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## **Executive Summary**

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The historical cultural practice for disposing of agricultural materials, such as prunings and orchard removals, is to burn the materials. Burning agricultural materials in the field has helped prevent the spread of diseases, as well as control weeds and pests. However, recognizing the impacts that open burning has in the San Joaquin Valley Air Basin (SJVAB), concerned Valley growers have reduced open burning through the use of sustainable agricultural practices. Those practices have contributed to a significant reduction in particulate matter (PM) emissions over the last several years: since 2002, PM<sub>2.5</sub> emissions from open burning have been reduced by 64%, or eight tons of PM<sub>2.5</sub> per day.

Open burning of agricultural crops and materials is managed by the District's Smoke Management System (SMS). The District's use of the SMS is intended to limit emissions to levels below the federal ambient air quality standards and to better distribute emissions temporally and spatially for flexibility of burn days for growers while minimizing the impact on the public. The SMS analyzes the daily impact of open burning on air quality in 103 zones in the SJVAB and allocates daily burning allowances in a given zone based on factors such as the local meteorology, the air quality conditions, the atmospheric holding capacity, the amount of burning already approved in a given area, and the potential impacts on downwind populations. Public exposure to smoke has been significantly reduced with the implementation of the smoke management program. The Valley has not experienced episodes where communities are inundated with smoke due to the District's ability to better manage and minimize smoke production based on local meteorological conditions for each of the SMS zones. Greater control over the timing of burns also improved the general air quality in all areas of the District. Under the SMS, no burns have been allowed in zones on days when exceedances of the federal ozone standard have occurred. The continued issuance of burn permits for these crop types would not cause or substantially contribute to a violation of an applicable federal ambient air quality standard

For more information on the California Health and Safety Code requirements and how the crop categories have been addressed since 2004, please refer to Appendix B of this report. The District has also completed an Initial Study for said rule that indicates the project will not result in any significant adverse effects to the environment, and a Proposed Negative Declaration has been prepared and properly noticed pursuant to the California Environmental Quality Act Guidelines (CEQA).

## State Law Requirements

In 2003, state law was amended to require the District to limit open burning for diseased crops, establish best management practices for other weeds and maintenance, and prohibit open burning for numerous crop categories. In addition to those requirements, the state law authorizes the District to postpone the burn prohibition dates for specific types of agricultural material if the District makes three specific determinations and the Air Resources Board (ARB) concurs. The determinations are: (1) there are no economically feasible alternatives to open-burning that type of material; (2) open-burning that type of material will not cause or substantially contribute to a violation of a National Ambient Air Quality Standard (NAAQS); and (3) there is no long-term federal or state funding commitment for the continued operation of biomass facilities in the Valley or the development of alternatives to burning.

The District has continued to work closely with the stakeholders to identify economically feasible alternatives to open burning of various agricultural materials and to meet its legal obligation under the CH&SC. To fulfill the state law requirements, the District has implemented the requirements for most crop categories identified in California Health and Safety Code (CH&SC) Section 41855.5. This report examines the feasibility of prohibiting open burning for the remaining crop categories and crop types, as well as to satisfy the determinations required by the CH&SC Section 41855.6.

## Summary of the Recommendations Contained in this Report

For the purposes of this project, District staff will not address the following crop categories and crop types:

- Prohibited crop types from earlier deadlines: In 2005 and 2007, District staff evaluated several alternatives to open burning for the crop categories identified in the CH&SC and has prohibited open burning for most of those crops and materials.
- Diseased crops: The District incorporated the state law requirements for diseased crops into Section 5.9 of Rule 4103 in 2004. The requirements provide for the issuance of a conditional crop burning permit if certain criteria were met and the county agricultural commissioner makes specific determinations for the crop type. This category includes crop types that are identified as diseased per Section 5.9 of Rule 4103.
- Other weeds and maintenance: These materials have already been addressed in 2005 as part of the CH&SC requirements to establish best management practices for the control of other weeds and maintenance. The

best management practices were developed in consultation with the University of California Cooperative Extension, stakeholders (growers), producers, and agricultural industry groups. See Rule 4103, Attachment 1, to view the Best Management Practices for the control of other weeds and maintenance.

- Attrition of various crops: According to the District's policy, attrition is vegetative materials not associated with pruning (as defined in Rule 4103) or orchard/vineyard removals. Attrition materials include the incidental cuttings of dead or broken branches, tree mortality, water sprouts or suckers, or other damage to tree crops. CH&SC does not prohibit these materials from being open burned.

This report analyzes the crop categories that are subject to the June 1, 2010 burn prohibition deadline, as well as the crop types that were postponed from earlier phases. The table below shows the crop categories and District staff's recommendations.

**Table ES – 1 Summary of Revised Proposed Recommendations on Specific Crop Type**

Crop Categories and Crop Type	Revised Proposed Recommendations and Findings	For More Information, see Sections:
<b>Vineyard Removal Materials</b>		
Grape and Kiwi Crops	Allow Burn  Findings: <ul style="list-style-type: none"> <li>• Difficult, if not impossible, to remove wires embedded in wood</li> <li>• Biomass alternative is not economically feasible</li> </ul>	3.1; 5.2; 6.1.1; 6.2.1; 6.3.4; 9.1; B.3.1
<b>Orchard Removal Matter</b>		
Small Other Orchards (Currently at 20 acres or less)	Reduce Burn allowance to 15 acres or less per location per year.  Findings: <ul style="list-style-type: none"> <li>• Cost analysis shows that the cost-per-acre increases to a level where biomass alternative is not economically feasible for orchard removals at 15 acres or less</li> <li>• Biomass alternative is economically feasible for orchard removals above 15 acres</li> </ul>	3.2.1; 4.1.1; 5.2; 5.3; 5.4; 6.1.1; 6.2.1; 6.3; 7.2.1; 7.2.2; 9.1; B.3.1
Fig Crops	Reduce Burn allowance to 15 acres or less per location per year.  Findings: <ul style="list-style-type: none"> <li>• Biomass alternative is found to be common practice</li> <li>• This category would be included in the Small Other Orchards category.</li> <li>• Biomass alternative is economically feasible as part of the Small Other Orchards category.</li> </ul>	3.2.2; 4.1.1; 5.2; 5.3; 5.4; 6.1.1; 6.2.1; 6.3; 7.2.1; 7.2.2; 9.1; B.3.1
Citrus Crops	Allow Burn  Findings: <ul style="list-style-type: none"> <li>• Biomass alternative is not economically feasible</li> <li>• Uncertainty in whether all citrus materials could be accepted at biomass power plants, due to the lack of future commitments to biomass plant operations</li> </ul>	3.2.3; 4.1.1; 5.2; 5.3; 6.1.1; 6.2.1; 6.3; 7.2.1; 7.2.2; 9.1; B.3.1
Apple, Pear, and Quince Crops	Allow Burn  Findings: <ul style="list-style-type: none"> <li>• No technologically feasible alternatives</li> <li>• Disease, specifically, Fireblight, is prevalent among these crop types</li> </ul>	3.2.4; 5.3; 5.2; 6.1.1; 6.2.1; 6.3; 9.1; B.3.1

**Table ES – 1 Summary of Revised Proposed Recommendations on Specific Crop Type  
 (CONTINUED)**

Crop Categories and Crop Type	Revised Proposed Recommendations and Findings	For More Information, see Sections:
<b>Weed Abatement</b>		
Ponding & Levee Banks	Allow Burn  Findings: <ul style="list-style-type: none"> <li>• Mowing and herbicides are not viable alternatives due to slopes and remote locations.</li> </ul>	3.3; 4.1.10; 5.2; 9.1
<b>Other Materials</b>		
Brooder Paper	Prohibit Burn  Findings: <ul style="list-style-type: none"> <li>• Landfill alternative is found to be common practice</li> </ul>	3.4.1; 5.2; 9.1
Deceased Goats	Prohibit Burn  Findings: <ul style="list-style-type: none"> <li>• Burial alternative is found to be common practice</li> </ul>	3.4.2; 4.2; 5.2; 9.1
Diseased Bee Hives	Allow Burn  Findings: <ul style="list-style-type: none"> <li>• CH&amp;SC identifies this crop type as “diseased” bee hives.</li> <li>• No technologically feasible alternatives</li> </ul>	3.4.3; 4.2.4; 5.2; 9.1
<b>Field Crop</b>		
Rice Stubble	Interim phase-down schedule would be modified: <ul style="list-style-type: none"> <li>• Only 70% of acreage can be burned starting 6/1/08</li> <li>• 50% limitation (6/1/10) would be removed</li> <li>• Burning is prohibited starting 6/1/15</li> </ul> Findings: <ul style="list-style-type: none"> <li>• Market is not available for baling rice stubble</li> <li>• Lack of available water in the post-harvest season in the SJVAB for soil incorporation</li> <li>• Baling and soil incorporation are not viable alternatives</li> </ul>	3.5; 4.1.11; 4.1.12; 4.1.13; 5.2; 9.1
<b>Prunings</b>		
Apple, Pear, and Quince Crops	Allow Burn  Findings: <ul style="list-style-type: none"> <li>• No technologically feasible alternatives</li> <li>• Disease, specifically Fireblight, is prevalent among these crop types</li> </ul>	3.6.1; 4.1.2; 5.2; 5.3; 6.1.2; 6.2.2; 6.3; 9.1; B.3.2
Fig Crops	Prohibit Burn  Findings: <ul style="list-style-type: none"> <li>• Shredding alternative is found to be common practice</li> </ul>	3.6.2; 4.1.2; 5.2; 5.3; 5.4; 6.1.2; 9.1; B.3.2

**Table ES – 1 Summary of the Recommendations on Specific Crop Type  
 (CONTINUED)**

Crop Categories and Crop Type	Revised Proposed Recommendations and Findings	For More Information, see Sections:
<b>Surface Harvested Prunings</b>		
Grape vines – prunings from grape vines	Prohibit Burn  Findings: <ul style="list-style-type: none"> <li>• Soil incorporation alternative is found to be common practice</li> </ul>	3.7.1; 4.1.2; 5.2; 6.3.3; 9.1
Grape canes – defined as “Vineyard Materials”	Prohibit Burn  Findings: <ul style="list-style-type: none"> <li>• Soil incorporation alternative is found to be common practice</li> </ul>	3.7.1; 4.1.2; 5.2; 6.3.3; 9.1
Raisin Trays – defined as “Vineyard Materials”	Allow Burn  Findings: <ul style="list-style-type: none"> <li>• Raisin trays contain five percent polymer, which slows the decomposition process for soil incorporation and are not accepted at biomass power plants.</li> <li>• Market is not available to ship the materials overseas for recycling.</li> <li>• Soil incorporation, biomass, and recycling overseas are not viable alternatives</li> </ul>	3.7.2; 4.1.2; 5.2; 9.1
Almond, Walnut, and Pecan Crops	<ol style="list-style-type: none"> <li>1. Prohibit burning of prunings for each agricultural operation whose total nut acreage (i.e., almonds, walnuts, and pecans) at all agricultural operation sites is 3,500 acres or more.</li> <li>2. For each agricultural operation whose total nut acreage at all agricultural operation sites is less than 3,500 acres,                             <ol style="list-style-type: none"> <li>a. Allow burning of up to 20 acres of prunings per year, and</li> <li>b. Allow burning of additional prunings, provided:                                     <ol style="list-style-type: none"> <li>i. The operator submits to the 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.</li> <li>ii. 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.</li> </ol> </li> </ol> </li> </ol> Findings: <ul style="list-style-type: none"> <li>• Equipment is available to shred prunings to smaller pieces to help speed the decomposition process.</li> <li>• Cost to buy the shredding equipment is feasible only for larger growers</li> <li>• Most growers are shredding the pruning material as a viable alternative</li> <li>• Current fleet of contractor shredding equipment cannot meet demand of a full prohibition</li> <li>• Set-up charges make shredding economically infeasible at 20 acres or less</li> </ul>	3.7.3; 4.1.2; 5.2; 5.3; 5.4; 6.1.2; 6.2.2; 6.3; 9.1; B.2.2; B.3.2

## Summary of Methodology for Determining Recommendations

During the research process, District staff worked closely with representatives from the Ag industry and other agencies to address the burn prohibition requirements for various crops. The Ag industry representatives have conducted extensive research and effort to provide District staff with key information to help move this project forward. The information used for further analysis include economic data, costs for chipping and burning, description of operation, and other related information.

District staff reviewed the technologically feasible alternatives for each of the affected agricultural crop in the SJVAB. From those alternatives, District staff continued to evaluate what appears to be the most viable and likely method to open burning for many of the affected crops. For the crop types that did not have any technologically feasible alternatives to open burning, District has recommended postponing the burn prohibition for that specific crop type. District staff also recommended that the crop types where viable alternatives are considered common practice be prohibited from open burning. For the remaining crop types, District staff conducted further research and analyses on costs and economic impact based on the alternatives that were determined to be most viable and likely method to open burning. Growers are not bound to the selected alternative for each of the specific crop type in this report and may choose other alternatives.

In addition to the analyses above, District staff analyzed the emissions and emissions reductions from agricultural burning and the selected alternatives, as well as the health considerations from those emissions. District staff also conducted extensive research on biomass power plants, including the capacity to accept agricultural materials and long-term federal or state funding commitment. The air quality impacts of continued open burning and alternatives, as well as the District's determinations, are presented toward the end of this report.

Each of the chapter in this report is summarized below.

**Chapter One** discusses the reasons for the report, describes the affected crop categories, and provides a brief description of questions staff asked throughout the report research, and writing process.

**Chapter Two** examines regulatory information regarding the current District Rule and the CH&SC burning prohibitions.

**Chapter Three** discusses each individual crop type and provides a summary of the analysis and recommendation as well as a description of the crop type, and alternative methods of disposal that were evaluated.

**Chapter Four** provides an in depth discussion and analysis of the various technological alternatives to open burning. This discussion includes alternative methods that may not necessarily be in use currently, but could potentially be put to use in the future.

**Chapter Five** presents data from the District databases regarding criteria emissions from open burning of each crop type. The emission inventory from agricultural burning is compared to expected emissions from alternative methods of disposing of the agricultural materials. A discussion of the emission reduction analysis methodology and calculations is included. Also in this chapter is a discussion of the health benefits from reduced open burning, and a health risk assessment of open burning and alternatives to open burning.

**Chapter Six** discusses the costs for open burning of orchard and vineyard removal and orchard prunings. Costs for sending the material from orchard removals, vineyard removals to biomass power plants, as well as a discussion on the costs for the disposal of orchard prunings by chipping it is provided.

**Chapter Seven** provides an in depth look at the biomass power plants that are currently operational in the Valley. A general description of how a biomass power plant operates and receives biomass fuel is provided. Locations, fuel use and storage capacities are discussed, as well as a detailed look at the emissions and technologies used to reduce and control emissions from plant activities. Staff also explores the economics of accepting agricultural materials versus accepting urban waste material as fuel sources at the biomass power plants. Questions are asked and answered such as how much more agricultural material is expected due to prohibition of open burning and can the biomass power plants physically handle the increase in material. An analysis exploring the outlook of the future of biomass power plants is provided through discussions of policies for renewable energy, contracts with utility companies for the sale of the generated electricity, the District's own legislative platform affecting biomass power plants, State and Federal commitments for continued operation of the biomass power plants, and the potential new facilities that once operational would increase the capacity of biomass plants to accept agricultural materials as fuel.

**Chapter Eight** discusses air quality impacts of continued open burning and alternatives.

**Chapter Nine** illustrates the determinations required by state law regarding economic feasibility, Federal and State commitments for biomass facilities, air quality impacts, and the need for ARBs concurrence with District recommendations.

**Governing Board Approval of this Report Satisfies the Determinations Required by State Law**

The California Health and Safety Code (CH&SC) Section 41855.5, which was added in 2003, prohibits the continued open burning of certain types of agricultural material, according to a phased-in schedule of deadlines, but also authorizes the Governing Board of the San Joaquin Valley Air Pollution Control District (District) to postpone the deadlines if economically feasible alternatives are not available and the Air Resources Board concurs with the Governing Board's determinations. The District addressed the requirements from the California Health and Safety Code (CH&SC) through a two-step process. For the first step, District staff proposed to the Governing Board an amendment to Rule 4103 (Open Burning) to incorporate the provisions of CH&SC Section 41855.5 and Section 41855.6 directly into the rule. The Governing Board's approval of this action would allow the District to consider the feasibility of non-burning alternatives for specific crops and materials. The revised proposed amendments to the rule would become effective June 1, 2010.

Governing Board approval of this report implemented the second step of the process and addressed the technological research and economic analysis associated with the June 2010 deadline. The recommended determinations on the economic feasibility of burn alternatives for specific crops and materials are presented in this report. The Governing Board's approval of the recommended determinations, in the form of a Resolution, would satisfy the requirements in the State law and the revised proposed Section 5.5.2 of Rule 4103. The District will periodically review the burning prohibitions and provide any new recommendations to the Governing Board before any new prohibition take effect, but no later than December 31, 2015.

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