaining materials, these alternatives were found not to be economically feasible. As a result, the District staff proposes to allow burning of these materials. However, as shown in Table 3, limitations on the amount of burning allowed has been proposed for some crops based on differential costs. The District will revisit all postponements within five years to reassess both technical and economic feasibility.

To develop the proposal, the District worked closely with representatives from the agriculture community and other agencies in addition to consulting with biomass and

chipping industry representatives. The District staff conducted a public workshop on the proposal on May 14, 2010.

**Table 3. District’s Agricultural Burning Proposals for Phase IV**

	<b>Crop Category and Crop Type</b>
<b>Prohibit Burning</b>	
Feasible Alternatives	<b>Surface Harvested Prunings</b> <ul style="list-style-type: none"> <li>• Grape Vine Prunings</li> <li>• Grape Canes</li> </ul>
	<b>Other Materials</b> <ul style="list-style-type: none"> <li>• Brooder Paper</li> <li>• Deceased Goats</li> </ul>
	<b>Fig Crop Prunings</b>
<b>Allow Burning</b>	
No Technologically Feasible Alternative	<b>Surface Harvested Prunings</b> <ul style="list-style-type: none"> <li>• Raisin Trays</li> </ul>
	<b>Other Materials</b> <ul style="list-style-type: none"> <li>• Diseased Beehives</li> </ul>
	<b>Orchard Removal Matter and Prunings</b> <ul style="list-style-type: none"> <li>• Pome Fruits (Apple, Pear, Quince)</li> </ul>
	<b>Weed Abatement Affecting Waterways</b>
No Economically Feasible Alternative	<b>Vineyard Removal Materials</b> <ul style="list-style-type: none"> <li>• Grapes and Kiwi Crops</li> </ul>
	<b>Orchard Removal Matter</b> <ul style="list-style-type: none"> <li>• Citrus Crops</li> </ul>
<b>Allow Limited Burning</b> (Limited Economical Feasibility of Alternative)	
1. Only 70% of acreage can be burned; 2. Burning prohibited starting in June 2015.	<b>Rice Stubble (Straw)</b>
1. Prohibit burning at sites with 3,500 or more total nut acres; 2. For sites with less than 3,500 total nut acres: a. Allow burning of up to 20 acres of prunings per year, and b. Allow burning additional prunings, pending, i. Grower submittal of estimated shredding cost, and ii. District determination of financial impact and timing of shredding service availability.	<b>Surface Harvested Prunings</b> <ul style="list-style-type: none"> <li>• Almonds, Walnut, and Pecan Crops</li> </ul>
Reduce burning allowance to 15 acres or less per location per year	<b>Orchard Removal</b> <ul style="list-style-type: none"> <li>• Other Orchards of 20 Acres or Less</li> <li>• Fig Crops</li> </ul>

## Discussion of District Staff Proposal

### **Prohibit Burning**

Growers have already been using no-burn alternatives to dispose of some pruning materials, brooder paper, and deceased goats. It is common practice to shred grape vine and grape cane prunings and incorporate them into the soil. Farmers also shred fig prunings and leave them in place to decompose. Brooder paper gets sent to landfills and deceased goats are buried. Consequently, the burning of these materials will be prohibited beginning on June 1, 2010.

### **Allow Burning: Alternatives Not Technically Feasible**

Based on an assessment of the potential alternatives to burning, there do not appear to be technically feasible alternatives available, and therefore no economically feasible alternatives for raisin trays, diseased beehives, pome fruit prunings and orchard removals, and weed abatement affecting surface waterways.

#### Raisin Trays

Raisin trays are paper trays used to dry the grapes on the ground. These trays contain polymer so that the moisture on the ground can not be absorbed in the raisin tray. The grapes remain on the raisin trays until they meet the appropriate moisture content. In the past, growers used recycling firms to dispose of the trays. These recycling firms shipped the trays to China for reuse. However, due to the value of the dollar, China has cut off the import of raisin trays and this alternative is no longer viable. Since the polymer does not degrade quickly, soil incorporation is not a feasible alternative to burning raisin trays. In addition, due to the polymer, biomass facilities will not accept raisin trays. Therefore, at this time there are no feasible alternatives to burning raisin trays and the District has proposed to postpone this burn prohibition.

#### Diseased Beehives

Recently, a phenomenon known as colony collapse disorder has been causing bees to mysteriously abandon their hives, leaving only the queen and worker bees. Bee pollination is vital to California's agriculture industry. If diseased beehives are transported, there is opportunity to spread the disease to other beehives in California. In addition, California regulations require that infested bee colonies be killed and if burned be done according to local district regulations. Therefore, in order to reduce the spread of disease and its impact on California's agriculture industry, the District has determined there is no alternative to burning diseased beehives and has proposed postponement of this burn prohibition.

## Pome Fruit Prunings and Orchard Removal Matter

Pome fruits include apple, pear, and quince crops. The primary concern for pome fruits is their susceptibility to fire blight, a bacterial disease that kills blossoms, shoots, limbs, and potentially the entire tree. Chipping/grinding and composting create a potential opportunity for transfer and infection of nearby orchards. Fire blight is prevalent in the San Joaquin Valley and is a difficult disease to control. Burning of infected material is a preventive measure used by growers to help ensure the disease does not spread. In light of the disease issue, the District determined that there is no feasible alternative to burning pome fruit prunings or orchard removal matter at this time.

## Weed Abatement Affecting Surface Waterways

Surface waterways have steep slopes and are in remote locations. The steep bank slopes need to be devoid of vegetation so that they can be checked for rodents. Available alternatives include hand crews, mowing, tilling, and chemicals. The labor-intensive removal of individual weeds on steep bank slopes creates worker safety issues and is technologically infeasible due to the magnitude of weed abatement required. Mowing and tilling on these steep banks also pose worker safety issues. Finally, spraying chemicals on the weeds near the waterways can cause the chemicals to run off into the waterways. The State Water Resources Control Board is advocating the elimination of spraying near waterways to avoid contamination. Based on worker safety and water quality concerns, there are no feasible alternatives to control weeds near waterways, thus the District has proposed postponement of this burn prohibition.

## **Allow Burning: Alternatives Not Economically Feasible**

For the remaining crops discussed below, there are technically feasible alternatives to burning. These include:

- Shredding materials and leaving them on the ground;
- Tilling shredded materials into the soil;
- Chipping materials and transporting to a biomass power plants for use as fuel; and
- Baling of straw materials for various commercial purposes.

In order to assess the economic impacts that burning restrictions would have on these crops, the District contracted with an economic consulting firm. The District and consultant gathered information on crop profitability and estimates of compliance costs from affected industry stakeholders and other sources including the U.C. Davis Cooperative Extension Service. Using this data, the consultant estimated the net after tax profit ratios for the affected crops and calculated a ratio of profit per dollar of revenue for affected industries. The result is an analysis that shows the proportion of profits represented by the cost of compliance.

The district applied a 10% threshold to the ratio calculation described above, which is referred to as return on sales (ROS). If the ROS is greater than 10% (i.e. compliance cost is greater than 10% of net profit) then the mechanism analyzed as an alternative to burning is considered to not be economically feasible. In calculating the ROS, cost and profit data was averaged over a ten year period. Given the recent economic downturn, use of a ten year average represents a conservative approach, and ROS values based on more recent economic data would likely be higher.

Historically, ARB has used a 10% threshold of return on equity (ROE), not sales, to decide if alternatives are economically feasible. This methodology was established in a 1995 ARB report<sup>2</sup> by Dr. Peter Berck of UC Berkley. However, data on equity in the agricultural sector can be hard to find and is often outdated. When sufficient data cannot be found to calculate ROE, ROS can be used as a proxy. The District has a precedent of using the ROS approach with a 10% cut off for economic feasibility when developing District rules. This methodology and the 10% threshold are discussed in the publication *Socioeconomic Analysis Program Impact Screening and Analysis Procedures* which was prepared by Decision Economics, Inc. for the District in 1994.

### Grape and Kiwi Crop Vineyard Removal Materials

The chipping of vineyard materials with subsequent transport and processing at biomass power plants is the most likely alternative to open burning. Grape and kiwi vine cultivation requires use of extensive trellis systems to support the vines. The support system consists of wires and may include wood or metal posts and stakes. In some instances, grape canes remaining after pruning get wrapped around the wires to provide the needed support. As vines mature and age, trellis wires become deeply embedded into the canes or cordons. To avoid mechanical damage to chippers and biomass power plants, the embedded wires need to be removed. Wire removal requires intensive manual labor, adding significant cost to vineyard growers. Biomass power plant operators have indicated they accept vineyard materials. However, in some cases, chipping operators refuse to process these materials because of the wires. In addition, due to the limited number of chipping contractors operating in the Valley, service may not be available according to the vineyard grower's schedule, which can cause delays in planting for the following season.

The ROS for the chipping/biomass power plant option for kiwi vineyard removal materials ranged between 11.1% and 16.6% for less than 100 acre (smaller) vineyards and between 9.5% and 14.1% for 100 acre or greater (larger) vineyards. For grape vineyard removal materials, the ROS ranged between 55.2% and 129% for smaller vineyards and between 46.9% and 109.7% for larger vineyards. Therefore, the District concluded that there are no economically feasible alternatives to the open burning of grape and kiwi crop vineyard removal materials and has proposed postponement of the burn prohibitions.

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<sup>2</sup> Berck, P., 1995. *Development of a Methodology to Assess the Economic Required by SB513/AB969*. Available at [http://www.arb.ca.gov/research/apr/past/econ.htm#Economic\\_Impacts](http://www.arb.ca.gov/research/apr/past/econ.htm#Economic_Impacts)

## Citrus Crop Orchard Removal

Similar to vineyard removals, the chipping of citrus orchard removals with subsequent transport and processing at biomass power plants is the most likely alternative to open burning. The adobe soil in which citrus crops are usually grown is extremely difficult to remove from the extensive root system of citrus trees. Separating the roots from the trunk prior to chipping, as well as screening the chipped root material to remove excessive clumps all increase the costs associated with chipping citrus material. In addition, ground citrus wood produces stringy material. As a result, only three of the nine biomass facilities in the Valley accept citrus orchard removal materials. Those biomass facilities which do accept citrus chips will blend 25% to 30% of citrus material with other crops to promote better flow of the material through the equipment. Given the limited number of biomass facilities which will accept citrus material, as well as the need to blend only limited amounts with other materials, there is significant concern whether sufficient biomass capacity exists to handle all of the orchard removal material generated in the Valley.

Depending upon the amount of material removed, the cost to chip and haul material to a biomass facility is approximately 2 to 4 times higher per acre than open burning. ROS values ranged from 10.9% to 11.9% for small farms, and 9.4% to 10.3% for large farms. Given concerns regarding biomass capacity, as well as cost-effectiveness issues, the District determined that there is no economically feasible alternative to burning citrus crop orchard removal material at this time and has proposed postponement of the burn prohibitions.

## **Allow Limited Burning**

### Rice Stubble (Straw)

Previous rule amendments established a phase-down schedule for in-field burning of rice straw requiring partial phase-downs of 30% of the total acreage farmed through mid 2010, 50% through mid 2015, followed by full phase-out starting June 1<sup>st</sup>, 2015. The current District recommendation maintains the full phase-out in 2015, but removes the interim 50% limitation.

While growers have been implementing some alternatives to burning, such as baling rice straw for off-field use, economic and market factors limit the viability of this alternative. Within the last few years, the market for rice straw bales has become almost non-existent. Furthermore, the limited supply of irrigation water in the San Joaquin Valley prevents use of post-harvest in-field straw degradation processes prevalent in the Sacramento Valley. The continuation of the 30% burning limitation allows the growers to limit burning using current alternatives to the best of their ability while allowing additional time to identify and implement other feasible alternatives. The District, therefore, determined that further reducing the rice straw burning in the San Joaquin Valley appears both technically and economically infeasible at this time.

## Almond, Walnut and Pecan Prunings

Shredding and soil incorporation is the most likely alternative to open burning for almond, walnut, and pecan prunings. Due to differential cost impacts, evaluation of costs and practices looked at sites with total nut acreage crop of 3,500 acres or more (larger operations) and those with less than 3,500 acres.

- Total Nut Acreage of 3,500 Acres or More

In order to shred the prunings, farmers have two options, purchase a shredder or hire a custom shredder. Some large growers have already purchased shredders as an alternative to burning prunings. For agricultural operations whose total nut crop acreage is 3500 acres or more, it is more economically feasible to purchase a shredder than hire a custom shredder. The ROS for this alternative is 8.5% and therefore, below the District's threshold. Thus, the District has proposed prohibiting the burning of almond, walnut, and pecan prunings for growers with agricultural operations whose total nut crop is larger than 3500 acres since shredding and soil incorporation is an economically feasible alternative.

- Total Nut Acreage of Less Than 3,500 Acres

For agricultural operations whose total nut crop is less than 3500 acres at all operation sites, the purchase of a custom shredder is cost prohibitive. Therefore, costs associated with hiring a custom shredder were evaluated. Custom shredders charge a two-hour service fee and are capable of shredding up to 20 acres within this time. Therefore, for operations smaller than 20 acres, the cost becomes much higher on a per acre basis. While the District's contractor did not look specifically at the ROS for a 20 acre threshold, the contractor did determine that for 15 to 24.9 acres, the ROS would be 10.3% and therefore above the threshold established by the District. Therefore, the District has proposed allowing burning of up to 20 acres per year.

The ROS for pruning more than 25 acres was 10%. Growers have expressed concerns that due to the limited number of custom shredders operating in the San Joaquin Valley, their services may not be available within the time frame consistent with established pruning/spraying/irrigating practices. Therefore, the District has proposed to allow additional burning beyond the 20 acres provided:

- The agricultural operator submits to the District Air Pollution Control Officer (APCO) before the pruning operation is completed, a representative cost estimate(s) for shredding all prunings generated by the total nut acreage at the agricultural operation site. The cost estimate(s) shall reflect shredding in a time frame that allows the operator to proceed with established post-pruning cultural practices; and
- The APCO determines that either the submitted cost estimate(s) represent(s) an unreasonable financial impact to the operator, or that adequate shredding

services are not available in time for the operator to proceed with established post-pruning cultural practices.

### Orchard Removal Matter of 20 Acres or Less

Since June 2007, the District has required a case-by-case economic justification for permitting burns of 20 acres or less in farms of greater than 100 cumulative acres. Analysis of this information led the District to limit the number of burning permits issued, in accordance with the provisions for narrow implementation of burning for orchards of 20 acres or less established in 2007.

Based on information collected as part of this case-by-case evaluation, the chipping/biomass option for orchard removal materials is cost effective for farms of less than 100 acres, with an estimated ROS of 7.0%. However, based on updated information gathered on grind and haul costs, the per-acre chipping costs increases significantly for the smallest orchards within this size range. While chipping becomes economically infeasible for the removal of 15 acres or less, the cost per acre appears to level out when chipping more than 15 acres. Therefore, the District recommends reducing the burn allowance threshold for orchard removals to 15 acres or less per location per year, with case-by-case economic determinations no longer required.

### Fig Orchard Removal

Chipping of fig orchard removal material and subsequent transport to biomass power plants has been used by some larger operations. However, as for other small orchards, this option becomes too expensive and therefore infeasible when removing 15 acres or less. Therefore, the District has recommended limiting the burning allowance for fig orchard removals to 15 acres or less per location per year, equivalent to the requirements for other orchard removals.

### **Biomass Facility Funding Criterion**

There is currently no long-term federal or state commitment for the operation of biomass facilities or the development of alternatives to burning. Biomass facilities have received funding from the California Energy Commission via the Existing Renewable Facilities Program (ERFP) and short-term federal tax credits through the Renewable Electricity Program Tax Credit, but there is no long term funding available at this time.

Ensuring the ability to finance and support biomass development by providing state-backed loan guarantees, government procurement programs, long-term contracting and other financial mechanisms would help stimulate the investment necessary to build the production capacity and infrastructure needed.

## Air Quality Impacts

### Daily (24-hour) PM2.5 and 8-Hour Ozone Standards

The San Joaquin Valley is currently designated nonattainment for the federal PM2.5 and 8-hour ozone standards. While the proposed postponements would allow some burning to continue, in practice, burning is substantially limited by the District's Smoke Management System. As described earlier, the System is designed to limit burning on high pollution days in order to avoid contributing to a violation of federal 8-hour ozone or 24-hour PM2.5 standards.

In addition, per District policy, agricultural burning is not allowed in specified zones when no-burn days have been declared for residential wood burning from November through February, the PM2.5 high season in the Valley. The District declares no-burn days when the potential for a PM2.5 concentration of 30  $\mu\text{g}/\text{m}^3$  or greater is predicted for a region within the Valley.

Finally, while these programs ensure that agricultural burning does not contribute to violations of short-term air quality standards, they are also designed to minimize localized public health impacts by carefully managing where and when burning can occur.

### Annual PM2.5 Standard

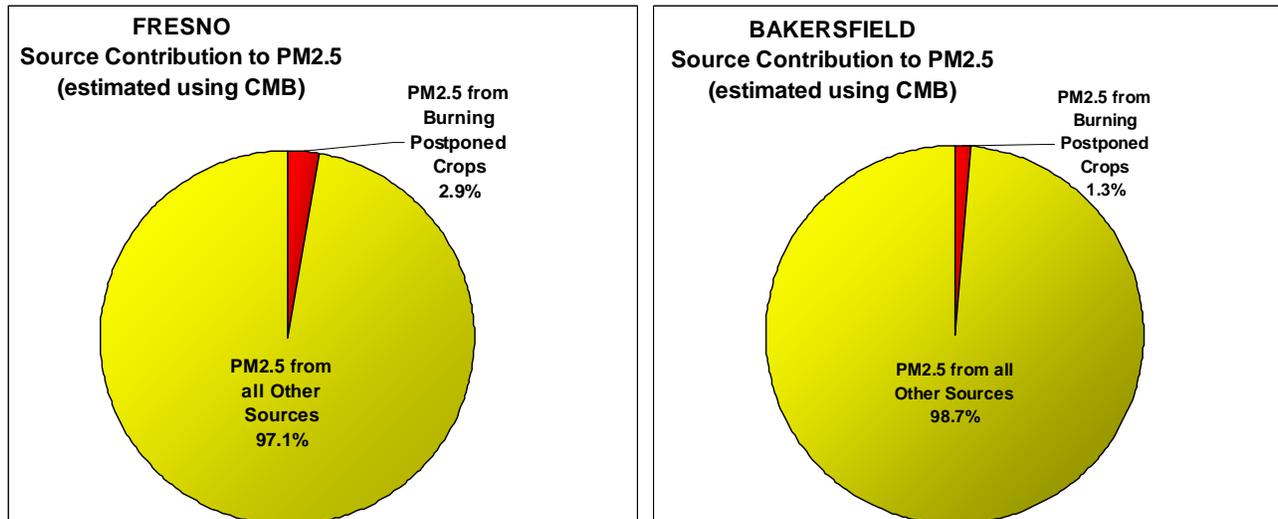
ARB staff also evaluated the impact of the agricultural burning postponements currently recommended in the District's ***Proposed Staff Report Recommendations on Agricultural Burning*** on the federal annual PM2.5 standard. This analysis showed that the postponement would not substantially contribute to a violation of the annual PM2.5 standard.

ARB staff's assessment used two source apportion modeling methods, Chemical Mass Balance and Positive Matrix Factorization, previously used in the District's 2008 PM2.5 Attainment Plan. Modeling results estimate smoke from vegetative burning, which reflects contributions from residential wood burning, agricultural and forest management burning, and wildfires. The contribution from agricultural burning was determined based on the proportion of agricultural burning emissions to total vegetative burning in the emission inventory. The source apportionment methods used data from 2004-2006.

PM2.5 emissions from agricultural burning have further decreased in recent years. Compared to the 2004-2006 average, 2008 PM2.5 emissions were 43% and 52% lower in Fresno and Kern Counties, respectively. Therefore, in 2008, the burning of crops with proposed postponements is estimated to contribute from 0.28  $\mu\text{g}/\text{m}^3$  to 0.51  $\mu\text{g}/\text{m}^3$  to annual PM2.5 concentrations, depending on location and source apportionment method. The 2008 annual design values for Fresno and Kern Counties are 17.1  $\mu\text{g}/\text{m}^3$  and 21.3  $\mu\text{g}/\text{m}^3$ , respectively. Therefore, the emissions from the proposed burn

prohibition crops would contribute about 2.9% of the PM2.5 mass annually in Fresno County and about 1.3% in Kern County (Figure 2).

**Figure 2. Contribution of Continued Agricultural Burning to Ambient PM2.5 Concentrations in Fresno and Bakersfield**



### III. STAFF RECOMMENDATION

ARB staff has reviewed the District's **Proposed Staff Report Recommendations of Agricultural Burning** dated April 20, 2010. ARB staff's evaluation focused on whether the District staff proposals comply with the following requirements specified in SB 705 for any postponements of the phase-out:

- There is no economically feasible alternative means of eliminating the waste;
- There is no long-term federal or State funding commitment for the continued operation of biomass facilities in the San Joaquin Valley or development of alternatives to burning; and
- The continued issuance of permits will not cause, or substantially contribute to, a violation of an applicable federal air quality standard.

Based on this evaluation, ARB staff believes that there continues to be a number of impediments to fully implementing alternatives to burning for selected crop categories. Issues include the availability of technically feasible alternatives, the higher costs of non-burning alternatives, prevention of the spread of disease, and the ability of chippers/shredders and biomass facilities to handle the increased load of agricultural material.

The comprehensive evaluation of potential alternatives, as well as the methodology for assessing economic feasibility, demonstrates that there are no economically

feasible alternatives to burning for the crop categories the District has recommended for limited term postponements. In addition, despite several prior short-term biomass incentive programs, there are no long-term funding commitments for the continued operation of biomass facilities in the Valley. Finally, ARB staff's evaluation shows that due to the daily limitations on agricultural burning resulting from implementation of the District's smoke management system, as well as the significant decline in the overall amount of agricultural burning, the remaining burning will not cause or substantially contribute to violations of federal air quality standards.

ARB staff recommends that the Board concur with District's proposal, contingent upon approval by the District Governing Board.