REVISED APPENDIX D

Socioeconomic Impact Analysis for Rule 4702 (Internal Combustion Engines – Phase 2)

June 16, 2005

Socioeconomic Analysis Proposed Amendments to Rule 4702: Internal Combustion Engines: Phase 2 (REVISED DRAFT)

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Prepared for

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1. EXECUTIVE SUMMARY

The San Joaquin Valley Unified Air Pollution Control District ("District") seeks to amend Rule 4702 to meet certain United States Environmental Protection Agency (EPA) mandates and timelines with regards to improved air quality in the region. This section of the report summarizes the findings of the socioeconomic analysis of proposed amendments to Rule 4702.

The District's cost of compliance indicates that, overall, affected engine-owners would experience between $29.7 million (Scenario 1) and $32.9 million (Scenario 2) in annual costs. Of this amount, agricultural operations (AO) would bear $28.2 million to $31.4 million and non-agricultural operations (non-AO) would bear $1.46 million to $1.54 million in annual compliance costs. For agricultural operators, funding from the Carl Moyer program would reduce the annual cost to roughly $18.7 to $19.8 million a year.

As demonstrated in the analysis, there are four general crop categories, and the category that is most affected by the proposed amendment is cash grains, particularly agricultural operators of farms over 500 acres. Farmers categorized under the other three categories -- field crops, vegetables and fruit-and-tree nuts -- are also impacted, although not to same extent that cash grain operators.

The analysis shows that in the San Joaquin Valley, there are over 25,000 farms in the four categories of agricultural operations (AO). Between 1998 and 2003, the value of crops and livestock generated by agriculture increased annually by a slight 0.5 percent in inflation-adjusted dollars, going from $16.2 billion to $16.5 billion. Harvested acreage declined by two percent annually during this five-year period. Vegetables demonstrated the most rapid growth in terms of value, growing by ten percent a year annually and, when adjusted on a per acre basis, by 11 percent per year. Overall employment in the four crop categories declined by almost two percent annually between 1998 and 2003—from 117,619 to 107,837 jobs.

If affected agricultural operators recoup the cost of compliance by reducing their labor, this could result in the direct loss of 120.8 to 259.3 jobs, as well as the indirect loss of another 26.6 to 69.5 jobs, depending on the economic scenario. In the worst case scenario, in which 385 jobs are directly and indirectly lost as a result of proposed amendments to

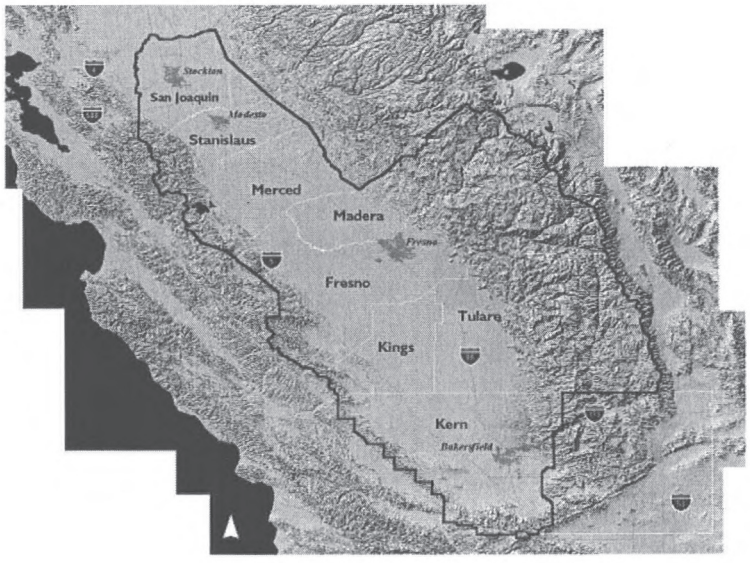
Rule 4702, the total loss of jobs equals 0.03 percent of total jobs in the region. The loss of 147.4 to 385.0 jobs also amounts to 0.1 percent to 0.4 percent of total agricultural in the region.

2. INTRODUCTION

This report describes the socioeconomic impacts of proposed amendments to Rule 4702. Following this introduction, the report summarizes the proposed amendments and describes the methodology for the socioeconomic analysis. In Section 5, the report describes the economic characteristics of sources affected by proposed amendments to Rule 4702. The sixth section analyzes the socioeconomic impacts of compliance costs on the regional economy.

The report is prepared pursuant to the provisions of AB2051 (Section 40728.5 of the California Health and Safety Code), which requires an assessment of socioeconomic impacts of proposed air quality rules. The findings in this report can assist District staff in understanding the socioeconomic impacts of proposed amendments to Rule 4702, and can assist staff in preparing a refined version of the rule. A final draft report will be presented at a workshop conducted by District staff in April, 2005. Figure 1 is a map of the eight-county region that comprises the San Joaquin Valley Air Basin. As indicated in the map, Kern County is not completely in the District.

FIGURE 1
Map of the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) Air Basin



3. DESCRIPTION OF DRAFT RULE

Internal combustion engines are used in a broad variety of businesses and industries and in a broad range of activities. Businesses and industries in the San Joaquin Valley Air Basin that could be affected by the proposed amendments include, but are not limited to, the following: agricultural operations, oil and gas extraction, oil refining, natural gas transmission, water supply and irrigation, general government, and several other miscellaneous businesses and industries. Above all, the proposed amendments to Rule 4702 seek to reduce NOx emissions from internal combustion engines used in agricultural operations and permitted compression-ignited engines. A preliminary analysis indicates that the proposed amendments of Rule 4702 would reduce NOx emissions by approximately 35 tons per day.

The engines that would be affected by the proposed amendments were categorized as engines that are used in agricultural operations (AO) and engines that are not used in agricultural operations (non-AO). The SJVAB is home to over 25,000 farms that grow a variety of crops that the Agricultural Census breaks down into four categories: cash grains, field crops, vegetables, and fruits-and-nut trees. In order to grow their respective crops, growers use an estimated 5,400 engines (4,500 diesel and 900 spark-ignited) to irrigate their lands.

District staff also identified 1,820 permitted non-AO engines that would be affected by the proposed amendments to Rule 4702. Most of the 1,820 permitted non-AO engines would be exempt from the emission limits of Rule 4702 and would not incur additional costs to comply with the proposed amendments. Of the 1,820 permitted non-AO engines, District staff estimates that 130 non-AO engines would incur additional costs to comply with the proposed amendments of Rule 4702.

District staff identified 104 non-AO diesel engines as operating less than 1000 hours (low-use). It was assumed that half (52) of the 104 engines would be subject to the emission limits of Rule 4702 and would incur additional costs to comply with the proposed amendments of Rule 4702. The other half would reduce the operating hours of the engines and be exempt from the emission limits of Rule 4702. As it is not possible to specifically identify which 52 engines of the 104 low-use engines would be subject to the emission limits of Rule 4702, the District staff identified the

SIC Major Groups of the businesses and organizations that operate the 104 low-use engines.

In estimating the number of engines and calculating the cost of compliance, District staff used the Moyer Program database to gather information, such as engine size and operating hours, on engines that have participated in the Program. District staff also used the District Permit Database to identify and compile a list of 1,820 permitted engines that would most likely be affected by the proposed amendments to Rule 4702. Most of those engines are emergency units.

4. METHODOLOGY

The socioeconomic analysis involves the use of information provided directly by affected sources, as well as secondary data used to describe the industries affected by the proposed amendments to Rule 4702. The approach is briefly described below.

ADE began the analysis by preparing a statistical description of the industry groups of which the affected sources are part, analyzing data on the number of jobs, sales levels, the typical profit ratios and other economic indicators for each industry.

This report relies heavily on the most current data available from a variety of sources, such as the California Agricultural Statistical Service's report called "The County Agricultural Commissioners' Data."[1] In addition, the report relies on data from the US Census' 1997 Agricultural Census, the 2002 Agricultural Census, the State of California's Employment Development Department (EDD) Labor Market Information Division and the EDD's Agricultural Bulletin.

ADE also relied on the California Department of Food and Agriculture's "2003 California Agricultural Statistics," which included information on net profit.[2] The 1997 Agricultural Census and the 2002 Agricultural Census also contain data on net profits.[3] ADE also reviewed net profit estimates based on the University of California's Cooperative Extension's extensive review of a variety of crops grown in California. Finally, we checked the net profit estimates derived from the Agricultural Census and the "2003 California Agricultural Statistics" against Dun and Bradstreet's dataset on net profit.

With the above information, ADE was able to estimate net profit ratios for sources affected by amendments to the rule. ADE calculated ratios of profit per dollar of revenue for affected agricultural industries. The result of the socioeconomic analysis shows what proportion of profits the compliance costs represent. Based on assumed thresholds of significance, ADE discusses in the report whether the affected sources are likely to reduce jobs as a means of recouping the cost of rule compliance or as a

[1] http://www.nass.usda.gov/ca/bul/agcom/indexcac.htm

[2] http://www.cdfa.ca.gov/card/card_new03.htm (see page 5)

[3] See Appendix discussion on "Net cash farm income of the operations" and "Total farm production expenses" (http://www.nass.usda.gov/census/census02/volume1/ca/ca2appxa.pdf)

result of reducing business operations. To the extent that such job losses appear likely, the indirect multiplier effects of the jobs losses are estimated using a regional IMPLAN input-output model.

5. IMPACTED INDUSTRIES SUBJECT TO PROPOSED AMENDMENTS TO RULE 4702

This section of the socioeconomic analysis describes demographic and economic trends in the San Joaquin Valley region. The first part of this section compares the San Joaquin Valley region against California as a whole, and provides a context for understanding demographic and economic changes that occurred within the San Joaquin Valley region between 1998 and 2003. Starting with sub-section 5.2, the second part of this section narrows the focus of the socioeconomic analysis to industries affected by proposed amendments to Rule 4702. The second part of this section describes the economic characteristics of impacted industries subject to the proposed amendments to Rule 4702.

In this report, the San Joaquin Valley region is defined as Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare counties. Data for Kern County in Tables 1 and 2 are for all of Kern County, although Kern County is only partially in the San Joaquin Valley Air Basin. Starting with Table 3, data for Kern County are for the part of Kern County that is in the San Joaquin Valley Air Basin.

5.1 REGIONAL DEMOGRAPHIC AND ECONOMIC TRENDS

REGIONAL DEMOGRAPHIC TRENDS

The San Joaquin Valley region experienced tremendous population growth during the 1990s. Many came to this area because of affordable housing. As a result, population increased significantly. The eight-county region's population increased by 22 percent (or approximately 2.0 percent annually), from 2.9 million in 1993 to 3.6 million in 2003. While the State of California's population increased by 15 percent (or approximately 1.4 percent annually), all the counties in the region experienced faster rates of growth, and two counties grew at rates that were double the State's growth rate, as Table 1 shows. While by many standards Madera County continues to be a small county– at 135,262 residents according to the Department of Finance–it still experienced a 35 percent growth in population during the last decade (or three percent annually). Kings County grew by 28 percent (or 2.6 percent per year). As demonstrated in

the following section on regional economic trends, the demographic changes that occurred in the San Joaquin Valley region during the 1990s significantly influenced the economy of this eight-county region.

TABLE 1 Population Growth: San Joaquin Valley Region, 1993 - 2003

	1993	1998	2003	Distribution, 2003	Annual Per. Chng 93-98	Annual Per. Chng 98-03	Annual Per. Chng 93-03
California	31,303,452	32,670,019	36,144,267		0.9%	2.0%	1.4%
SJV Region	2,959,911	3,192,439	3,615,696	10%	1.5%	2.5%	2.0%
Fresno	722,608	781,936	862,642	24%	1.6%	2.0%	1.8%
Kern	593,087	637,227	724,883	20%	1.4%	2.6%	2.0%
Kings	109,648	120,957	141,434	4%	2.0%	3.2%	2.6%
Madera	100,297	114,137	135,262	4%	2.6%	3.5%	3.0%
Merced	191,883	203,181	232,141	6%	1.2%	2.7%	1.9%
San Joaquin	507,170	546,852	630,577	17%	1.5%	2.9%	2.2%
Stanislaus	400,417	428,272	491,929	14%	1.4%	2.8%	2.1%
Tulare	334,801	359,877	396,828	11%	1.5%	2.0%	1.7%

Source: Applied Development Economics, based on California Department of Finance

REGIONAL ECONOMIC TRENDS

Economic development practitioners and planners have traditionally divided economies into two broad industrial categories—the economic base and local support industries. Economic base industries are the drivers of local and regional economies in that these industries draw income into a local economy by selling products outside of the local economy, much like the export industries of a national economy. Accrued earnings then circulate throughout the local area in the form of wages and salaries, investments, purchases of fixed assets, and goods and services, generating more jobs and wealth.

The economic base is typically comprised of industries within the manufacturing, minerals-resource extraction, and agricultural sectors. There are also the "local support industries" such as retail or service sectors, the progress of which is a function of the economic base and demographic changes, and more so the latter than the former. As population increases in a given area, demand for services–such as realtors, teachers, and healthcare–increases, as does demand for basic retail items like groceries, gas for commuting, or clothing at the local apparel shops.

Agriculture is the economic base of the San Joaquin Valley region by virtue of the amount of goods this sector produces and exports throughout the nation and the globe. Fourteen percent of all workers in the region are employed by industries within agriculture, as Table 2 shows. However, in 1998 the proportion of workers in agriculture was 18 percent. In fact, over the five-year period between 1998 and 2003, employment in agriculture declined by three percent per year, or by 14 percent over five years.

Between 1998 and 2003, local support industries gained in prominence within the San Joaquin Valley region. Service-rendering industries employed the most workers as a proportion of total employment in the region. As Table 2 shows, excluding wholesale, retail and transportation, service-rendering industries comprise the largest employment sector in the region, at 647,100 or 53 percent of all jobs. With retail, transportation and wholesale, services accounts for slightly over 70 percent of all jobs In 1998, service-rendering industries represented 50 percent of all jobs, and when including retail, wholesale and transportation in the mix, 67 percent.

Increases in employment in service-rendering industries are consistent with regional population growth. In the region, local support industries of construction, education and health, financial activities, and government increased annually by six percent, four percent, three percent and three percent respectively between 1998 and 2003.

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TABLE 2 Employment Profile Of The San Joaquin Valley Region 1998 – 2003

Major Sectors	San Joaquin Valley Region Employment 1998	San Joaquin Valley Region Employment 2003	San Joaquin Valley Region Employment Distribution, 2003	Annual Percent Change 1998 to 2003	California Employment Distribution, 2003	Annual Percent Change 1998 to 2003
Good-producing Industries						
Agriculture	204,200	174,900	14%	-3%	3%	-2%
Natural Resources, Mining and Construction	57,400	78,100	6%	6%	5%	5%
Manufacturing	114,300	110,300	9%	-1%	10%	-4%
Serving-Rendering Industries						
Wholesale	34,400	39,000	3%	3%	4%	1%
Retail	121,400	133,200	11%	2%	11%	2%
Transportation/Warehousing/Utilities	37,600	45,700	4%	4%	3%	-1%
Information	15,000	14,200	1%	-1%	3%	0%
Financial Activities	40,400	46,600	4%	3%	6%	3%
Professional and Business Services	88,000	95,100	8%	2%	14%	1%
Educational and Health Services	101,500	122,200	10%	4%	10%	3%
Leisure, Hospitality and Other Services	112,500	116,400	9%	1%	13%	2%
Government	221,200	252,600	21%	3%	16%	2%
Total Employment	1,147,900	1,228,300	100%	1%	100%	1%

Source: Applied Development Economics, based on California Employment Development Department

The emergence of local support industries in the San Joaquin Valley region mirrors and leads statewide trends, as Table 2 shows. In the region, construction, health-education, and government increased annually by six percent, four percent and three percent, whereas, statewide, these industries grew by five percent, three percent and three percent per year between 1998 and 2003. In short, while agriculture remains the leading edge of the economy, the San Joaquin Valley region's economy has become more diverse, with the growth occurring within population-driven local support industries rather than the export-focused economic base industries of manufacturing and agriculture.

5.2 AGRICULTURAL TRENDS IN THE REGION AND STATE

Given that the vast bulk of impacts associated with the proposed amendments to Rule 4702 affect agriculture the most, this section of the report provides an overview of agricultural trends in the region and state. What is clear from a review of secondary sources and primary data is that California is the leading agriculture producer in the nation, if not the world. Confirming the global nature of this industry, California's Department of Food and Agriculture reports that the "Golden State is the

number one agricultural producer and exporter in the United States."[4] California growers are the number one exporters of vegetables, fruits and nuts, and rank second in the nation in exporting cotton.[5] Approximately 30 percent of growers' revenues come from exports. In addition to feeding the world, the state is also the breadbasket to the United States. California contains less than four percent of all farms in the United States, but it produces 20 percent of the nation's milk supply, almost 90 percent of all grapes in the country, and more than half of the nation's total of fruits, nuts and vegetables. Data below provides a snapshot of California's agricultural economy. Table 3 shows, in 2003 crop and livestock producers in the region generated $16.6 billion, about 51 percent of what was generated in California as a whole for the same year. In the state, crop and livestock producers generated $32.5 billion in 2003.

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[4] ftp://www.nass.usda.gov/pub/nass/ca/AgStats/2003cas-all.pdf (see page 1)

[5] http://www.ers.usda.gov/StateFacts/CA.htm

TABLE 3 Agricultural Trends: Region Versus State: San Joaquin Valley Region, 2003

	Region			California			Region as Percent of State	
	Harvested Acres	Value	Distribution of Value	Harvested Acres	Value	Distribution of Value	Percent Harvested Acres	Percent Value
011 Cash grains	1,172,937	$493,720,000	3%	2,220,299	$1,346,478,900	4%	53%	37%
013 Field crops	1,774,373	$1,751,355,000	11%	2,931,829	$2,412,767,200	7%	61%	73%
016 Vegetables	233,607	$1,413,232,000	9%	863,722	$5,917,986,400	18%	27%	24%
017 Fruit and tree nuts	2,030,696	$6,754,487,300	41%	2,964,733	$11,236,773,400	35%	68%	60%
018 Horticultural specialties	0	$480,373,000	3%	2,278	$3,432,481,300	11%		14%
021 Livestock	0	$1,338,143,200	8%	0	$2,431,400,600	7%		55%
024 Dairy farms	0	$3,215,011,000	19%	0	$4,112,478,500	13%		78%
025 Poultry and eggs	0	$906,561,000	5%	0	$1,108,951,000	3%		82%
027 Animal specialties	0	$104,972,400	1%	0	$147,524,200	0%		71%
080 Forestry	0	$5,223,700	0%	0	$15,826,000	0%		33%
Pasture lands	5,537,820	$110,480,000	1%	20,367,800	$283,861,700	1%	27%	39%
099 Other	0	$16,457,000	0%	34,465	$71,508,800	0%		23%
Total	10,749,433	$16,590,015,600	100%	29,385,126	$32,518,038,000	100%	37%	51%
Sub-Total: SIC 011 - 017	5,211,613	$10,412,794,300		8,980,583	$20,914,005,900		58%	50%

Source: Applied Development Economics, based on California Agricultural Statistical Service

Table 3 also shows the relative strengths of the agricultural industry in the region. Thus, the region's comparative advantage lies with fruit and tree nuts, dairy, and field crops, in terms of value. Specific crops within these four categories are listed in Appendix B. These industries comprise 19 percent, 11 percent and 9 percent of the region's $16.5 billion agricultural industry. The top three agricultural industries in the state in terms of value are fruit and tree farms, vegetables, and dairy farms. As for dairy, almost 75 percent of dairy production in the state occurs in the eight-county region, or $3.2 billion out of $4.1 billion.

Table 4 below identifies agricultural trends since 1998 in the region, and it shows varying degrees of change. Between 1998 and 2003, the value of crops and livestock generated by agriculture increased annually by a slight 0.5 percent in inflation-adjusted dollars, going from $16.2 billion to $16.5 billion. Harvested acreage declined by two percent annually during this five-year period, as the table shows below. Vegetables demonstrated the most rapid growth in terms of value, growing by ten percent a year and, when adjusted on a per acre basis, by 11 percent per year. Vegetable growers have become more efficient between 1998 and 2003, going from $3,666 in value per acre to $6,050. Still, vegetables growers in the state as a whole generate approximately $6,800 in value per acre.

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TABLE 4 Agricultural Trends, 1998-2003
San Joaquin Valley Region

	1998		2003		Annual Change 98-03		
	Harvested Acres	Value	Harvested Acres	Value	Acres	Value	Value per Acre Select Crops
011 Cash grains	1,160,994	$517,691,272	1,172,937	$493,720,000	0.2%	-1%	-1%
013 Field crops	1,877,137	$1,792,753,068	1,774,373	$1,751,355,000	-1%	-0.5%	1%
016 Vegetables	235,362	$862,277,844	233,607	$1,413,232,000	-0.1%	10%	11%
017 Fruit and tree nuts	1,834,233	$6,874,944,617	2,030,696	$6,754,487,300	2%	0%	-2%
018 Horticultural specialties		$378,240,950		$480,373,000		5%	
021 Livestock		$843,644,071		$1,338,143,200		10%	
024 Dairy farms		$3,485,358,054		$3,215,011,000		-2%	
025 Poultry and eggs		$1,209,682,715		$906,561,000		-6%	
027 Animal specialties		$71,672,907		$104,972,400		8%	
080 Forestry		$2,645,573		$5,223,700		15%	
Pasture lands	5,431,278	$102,748,595	5,537,820	$110,480,000	0.4%	1%	1%
099 Other	767,833	$40,851,144	0	$16,457,000		-17%	
Total	11,852,694	$16,182,510,810	10,749,433	$16,590,015,600	-2%	0.5%	
Sub-Total: SIC 011 - 017	5,107,726	$10,047,666,800	5,211,613	$10,412,794,300	0.4%	0.7%	

Source: Applied Development Economics, based on California Agricultural Statistical Service

Cash grains such as wheat and sorghum declined by one percent annually between 1998 and 2003, while other sub-par performers includes fruit trees and nuts. Perhaps because of changing eating habits among the nation's consumers, partly attributable to the popularity of the beef-friendly Atkins diet, the livestock industry increased its value by 15 percent per year over the same five-year period, going from $843 million to $1.3 billion.

Overall, the agricultural industry in the San Joaquin Valley region experienced stagnant fortunes during the five-year period stretching from 1998 to 2003, as indicated by the decline in harvested acreage and slight change in value generated. The overall decline in value may be attributable to a number of factors, especially the global nature of the agricultural industry. A combination of increased world supply of crops and livestock, currency exchange rate differences, and factors related to the World Trade Organization (WTO) could make California's products less competitive in world markets, in turn forcing lower prices on growers. In response, farmers may either retire lands or, where possible, grow higher-value crops and livestock.

5.3 DESCRIPTION OF AFFECTED INDUSTRIES

The analysis above reviewed agricultural trends in a broad manner. The analysis below looks specifically at agricultural trends by agricultural industries that will be most affected by the proposed amendments to Rule 4702, namely cash grain, field crop, vegetables, and fruits and tree nut operators. To be sure, industries other than agriculture will be affected by the proposed amendments, though not to the extent that agriculture will be affected. Thus, we analyze agriculture in greater detail. Discussion on the impacts of proposed amendment to non-agricultural operators begins in Section 6.7.

As discussed earlier, growers use an estimated 5,400 engines (4,500 diesel and 900 spark-ignited) to irrigate their lands. In addition, there are 130 permitted non-agricultural engines that would incur additional costs to comply with the proposed amendments to Rule 4702.

The analysis below is based on data for the year 2003, the most current data available. The data comes from sources such as the California Agricultural Commissioners Annual Reports, Minnesota IMPLAN Group (MIG), the California Employment Development Department – Agricultural Bulletin, and the 2002 Agricultural Census. In estimating revenues, the consultant relied on tens year's worth of net profit ratios for

various crop industries at the four-digit Standard Industrial Classification (SIC) level derived from Dun and Bradstreet. In applying the Dun and Bradstreet net profit ratios, the consultant also factored into the analysis three levels of ratios reported by Dun and Bradstreet for each crop, and these ratios correspond to poor-performing, median-performing, and high-performing crop industries.[6]

Consistent with the stagnant fortunes of the agricultural industry in general discussed above, employment in industries most affected by the proposed amendments has declined since 1998 in the state and region, as Table 5 below shows. While employment in the four crop categories in the region declined annually by almost two percent, employment in the state as a whole for the same crops and over the same time period declined annually by less than one percent. In the region, field crops experienced the fastest decline between 1998 and 2003, dropping by 4.8 percent per year. Fruit and tree nuts also declined, as did cash grains, by 2.3 percent and 1.7 percent respectively.

TABLE 5 Agricultural Employment By Crop Categories San Joaquin Valley Region, 1998-2003

	Total	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
Regional Employment 1998	117,619	1,084	16,529	12,238	87,769
Regional Employment 2003	107,837	993	12,897	16,026	77,921
Change	-9,783	-91	-3,632	3,788	-9,848
Annual Percent Change	-1.7%	-1.7%	-4.8%	5.5%	-2.4%
State Employment 1998	223,375	3,689	18,349	49,807	151,530
State Employment 2003	219,403	4,021	17,328	53,382	144,672
Change	-3,972	332	-1,021	3,575	-6,858
Annual Percent Change	-0.4%	1.7%	-1.1%	1.4%	-0.9%

Source: Applied Development Economics, based on California Employment Development Department – Agricultural Bulletin. Note: Employment data covers workers who are paid on hourly wage or salary bases, and data comes primarily from two sources: the Employment Development Department Covered Employment and Wages (ES202) data files and a monthly survey conducted by the California Agricultural Statistical Service of the USDA. The employment figures include "farm labor contractors" but do not include farm owners.

Table 6 identifies economic trends for crop producers organized into four different categories, of cash grains, field crops, vegetables, and fruit and tree nuts. These categories correspond to categories found in the 2002 Agricultural Census, and data from the California Agricultural

[6] According to Dun and Bradstreet, over a ten year period between 1993 and 2003, cash grain farmers at the lowest 25th percentile generated net profit ratios amounting to 0.3 percent of revenues, while farmers at the 50th percentile generated 5.2% in net profits. Cash grain farmers in the top 25th percentile generated net profits amounting to 11.3 percent of revenues. These varying levels of net profit ratios were factored into the analysis.

Commissioner were organized accordingly. Data in the table below is also stratified by farm size categories.

As Table 6 shows, there are over 25,000 farms in the Central Valley that produce various crops.[7] At 17,344 farms or 72 percent of the total, the bulk of farms in the region are smaller than 100 acres. In large part, this is driven by the high number of fruit and tree nuts farms smaller than 100 acres. Of the 17,344 farms smaller than 100 acres, 13,604 are fruit and tree nut growers. On the opposite end of the spectrum, farms that are at least 500 acres comprise eight percent of all farms in the region, or 1,870 farms out of 25,750.

TABLE 6 Number of Farms By Crop Categories By Farm Size
San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	9,842	190	1,004	484	8,164
25 to 99 acres	7,502	477	1,400	185	5,440
100 to 249 acres	4,284	480	1,349	248	2,207
250 to 499 acres	2,252	221	900	218	913
500 acres or more	1,870	154	849	229	638
500 to 999 acres	1,205	93	555	141	416
over 1000 acres	663	59	294	88	222
	25,750	1,522	5,502	1,364	17,362
1 to 24 acres	37%	12%	18%	35%	47%
25 to 99 acres	29%	31%	25%	14%	31%
100 to 249 acres	17%	32%	25%	18%	13%
250 to 499 acres	9%	15%	16%	16%	5%
500 acres or more	8%	10%	15%	17%	4%
	100%	100%	100%	100%	100%

Source: Applied Development Economics, data based on US Census Agricultural Census 2002.

While large farms in excess of 500 acres are a small proportion of total farms, the bulk of harvested acreage occurs on these farms, as Table 7 shows. Thus, while eight percent of all farms in the region are at least 500 acres, these farms harvest slightly over 3 million acres of crops, or an estimated 60 percent of total harvested acreage. For specific categories,

[7]The Agricultural Census does not publish data on the number of farms that grow different crops within the same growing season or between different seasons in a given year. Thus, a farmer growing a cash grain on a 100-acre plot at the same time that she or he is growing a field crop on another 23-acre area is recorded in the census as having two farms. A farmer who grows crops in one category in one season and then grows a crop from another category on the same plot of land in a different season in the same year is recorded as two farms.

the numbers are even more pronounced. Ten percent of all cash grain farms are greater than 500 acres, but the estimated amount of acres harvested by these farms amounts to 83 percent of total cash grain acreage.

TABLE 7 Estimated Harvested Acreage By Crop Categories By Farm Size San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	115,437	2,340	12,048	3,081	97,968
25 to 99 acres	482,256	31,005	91,000	6,651	353,600
100 to 249 acres	734,053	84,000	236,075	27,753	386,225
250 to 499 acres	773,783	77,350	315,000	61,883	319,550
500 acres or more	3,106,083	978,242	1,120,250	158,500	849,092
500 to 999 acres	1,099,682	92,907	535,171	70,500	401,104
over 1000 acres	2,006,402	885,335	585,079	88,000	447,988
	5,211,613	1,172,937	1,774,373	257,868	2,006,435
1 to 24 acres	2%	0.2%	1%	1%	5%
25 to 99 acres	9%	3%	5%	3%	18%
100 to 249 acres	14%	7%	13%	11%	19%
250 to 499 acres	15%	7%	18%	24%	16%
500 acres or more	60%	83%	63%	61%	42%
500 to 999 acres	22%	8%	30%	27%	20%
over 1000 acres	38%	75%	33%	34%	22%
	100%	100%	100%	100%	100%

Source: Applied Development Economics, estimates based on US Census Agricultural Census 2002 and California Agricultural Statistical Service. Note: the number of harvested acres by farm size is an estimate based on the overall number of harvested acres by crop categories and the number of farms by crop categories and by farm size.

Table 8 provides estimates on the amount of value generated by farms by crop categories by farm size categories. The baseline value amount comes from the California Agricultural Commissioners, and data is for 2003. At $6.75 billion, the largest crop category in terms of revenue is fruit and tree nuts, which includes popular items such as almonds, pistachios and grapes, including wine grapes. Field crops, which recorded $1.75 billion in aggregate revenues, include items such as cotton.

TABLE 8 Estimated Revenues By Crop Category By Farm Size San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	$359,563,723	$984,968	$11,891,708	$16,886,326	$329,800,721
25 to 99 acres	$1,329,681,675	$13,050,823	$89,819,505	$36,447,810	$1,190,363,536
100 to 249 acres	$1,720,663,454	$35,357,819	$233,012,524	$152,100,360	$1,300,192,751
250 to 499 acres	$1,758,357,106	$32,558,658	$310,913,672	$339,147,593	$1,075,737,183
500 acres or more	$5,244,528,343	$411,767,732	$1,105,717,591	$868,649,910	$2,858,393,109
500 to 999 acres	$2,303,986,945	$39,107,010	$528,228,785	$386,371,096	$1,350,280,054
over 1000 acres	$2,940,541,398	$372,660,722	$577,488,806	$482,278,815	$1,508,113,055
	$10,412,794,300	$493,720,000	$1,751,355,000	$1,413,232,000	$6,754,487,300

Source: Applied Development Economics, estimates based on US Census Agricultural Census 2002 and California Agricultural Statistical Service. Note: revenue estimates by crop categories and by farm size categories are based on overall revenues by crop categories (i.e. cash grains = $493,720,000, field crops = $1,751,355,000, etc.) and overall harvested acreage by crop categories (see Table 7).

6. SOCIOECONOMIC IMPACTS

This section of the report compares the economic characteristics of affected industries against the compliance costs. The first part of this section discusses annual compliance cost estimates in general, reviewing cost estimates for both agricultural operations and non-agricultural operations. Section 6.2 discusses general business responses to compliance costs. From Section 6.3 to Section 6.6, the report analyzes the economic impacts of the proposed amendments to Rule 4702 on agricultural operations, which, at $28.2 million to $31.4 million (or $18.7 million to $19.8 million with Moyer funds), will experience the bulk of the annual compliance costs. While certain number of rental equipment operators who rent out their irrigation equipment will bear compliance costs below, it is growers who will ultimately bear the full impact of the compliance costs. In analyzing impacts on agricultural operations, the analysis will review impacts in several ways. The first scenario analyzes the impacts of the proposed amendments to Rule 4702 based on $28.2 million cost figure. The first scenario also analyzes the impacts of the Moyer Fund program, which could reduce annual compliance costs borne by agricultural operators from $28.2 million to $18.7 million. The second scenario analyzes impacts of the proposed amendments based on a $31.4 million annual compliance cost figure. This scenario also analyzes the impacts of the Moyer Fund program, which could be available to reduce the annual compliance cost borne by AO from $31.4 million to $19.8 million. Section 6.7 analyzes the impacts of the proposed amendments on non-agricultural operations, which will experience an estimated $1.5 million in annual compliance costs.

6.1 COMPLIANCE COST ESTIMATES

The District cost estimates are based in part on data provided by interested parties and in part on District analysis. In Scenario 1, the District's cost of compliance analysis indicates that, overall, affected industries would incur $29.7 million in annual cost. Annual compliance costs for agricultural operations (AO) are $28.2 million, while costs for non-AO engines are $1.46 million. While the overall annual compliance cost for AO's will continue to be $28.2 million, funds from the Carl Moyer program is expected to be available to reduce the cost to agricultural operators. With the Moyer funds, annual compliance costs borne by AO's will fall to approximately $18.7 million. Table 9 below

identifies annual compliance costs associated with the proposed amendments to Rule 4702.

TABLE 9 Summary of Annual Compliance Costs for Rule 4702

Engine Description	Annual Compliance Costs ($/yr) Scenario 1 Engine Cost Increase of 15% for Tier 3 and 20% for Tier 4	Scenario 2 Engine Cost Increase of 15% for Tier 3 and 60% for Tier 4
AO Engines	$28,238,000	$31,408,000
Non-AO Engines	$ 1,463,000	$ 1,542,000
Tot for all Engines Without Moyer Funds	$29,701,000	$32,950,000
Potential Moyer Funds for AO Engines*	$10,970,000	$13,138,000
Tot for all Engines W/ Moyer for AO Engines	$18,731,000	$19,812,000

Source: San Joaquin Valley Unified Air Pollution Control District: Note: * Non-AO engines are not eligible for Moyer funds.

Table 9 above also includes a second annual compliance cost scenario. In Scenario 2, the District's cost of compliance analysis indicates that, overall, affected industries would incur $32.9 million in annual cost. Annual compliance costs for agricultural operations (AO) are $31.4 million, while costs for non-AO engines are $1.54 million. While in this scenario the overall annual compliance cost for AO's will continue to be $31.4 million, funds from the Carl Moyer program is expected to be available to reduce the cost to agricultural operators. With the Moyer funds, annual compliance costs borne by AO's will fall to approximately $19.8 million.

Annual compliance data in Table 9 for agricultural operations is distributed into the different farm size categories below. The annual compliance costs below are distributed in a manner that corresponds to the way in which different crops utilize water on an acre-feet per acre basis. Appendix C identifies the acre-feet of water per acre by different farm categories and sizes. In addition, costs by crop type and by farm size category are further broken down into three sub-categories corresponding to the farms in the first quartile (zero to 25th percentile farms in a given sub-category), median group (26th to the 74th percentile farms), and upper quartile (75th to the 100th percentile farms).

TABLE 10 Cost Distributed By Water Use By Crop Categories By Farm Size Scenario One: Without Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	**$683,764**	**$9,970**	**$64,644**	**$19,687**	**$589,464**
lower quartile	$170,941	$2,492	$16,161	$4,922	$147,366
median	$341,882	$4,985	$32,322	$9,844	$294,732
upper quartile	$170,941	$2,492	$16,161	$4,922	$147,366
25 to 99 acres	**$2,790,431**	**$132,100**	**$488,262**	**$42,493**	**$2,127,575**
lower quartile	$697,608	$33,025	$122,065	$10,623	$531,894
median	$1,395,215	$66,050	$244,131	$21,247	$1,063,788
upper quartile	$697,608	$33,025	$122,065	$10,623	$531,894
100 to 249 acres	**$4,125,760**	**$357,891**	**$1,266,664**	**$177,329**	**$2,323,877**
lower quartile	$1,031,440	$89,473	$316,666	$44,332	$580,969
median	$2,062,880	$178,946	$633,332	$88,664	$1,161,938
upper quartile	$1,031,440	$89,473	$316,666	$44,332	$580,969
250 to 499 acres	**$4,337,796**	**$329,558**	**$1,690,137**	**$395,400**	**$1,922,700**
lower quartile	$1,084,449	$82,390	$422,534	$98,850	$480,675
median	$2,168,898	$164,779	$845,069	$197,700	$961,350
upper quartile	$1,084,449	$82,390	$422,534	$98,850	$480,675
500 acres or more	**$16,300,250**	**$4,167,904**	**$6,010,718**	**$1,012,729**	**$5,108,899**
500 to 999 acres	**$6,131,166**	**$395,840**	**$2,871,469**	**$450,457**	**$2,413,399**
lower quartile	$1,532,791	$98,960	$717,867	$112,614	$603,350
median	$3,065,583	$197,920	$1,435,735	$225,228	$1,206,700
upper quartile	$1,532,791	$98,960	$717,867	$112,614	$603,350
over 1000 acres	**$10,169,084**	**$3,772,064**	**$3,139,248**	**$562,272**	**$2,695,499**
lower quartile	$2,542,271	$943,016	$784,812	$140,568	$673,875
median	$5,084,542	$1,886,032	$1,569,624	$281,136	$1,347,750
upper quartile	$2,542,271	$943,016	$784,812	$140,568	$673,875
	$28,238,000	$4,997,424	$9,520,424	$1,647,638	$12,072,514

Source: Applied Development Economics, estimates based on San Joaquin Valley Unified Pollution Control District, US Census Agricultural Census 2002, California Agricultural Statistical Service, and California Department of Water Resources

Annual compliance costs in Table 11 take into account the Moyer program, and these costs are distributed across various farm size categories in a manner that corresponds to the way in which different crops utilize water on an acre-feet per acre basis.

TABLE 11 Cost By Water Use By Crop Categories By Farm Size
Scenario One: with Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	**$453,559**	**$6,613**	**$42,880**	**$13,059**	**$391,006**
lower quartile	$113,390	$1,653	$10,720	$3,265	$97,752
median	$226,779	$3,307	$21,440	$6,530	$195,503
upper quartile	$113,390	$1,653	$10,720	$3,265	$97,752
25 to 99 acres	**$1,850,965**	**$87,625**	**$323,877**	**$28,187**	**$1,411,276**
lower quartile	$462,741	$21,906	$80,969	$7,047	$352,819
median	$925,483	$43,813	$161,938	$14,093	$705,638
upper quartile	$462,741	$21,906	$80,969	$7,047	$352,819
100 to 249 acres	**$2,736,724**	**$237,398**	**$840,211**	**$117,627**	**$1,541,488**
lower quartile	$684,181	$59,350	$210,053	$29,407	$385,372
median	$1,368,362	$118,699	$420,106	$58,813	$770,744
upper quartile	$684,181	$59,350	$210,053	$29,407	$385,372
250 to 499 acres	**$2,877,373**	**$218,604**	**$1,121,112**	**$262,279**	**$1,275,377**
lower quartile	$719,343	$54,651	$280,278	$65,570	$318,844
median	$1,438,686	$109,302	$560,556	$131,140	$637,688
upper quartile	$719,343	$54,651	$280,278	$65,570	$318,844
500 acres or more	**$10,812,380**	**$2,764,679**	**$3,987,065**	**$671,769**	**$3,388,865**
500 to 999 acres	**$4,066,962**	**$262,571**	**$1,904,720**	**$298,800**	**$1,600,871**
lower quartile	$1,016,740	$65,643	$476,180	$74,700	$400,218
median	$2,033,481	$131,286	$952,360	$149,400	$800,435
upper quartile	$1,016,740	$65,643	$476,180	$74,700	$400,218
over 1000 acres	**$6,745,418**	**$2,502,108**	**$2,082,345**	**$372,970**	**$1,787,995**
lower quartile	$1,686,354	$625,527	$520,586	$93,242	$446,999
median	$3,372,709	$1,251,054	$1,041,173	$186,485	$893,997
upper quartile	$1,686,354	$625,527	$520,586	$93,242	$446,999
	$18,731,000	$3,314,921	$6,315,145	$1,092,921	$8,008,012

Source: Applied Development Economics, estimates based on San Joaquin Valley Unified Pollution Control District, US Census Agricultural Census 2002 and California Agricultural Statistical Service

Tables 12 and 13 are similar to Tables 10 and 11 except the tables below distribute annual compliance costs data for Scenario 2. Again, the annual compliance costs below are distributed in a manner that corresponds to the way in which different crops utilize water on an acre-feet per acre basis.

TABLE 12 Cost Distributed By Water Use By Crop Categories By Farm Size Scenario Two: Without Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	**$760,524**	**$11,089**	**$71,901**	**$21,897**	**$655,637**
lower quartile	$190,131	$2,772	$17,975	$5,474	$163,909
median	$380,262	$5,545	$35,950	$10,949	$327,818
upper quartile	$190,131	$2,772	$17,975	$5,474	$163,909
25 to 99 acres	**$3,103,684**	**$146,930**	**$543,074**	**$47,264**	**$2,366,417**
lower quartile	$775,921	$36,732	$135,769	$11,816	$591,604
median	$1,551,842	$73,465	$271,537	$23,632	$1,183,209
upper quartile	$775,921	$36,732	$135,769	$11,816	$591,604
100 to 249 acres	**$4,588,918**	**$398,068**	**$1,408,860**	**$197,235**	**$2,584,755**
lower quartile	$1,147,230	$99,517	$352,215	$49,309	$646,189
median	$2,294,459	$199,034	$704,430	$98,618	$1,292,378
upper quartile	$1,147,230	$99,517	$352,215	$49,309	$646,189
250 to 499 acres	**$4,824,757**	**$366,554**	**$1,879,872**	**$439,788**	**$2,138,542**
lower quartile	$1,206,189	$91,639	$469,968	$109,947	$534,636
median	$2,412,378	$183,277	$939,936	$219,894	$1,069,271
upper quartile	$1,206,189	$91,639	$469,968	$109,947	$534,636
500 acres or more	**$18,130,117**	**$4,635,794**	**$6,685,481**	**$1,126,418**	**$5,682,424**
500 to 999 acres	**$6,819,451**	**$440,277**	**$3,193,821**	**$501,025**	**$2,684,328**
lower quartile	$1,704,863	$110,069	$798,455	$125,256	$671,082
median	$3,409,725	$220,139	$1,596,910	$250,513	$1,342,164
upper quartile	$1,704,863	$110,069	$798,455	$125,256	$671,082
over 1000 acres	**$11,310,666**	**$4,195,516**	**$3,491,661**	**$625,393**	**$2,998,096**
lower quartile	$2,827,667	$1,048,879	$872,915	$156,348	$749,524
median	$5,655,333	$2,097,758	$1,745,830	$312,696	$1,499,048
upper quartile	$2,827,667	$1,048,879	$872,915	$156,348	$749,524
	$31,408,000	$5,558,435	$10,589,188	$1,832,602	$13,427,775

Source: Applied Development Economics, estimates based on San Joaquin Valley Unified Pollution Control District, US Census Agricultural Census 2002, California Agricultural Statistical Service, and California Department of Water Resources

TABLE 13 Cost Distributed By Water Use By Crop Categories By Farm Size Scenario Two: With Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	**$479,734**	**$6,995**	**$45,355**	**$13,813**	**$413,572**
lower quartile	$119,934	$1,749	$11,339	$3,453	$103,393
median	$239,867	$3,497	$22,677	$6,906	$206,786
upper quartile	$119,934	$1,749	$11,339	$3,453	$103,393
25 to 99 acres	**$1,957,788**	**$92,682**	**$342,568**	**$29,814**	**$1,492,723**
lower quartile	$489,447	$23,171	$85,642	$7,453	$373,181
median	$978,894	$46,341	$171,284	$14,907	$746,362
upper quartile	$489,447	$23,171	$85,642	$7,453	$373,181
100 to 249 acres	**$2,894,665**	**$251,099**	**$888,701**	**$124,415**	**$1,630,450**
lower quartile	$723,666	$62,775	$222,175	$31,104	$407,612
median	$1,447,333	$125,550	$444,351	$62,208	$815,225
upper quartile	$723,666	$62,775	$222,175	$31,104	$407,612
250 to 499 acres	**$3,043,431**	**$231,220**	**$1,185,813**	**$277,416**	**$1,348,981**
lower quartile	$760,858	$57,805	$296,453	$69,354	$337,245
median	$1,521,716	$115,610	$592,907	$138,708	$674,491
upper quartile	$760,858	$57,805	$296,453	$69,354	$337,245
500 acres or more	**$11,436,382**	**$2,924,234**	**$4,217,166**	**$710,538**	**$3,584,443**
500 to 999 acres	**$4,301,673**	**$277,725**	**$2,014,645**	**$316,044**	**$1,693,260**
lower quartile	$1,075,418	$69,431	$503,661	$79,011	$423,315
median	$2,150,837	$138,862	$1,007,323	$158,022	$846,630
upper quartile	$1,075,418	$69,431	$503,661	$79,011	$423,315
over 1000 acres	**$7,134,708**	**$2,646,509**	**$2,202,521**	**$394,495**	**$1,891,183**
lower quartile	$1,783,677	$661,627	$550,630	$98,624	$472,796
median	$3,567,354	$1,323,255	$1,101,261	$197,247	$945,592
upper quartile	$1,783,677	$661,627	$550,630	$98,624	$472,796
	$19,812,000	$3,506,231	$6,679,604	$1,155,996	$8,470,169

Source: Applied Development Economics, estimates based on San Joaquin Valley Unified Pollution Control District, US Census Agricultural Census 2002, California Agricultural Statistical Service, and California Department of Water Resources

6.2 BUSINESS RESPONSES TO COMPLIANCE COSTS

Industries impacted by the proposed amendments may respond in a variety of ways when faced with new regulatory costs. These responses may range from simply absorbing the costs and accepting a lower rate of return, to shutting down the affected business operation altogether and, where practical, shift from lower-value to higher-value crops. Affected sources may also seek to renew efforts to increase productivity and reduce

costs elsewhere in their operation in order to recoup the regulatory costs and maintain profit levels. With regards to agricultural operations that are affected by the proposed amendments, it should be noted that the agricultural sector in general is what is referred to as a "price taker." In other words, the price of commodities are established in the national and global marketplaces and, as such, there is little room for scaling the price upwards to accommodate regulatory costs associated with proposed amendments to Rule 4702.

6.3 OVERVIEW OF DUN AND BRADSTREET AND OTHER PROFIT RATIOS, COST OF DOING BUSINESS IN CALIFORNIA, AND AGRICULTURAL NET PROFITS

In calculating net income, profit ratios, and industry profits, ADE employed the following methodology and relied on the following sources of information. With regards to the non-agricultural operations that are affected by the proposed amendments, ADE relied on net profit ratios derived by Dun and Bradstreet. With regards to agricultural operations affected by the proposed amendments, the first document ADE reviewed was the California Department of Food and Agriculture's 2003 Resource Directory. This document yielded information on revenues, costs and net profit for the agricultural sector as a whole. According to this report, California's agricultural sector experienced an annual rate of return of 19 percent between 1998 and 2003. Net profit data in the 2002 Agricultural Census were similarly as high. It may be possible that these large farms could be the driving force behind the relatively high net profit ratios for the industry as a whole. Indeed, as Table 8 above showed, farms larger than 500 acres generated the bulk of agricultural revenues.

To control for the possible affects of large farms on industry-wide net profits, the consultant turned to Dun and Bradstreet, which produces estimates on net profit for industries at the four-digit Standard Industrial Classification (SIC) level. Dun and Bradstreet data was tracked for a period stretching from 1993 to 2003 (see Table 14 below).

TABLE 14 Dun and Bradstreet Net Profit Ratios: United States, 1991-1992 through 2001-2002

Description	SIC	Avg.	91 - 92	92 - 93	93 - 94	94 - 95	95 - 96	96 - 97	97 - 98	98 - 99	99 - 00	00 - 01	01 - 02
Wheat	0111	6.6	7.0	10.8	6.1	8.4	8.7	5.6	3.9	9.0	-0.4		
Corn	0115	5.1	3.0	4.8	6.3	1.5	8.0	6.5	3.7	10.5	1.4	2.7	3.3
Cash grains, nec	0119	4.0	5.1	8.2	8.9	5.3	6.9	2.1			-8.3		
Cotton	0131	8.1	9.5	14.2	5.2	5.4	11.5	6.5	4.3				
Sugarbeats	0133	10.3	8.4	12.1									
Irish potatoes	0134	4.1	9.8	2.8	3.2	3.7	0.5	4.8	7.0	4.7	0.3	2.1	
Field crops, excp. cash grains nec	0139	6.9	7.0	10.6	4.9	7.0	4.2	10.6	6.4	6.7	4.3	-1.2	
Vegetables and melons	0161	3.7	4.1	5.9	5.0	4.4	3.5	2.9	2.2	2.8	2.1	1.4	1.2
Berry crops	0171	7.9	7.7	3.8	10.0	16.2	6.2	3.5	8.1				
Grapes	0172	5.5	7.3	9.5	6.7	4.4	4.6	3.7	4.5	5.8	2.8	4.8	
Tree nuts	0173	5.8	2.3	1.5	6.4	11.9	7.3	6.9	4.5				
Citrus fruits	0174	4.6	1.1	3.4	7.2	1.7	4.7	7.4	9.1	5.4	1.6		
Deciduous tree fruits	0175	3.4	7.3	4.1	5.0	2.1	0.9	2.2	5.3	1.4	2.4	4.0	0.2

Source: Dun and Bradstreet. Note: figures above are the net profit ratios for median-performing agricultural operators

In applying the Dun and Bradstreet net profit ratios, the consultant also factored into the analysis three levels of ratios reported by Dun and Bradstreet. These ratios correspond to poor-performing, median-performing, and high-performing crop industries. Table 15 below identifies average net profit ratios organized by crop categories. The average spans a number of years and was employed in order to control for the affects of economic recessions and expansions, which may unnecessarily skew profits up or down.

TABLE 15 Net Profits Ratios By Crop Categories: US Averages

	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
lower quartile	0.3%	2.0%	0.2%	0.8%
Median	5.2%	7.3%	3.7%	5.5%
upper quartile	11.8%	14.1%	9.2%	12.5%

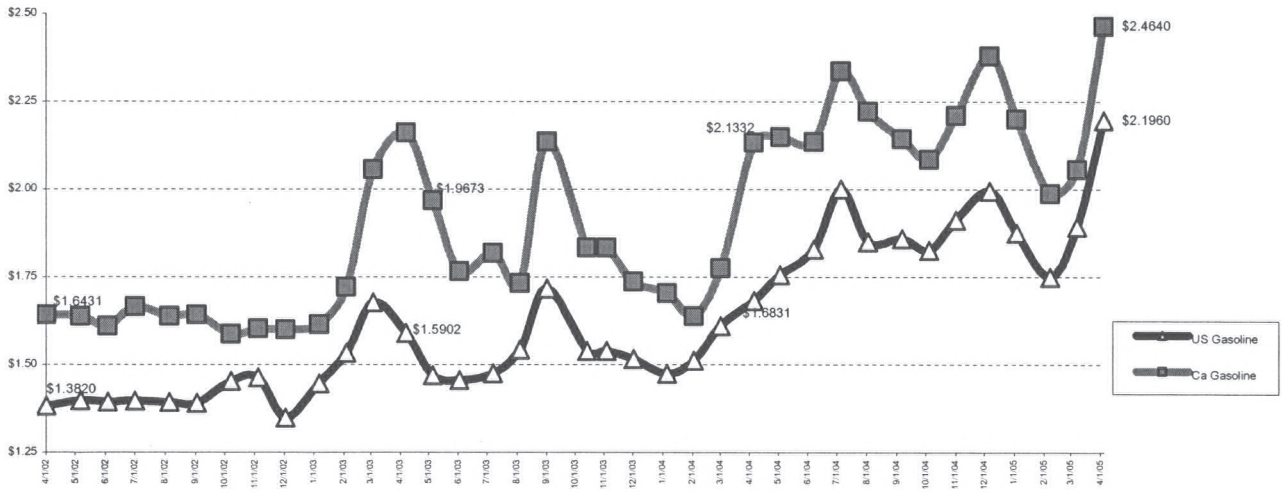
Applied Development Economics, based on Dun and Bradstreet

Net profit averages above are based on a pool of companies from across the country. It is possible that profit ratios may have to be adjusted downward given that the cost of doing business is higher in California than elsewhere. For example, the Milken Institute reports that, compared to Massachusetts, New York, Connecticut and New Jersey, the cost of manufacturing in California is 32.2 percent greater than in these comparison states. For the most part, the Milken Institute's cost of business study – "Manufacturing Matters: California's Performance and Prospects" – is largely silent on how California compares to other states with regards to agriculture. The discussion directly below attempts to determine whether and to what extent the net profit ratios is Table 15 should be adjusted.

Figures 1 and 2 track recent changes in fuel prices, while Table 16 tracks changes in workmen's compensation, two cost items that have recently garnered much attention in regional, statewide and national media attention. Figure 1 and Figure 2 compare monthly fluctuations in the per gallon cost of gasoline and diesel fuels. Data are for California and come from the United States Department of Energy. These data are adjusted for inflation. As the figures demonstrate, changes in fuel prices in California parallel national trends, though the unit price of fuel in

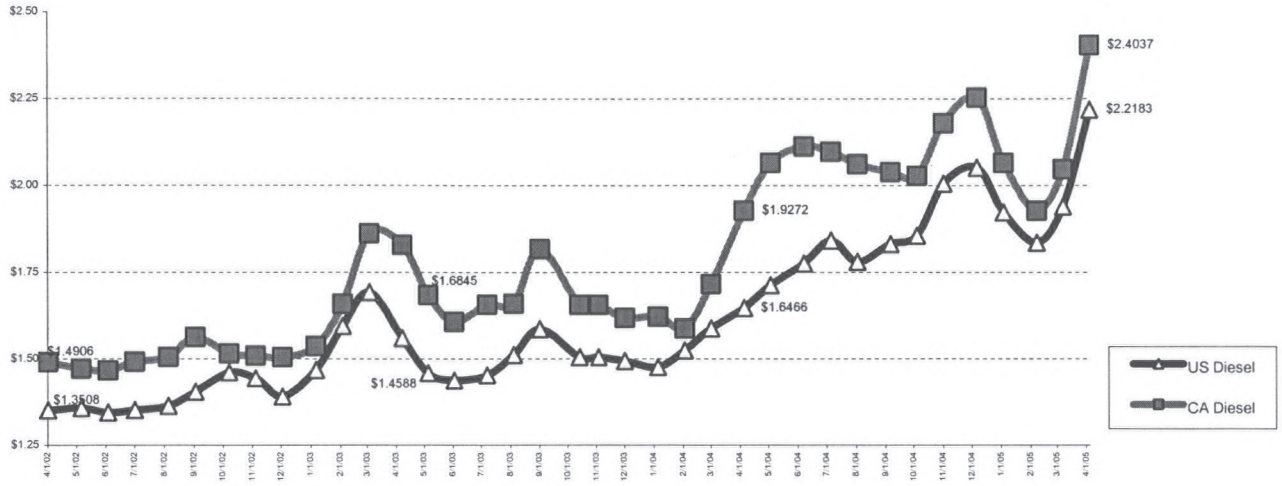
California is above national averages. Between April 2002 and April 2005, gasoline in California was $.20 per gallon to $.40 per gallon above national prices. For diesel, California prices tend to be slightly higher than national per gallon diesel prices, by $.15 per gallon to $.20 per gallon.

Figure 2. Monthly Gasoline Price ($/gallon) : California and US 2002 - 2005



Source: US Department of Energy

Figure 3. Monthly Diesel Price ($/gallon) : California and US 2002 - 2005



Source: US Department of Energy

In addition to fuel costs, California agriculture has been affected by the recent fluctuations in workmen's compensation costs. Table 16 identifies what is known as the "pure premium rate", which is workmen's compensation rate paid by employers. The California Insurance Commissioner approves rates, and, in doing so, looks to see that rates maintain insurance carrier solvency, among other things. Individual insurance carriers may charge a higher workmen's compensation rate that is higher than the "pure premium rate," so this rate should be considered a minimum. The workmen's compensation rate is expressed in dollars and cents and is multiplied by each $100 of payroll per industrial classification.

The workers compensation rates below are for agricultural industries. As the table shows, for many of the industries, workers compensation rates increased significantly between January 2002 and July 2003, continuing to grow somewhat between July 2003 and January 2004. Since January 2004, rates approved by the California Insurance Commissioner have begun to decrease to January 2002 level for many agricultural industries. However, bear in mind that specific insurance carriers may not have reduced their rates in step with rate reductions approved by the Insurance Commissioner.

Table 16 Pure Premium Rates Approved By the Insurance Commissioner of the State of California, 2002 - 2005

Industry	Code	Jan-02	Jul-02	Jan-03	Jul-03	Jan-04	Jul-04	Jan-05	Jul-05
Horticulture	0005	$5.89	$6.48	$8.72	$9.35	$7.72	$7.18	$6.30	$5.64
Citrus	0016	$11.16	$12.29	$14.38	$15.42	$11.46	$10.66	$10.28	$9.21
Poultry raising	0034	$10.09	$11.11	$15.14	$16.23	$12.96	$12.05	$12.51	$11.21
Florists-cultivating	0035	$6.80	$7.49	$10.32	$11.06	$7.56	$7.03	$8.56	$7.67
Dairy farms	0036	$9.06	$9.98	$11.12	$11.92	$8.53	$7.93	$9.95	$8.92
Stock farms	0038	$14.17	$15.60	$17.76	$19.04	$16.30	$15.16	$17.03	$15.26
Vineyards	0040	$5.27	$5.80	$6.31	$6.76	$5.19	$4.83	$6.04	$5.41
Potatoes	0041	$5.59	$6.15	$7.65	$8.20	$7.16	$6.66	$7.30	$6.54
Landscape gardening	0042	$10.27	$11.31	$13.01	$13.95	$9.51	$8.84	$9.79	$8.77
Cotton farms	0044	$8.28	$9.12	$10.18	$10.91	$8.25	$7.67	$8.40	$7.53
Orchards - nut crops	0045	$6.01	$6.62	$8.19	$8.78	$6.43	$5.98	$7.09	$6.35
Farm machinery operations	0050	$10.04	$11.05	$12.49	$13.39	$10.82	$10.06	$11.56	$10.36
Strawberry crops	0079	$6.11	$6.73	$6.68	$7.16	$5.70	$5.30	$5.85	$5.24
True pruning	0106	$31.27	$34.43	$34.82	$37.33	$27.43	$25.51	$28.79	$25.80
Truck farms	0172	$6.66	$7.33	$7.61	$8.16	$6.16	$5.73	$6.92	$6.20
Irrigations, drainage, reclamation	0251	$7.16	$7.88	$8.41	$9.02	$7.55	$7.02	$6.24	$5.59
Cotton merchants - compressing	0400	$10.10	$11.12	$12.56	$13.46	$11.17	$10.39	$10.39	$9.31
Cotton gin operations	0401	$12.69	$13.97	$16.17	$17.33	$12.99	$12.08	$12.04	$10.79
fresh fruit packing handling	2107	$7.61	$8.38	$11.29	$12.10	$11.03	$10.26	$9.21	$8.25
citrus fruit packing	2108	$12.49	$13.75	$15.28	$16.38	$16.69	$15.52	$15.90	$14.25
dried fruit packing	2109	$12.65	$13.93	$18.53	$19.86	$15.22	$14.15	$14.25	$12.77
AVERAGE		$9.97	$10.98	$12.70	$13.61	$10.75	$10.00	$10.69	$9.57

Source: State of California, Office of California Insurance Commissioner

Using data from Figures 1 and 2, as well as Table 16, Table 17 attempts to analyze the affects of recent changes in fuel and workmen's compensation costs on California's agricultural industry. According to the 2002 Agricultural Census, California farmers generated approximately $20.5 billion in farm expenses, perhaps the highest statewide sum in the nation. If the amount that California farmers spent on fuel in 2002 were adjusted to account for the recent increases in fuel costs, costs would increase by approximately $237.8 million. Adding the incremental cost of workmen's compensation attributable to recent fluctuations results in an estimated increase of another $163.7 million. Adding these incremental costs to the 2002 Agricultural Census figure of $20.5 billion increases overall expenses to $20.9 billion.

Table 17 compares California against several key agricultural states, as well as the nation as a whole, on a dollar per acre basis. As the table shows, California farmers (crop and livestock producers) spent approximately $744 per acre, and, factoring in increases in fuel and workmen's compensation costs, the figure would rise to $759 per acre. The national average was significantly below this amount, at $185 per acre. Iowa, Wisconsin and Washington farmers spend considerably less than

California farmers. Texas, Oregon and Nebraska farmers spent the least on a per acre basis, or $106, $163, and $197 respectively. At $795 per acre, California farmers spent slightly over four times as much as the national average on a per acre basis (i.e. $759/$185 = 4.11). Texas farmers spent slightly over half the national average (or $106/$185 = 0.57).

In addition to costs, there are also revenues to take into account. California farmers generate over four times as much revenue on a per acre basis than the nation as a whole (i.e. $933/$214 = 4.36)(see Table 17). None of the comparison states came close to California. Comparing various states' value per acre against their respective costs per acre allows us to calculate an overall index of productivity.[8] In short, taking into account recent surges in fuel and workmen's compensation costs, California's agricultural sector is still more productive than that of the nation and comparison areas, with an index of 1.06.

[8] The productivity index is computed in the following manner:

x = ([state rev per acre/US rev per acre]) divided by ([state cost per acre/US cost per acre])

If x >1, state agriculture is more productive than the nation. If x = 1, state agriculture is equally productive as the nation. If x<1, state is less productive than the nation. The most productive states would have a combination of a relatively high value index (i.e. state rev-acre/US rev-acre) and a relative low cost index (i.e. (state cost-acre/US cost-acre).

Table 17 California Agriculture and the Impact of Recent Surges in Workmen's Compensation and Fuel Prices On the Cost of Doing Business

			Total Farm Production Expenses: Crop and Livestock		Total Farm Production Value: Crop and Livestock				
	Farms	Gross Acres	Gross Cost	Cost per Acre	Gross Value	Value per Acre	Cost Per Acre Index (US = 1.00)	Value Per Acre Index (US = 1.00)	Productivity Index (US = 1.00)
California	79,655	27,589,027	$20,527,198,000	$744	$25,737,173,000	$933	4.03	4.36	1.08
Incremental fuel costs above 2002 baseline			*$237,791,917*						
Incremental workmen's' compensation costs above 2002 baseline			*$163,662,972*						
Adjustment	79,655	27,589,027	$20,928,652,888	$759	$25,737,173,000	$933	4.11	4.36	**1.06**
Texas	228,886	129,877,666	$13,734,706,000	$106	$14,134,744,000	$109	0.57	0.51	0.89
Iowa	90,648	31,729,490	$10,303,448,000	$325	$12,273,634,000	$387	1.76	1.81	1.03
Nebraska	49,356	45,903,116	$9,050,038,000	$197	$9,703,657,000	$211	1.07	0.99	0.93
Wisconsin	77,133	15,741,552	$4,642,287,000	$295	$5,623,275,000	$357	1.60	1.67	1.05
Oregon	40,055	17,080,422	$2,786,838,000	$163	$3,195,497,000	$187	0.88	0.87	0.99
Washington	35,959	15,318,008	$4,430,693,000	$289	$5,330,740,000	$348	1.57	1.63	1.04
US	2,128,739	938,279,056	$173,199,216,000	$185	$200,646,355,000	$214	1.00	1.00	1.00

Source: Applied Development Economics, based on 2002 US Agricultural Census, United State Department of Energy, and California Insurance Commissioner. Note: incremental fuel costs above 2002 baseline equals annual average incremental amount for 2003-2005. Incremental workmen's compensation amount above baseline equal bi-annual average for 2003-2005.

Because California's agricultural sector is more productive than comparison areas' agricultural sectors, we believe that the use of Dun and Bradstreet's national net profit ratios constitute a conservative measure for estimating industry profits in California. In other words, given California's comparative advantage in agriculture, one could argue that the Dun and Bradstreet ratios should be adjusted upward. For the purposes of analysis, no adjustments were made to net profit ratios found in Table 15.

Table 18 below provides estimates on the amount of net profits generated by growers of various farm sizes organized by crop categories. Affected farms in aggregate generated an estimated $632.7 million in profits in 2003, with the bulk of profits coming from fruit and tree nut growers, who generated almost $418 million in net profits (or almost two-thirds of total net profits).

The table below displays the estimated amount of net profits generated by the farmers by different quartile groupings. Farms in the "lower quartile" generated the lowest net profit ratio by crop category, while farms in the "upper quartile" are those farms that generated the highest profit rate by crop category. In other words, the lowest performing cash grain operators smaller than 25 acres recorded net profit ratios of approximately 0.32 percent, which, when multiplied against the amount of revenues generated by the first 25th percentile farms, yields $787 in net profits.[9] The highest 25th percentile cash grains operators smaller than 25 acres experienced an estimated 11.8 percent net profit ratio, resulting in net profits of $28,987.[10] In estimating net profits generated by the 26th percentile through 74th percentile cash grain operators, the analysis assumed that Dun and Bradstreet's cash grain net profit ratios were evenly distributed between the 25th percentile operator (whose corresponding net profit ratio is 0.32 percent) and the median 50th percentile operator (whose corresponding net profit ratio is 5.2 percent), and the median operator and the 75th percentile operator (11.8 percent net profit ratio), and calculated the net profit accordingly.

[9] ($984,968 x .25) x .0032 = $787

[10] ($984,968 x .25) x .1177 = $28,987

TABLE 18 Estimated Net Profits By Crop Categories and Farm Size San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	**$21,604,126**	**$55,268**	**$864,232**	**$904,460**	**$19,780,166**
lower quartile	$767,175	$788	$59,624	$8,685	$698,078
median	$9,546,415	$25,492	$385,662	$382,741	$8,752,520
upper quartile	$11,290,536	$28,987	$418,947	$513,034	$10,329,568
25 to 99 acres	**$81,657,334**	**$734,183**	**$6,716,475**	**$1,831,461**	**$72,375,215**
lower quartile	$2,997,581	$10,444	$450,345	$17,189	$2,519,603
median	$36,813,005	$339,655	$3,101,774	$798,905	$32,572,670
upper quartile	$41,846,748	$384,084	$3,164,355	$1,015,367	$37,282,942
100 to 249 acres	**$105,924,980**	**$2,032,048**	**$17,739,760**	**$7,034,944**	**$79,118,228**
lower quartile	$4,014,694	$28,296	$1,168,299	$66,025	$2,752,075
median	$48,037,587	$963,176	$8,362,393	$3,068,727	$35,643,291
upper quartile	$53,872,699	$1,040,577	$8,209,068	$3,900,191	$40,722,862
250 to 499 acres	**$104,080,285**	**$1,875,914**	**$23,991,788**	**$12,773,445**	**$65,439,138**
lower quartile	$3,981,802	$26,056	$1,558,887	$119,883	$2,276,977
median	$47,412,345	$891,661	$11,479,363	$5,571,931	$29,469,390
upper quartile	$52,686,139	$958,198	$10,953,538	$7,081,632	$33,692,772
500 acres or more	**$328,717,591**	**$22,492,379**	**$84,840,605**	**$44,941,752**	**$176,442,854**
500 to 999 acres	**$150,918,371**	**$2,148,671**	**$40,442,687**	**$24,958,052**	**$83,368,962**
lower quartile	$5,772,110	$31,296	$2,648,479	$234,239	$2,858,096
median	$69,257,285	$966,460	$19,184,633	$10,887,004	$38,219,189
upper quartile	$75,888,976	$1,150,915	$18,609,574	$13,836,810	$42,291,677
over 1000 acres	**$177,799,220**	**$20,343,708**	**$44,397,919**	**$19,983,700**	**$93,073,892**
lower quartile	$6,573,418	$298,227	$2,895,466	$187,553	$3,192,171
median	$81,599,342	$9,078,111	$21,157,421	$8,717,131	$42,646,680
upper quartile	$89,626,459	$10,967,370	$20,345,032	$11,079,016	$47,235,041
	$641,984,316	$27,189,793	$134,152,860	$67,486,062	$413,155,601

Source: Applied Development Economics, estimates based on US Census Agricultural Census 2002, California Agricultural Statistical Service and Dun and Bradstreet

Agricultural operators' and non-agricultural operators' responses to increased compliance costs hinge on the effect of the costs on the profits generated by the affected sources. An impact on estimated profits greater than 10 percent implies that the source would experience serious economic effects because of the compliance cost. When annual compliance costs are greater than 10 percent of estimated annual profits, companies typically respond to the impact by laying off some workers, closing parts of manufacturing or, in the case of, agricultural facilities, by shifting production from low- to high-value crops. In the most drastic

case, affected agricultural operators or non-agricultural operators might possibly close their respective affected facilities.

6.4 IMPACTS ON AGRICULTURAL INDUSTRIES

In analyzing impacts on agricultural operations, the analysis will review impacts in several ways. The first scenario analyzes the impacts of the proposed amendments to Rule 4702 based on $28.2 million cost figure. The first scenario also analyzes the impacts of the Moyer Fund program, which could reduce annual compliance costs borne by agricultural operators from $28.2 million to $18.7 million. The second scenario analyzes impacts of the proposed amendments based on a $31.4 million annual compliance cost figure. This scenario also analyzes the impacts of the Moyer Fund program, which could be available to reduce the annual compliance cost borne by AO from $31.4 million to $19.8 million.

SOCIOECONOMIC IMPACTS: SCENARIO 1: WITHOUT MOYER FUNDS

Table 19 describes the dollar amount of annual compliance cost above the threshold of significance associated with the proposed amendments to Rule 4702. As shown in Table 19, the compliance costs varies by crop categories, with cash grains bearing the highest burden of costs above the significance threshold. Cash grain growers in the region may be disproportionately affected because of the price they are getting for their crops, which is approximately $421 per acre. Five years before in 1998, cash grain operators generated approximately $445 per acre in inflation-adjusted dollars. By comparison, vegetables and fruits and tree nuts are generating approximately $5,500 and $3,400 in revenue per acre respectively. In addition, across the board, farms experiencing the lowest net profit ratios (i.e. lower quartile farms) experience impacts above the threshold of significance.

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TABLE 19 Amount of Annual Compliance Cost Above Threshold of Significance
Agricultural Operations Only: Scenario 1, Without Moyer Funds
San Joaquin Valley Region, 2003

	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres				
lower quartile	$2,414	$10,199	$4,053	$77,558
Median	$2,436	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
25 to 99 acres				
lower quartile	$31,981	$77,031	$8,904	$279,934
Median	$32,085	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
100 to 249 acres				
lower quartile	$86,643	$199,836	$37,730	$305,762
Median	$82,628	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
250 to 499 acres				
lower quartile	$79,784	$266,646	$86,862	$252,977
Median	$75,613	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
500 acres or more				
500 to 999 acres				
lower quartile	$95,830	$453,019	$89,190	$317,540
Median	$101,274	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
over 1000 acres				
lower quartile	$913,193	$495,266	$121,813	$354,658
Median	$978,221	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
	$2,482,102	$1,501,996	$348,552	$1,588,428

Source: Applied Development Economics

Table 20 below translates the dollar amount of impacts above the threshold of significance into potential direct job losses, should agricultural operators seek to recoup annual compliance costs in this manner. As the table shows, the bulk of losses are incurred by cash grain operators, particularly farms larger than 500 acres, which could loses up to 94.9 out of 112.8 at-risk positions in cash grains. Field crop operators could directly lose up to 68.3 jobs as a result of annual compliance costs associated with the proposed amendments, with large farms losing the bulk of the jobs. Fruit and tree nut operators could lose up to 72.2 jobs.

TABLE 20 Direct Employment Impacts Resulting from Amount of Annual Compliance Cost Above Threshold: Scenario 1, Without Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres					
lower quartile	4.28	0.11	0.46	0.18	3.53
median	0.11	0.11			
upper quartile					
25 to 99 acres					
lower quartile	18.08	1.45	3.50	0.40	12.72
median	1.46	1.46			
upper quartile					
100 to 249 acres					
lower quartile	28.64	3.94	9.08	1.71	13.90
median	3.76	3.76			
upper quartile					
250 to 499 acres					
lower quartile	31.19	3.63	12.12	3.95	11.50
median	3.44	3.44			
upper quartile					
500 acres or more					
500 to 999 acres					
lower quartile	43.44	4.36	20.59	4.05	14.43
median	4.60	4.60			
upper quartile					
over 1000 acres					
lower quartile	85.68	41.51	22.51	5.54	16.12
median	44.46	44.46			
upper quartile					
	269.14	112.82	68.27	15.84	72.20

Source: Applied Development Economics

Table 21 translates the amount of direct jobs lost as a percent of employment in a given crop category. Thus, the cash crop category could lose slightly over eleven percent of its workforce as a result of the proposed amendments to Draft Rule 4702, with the bulk of loses experienced by large farm operators over 1000 acres.

TABLE 21 Direct Employment Impacts As A Percent of Industry Employment: Scenario 1, without Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres					
lower quartile	0.020%	0.011%	0.004%	0.001%	0.005%
median	0.011%	0.011%			
upper quartile					
25 to 99 acres					
lower quartile	0.192%	0.146%	0.027%	0.003%	0.016%
median	0.147%	0.147%			
upper quartile					
100 to 249 acres					
lower quartile	0.496%	0.397%	0.070%	0.011%	0.018%
median	0.378%	0.378%	0.000%	0.000%	0.000%
upper quartile					
250 to 499 acres					
lower quartile	0.499%	0.365%	0.094%	0.025%	0.015%
median	0.346%	0.346%			
upper quartile					
500 acres or more					
500 to 999 acres					
lower quartile	0.642%	0.439%	0.160%	0.025%	0.019%
median	0.464%	0.464%			
upper quartile					
over 1000 acres					
lower quartile	4.411%	4.181%	0.175%	0.035%	0.021%
median	4.478%	4.478%	0.000%	0.000%	0.000%
upper quartile					
	12.084%	11.363%	0.529%	0.099%	0.093%

Source: Applied Development

Because the Moyer Program has provided, and is expected to continue to provide, a substantial amount of funds to pay for some of the costs of re-powering with cleaner engines for agricultural operations, the analysis below analyzes Scenario 1 taking into account Moyer fund dollars.

SOCIOECONOMIC IMPACTS: SCENARIO 1: WITH MOYER FUNDS

As a result of the Moyer program, the annual cost of compliance borne by affected agricultural operations should drop from $28.2 million to $18.7 million. Table 16 describes the dollar amount of annual compliance cost above the threshold of significance associated with the proposed amendments to Rule 4702. As shown in Table 19, the compliance costs varies by crop categories, with cash grains and field crops bearing the highest burden of costs above the significance threshold. While cash grain operators continue to bear the highest amount of dollar costs above the significance threshold relative to the other crop categories, at $1.14 million, the annual compliance costs in this scenario is lower than what is reported in Table 19 for cash grain operators ($2.2 million in annual costs)(see Table 22).

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TABLE 22 Amount of Annual Compliance Cost Above Threshold: Agricultural Operations Only: Scenario 1, With Moyer Funds San Joaquin Valley Region, 2003

	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres				
lower quartile	$1,574	$4,758	$3,449	$27,944
median	$757	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
25 to 99 acres				
lower quartile	$20,862	$35,935	$6,827	$100,859
median	$9,847	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
100 to 249 acres				
lower quartile	$56,520	$93,223	$26,222	$110,164
median	$22,382	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
250 to 499 acres				
lower quartile	$52,046	$124,389	$47,612	$91,147
median	$20,136	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
500 acres or more				
500 to 999 acres				
lower quartile	$62,513	$211,332	$93,029	$114,408
median	$34,640	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
over 1000 acres				
lower quartile	$595,704	$231,040	$74,487	$127,782
median	$343,243	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
	$1,142,310	$700,676	$251,626	$572,303

Source: Applied Development Economics

Table 23 below identifies the amount of annual compliance cost above the threshold of significance. Whereas in Scenario 1 without Moyer Funds the region stands to lose over 200 jobs directly – or .23 percent of all jobs in affected industries – because of the Moyer Funds, job losses drops to 120.8 positions, or as shown in Table 24, .112 percent of industry jobs in affected industries.

TABLE 23 Direct Employment Impacts Resulting from Amount of Annual Compliance Cost Above Threshold: Scenario 1, With Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres					
lower quartile	1.7	0.1	0.2	0.2	1.3
median					
upper quartile					
25 to 99 acres					
lower quartile	7.5	0.9	1.6	0.3	4.6
median					
upper quartile					
100 to 249 acres					
lower quartile	13.0	2.6	4.2	1.2	5.0
median					
upper quartile					
250 to 499 acres					
lower quartile	14.3	2.4	5.7	2.2	4.1
median					
upper quartile					
500 acres or more					
500 to 999 acres					
lower quartile	21.9	2.8	9.6	4.2	5.2
median					
upper quartile					
over 1000 acres					
lower quartile	46.8	27.1	10.5	3.4	5.8
median	15.6	15.6			
upper quartile					
	120.8	51.5	31.8	11.4	26.0

Source: Applied Development Economics

TABLE 24 Direct Employment Impacts As A Percent of Industry Employment: Scenario 1, with Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres					
lower quartile	0.002%	0.007%	0.002%	0.001%	0.002%
median					
upper quartile					
25 to 99 acres					
lower quartile	0.007%	0.096%	0.013%	0.002%	0.006%
median					
upper quartile					
100 to 249 acres					
lower quartile	0.012%	0.259%	0.033%	0.007%	0.006%
median					
upper quartile					
250 to 499 acres					
lower quartile	0.013%	0.238%	0.044%	0.014%	0.005%
median					
upper quartile					
500 acres or more					
500 to 999 acres					
lower quartile	0.020%	0.286%	0.074%	0.026%	0.007%
median					
upper quartile					
over 1000 acres					
lower quartile	0.043%	2.727%	0.081%	0.021%	0.007%
median	0.014%	1.571%			
upper quartile					
	0.112%	5.185%	0.247%	0.071%	0.033%

Source: Applied Development

SOCIOECONOMIC IMPACTS: SCENARIO 2: WITHOUT MOYER FUNDS

The second scenario analyzes impacts of the proposed amendments based on a $31.4 million annual compliance cost figure. This scenario also analyzes the impacts of the Moyer Fund program, which could be available to reduce the annual compliance cost borne by AO from $31.4 million to $19.8 million. Table 25 identifies the amount of annual compliance costs above the threshold of significance. Similar to Table 19

above, the compliance costs varies by crop categories, with cash grains bearing the highest burden of costs above the significance threshold. In addition, across the board, farms experiencing the lowest net profit ratios (i.e. lower quartile farms) experience impacts above the threshold of significance. Whereas cash grain operators experienced $2.156 million in annual costs, in this scenario, these operators could experience up to $2.78 million in annual costs.

TABLE 25 Amount of Annual Compliance Cost Above Threshold of Significance Agricultural Operations Only: Scenario 2, Without Moyer Funds San Joaquin Valley Region, 2003

	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres				
lower quartile	$2,693	$12,013	$6,371	$94,101
median	$2,995	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
25 to 99 acres				
lower quartile	$35,688	$90,734	$12,610	$339,644
median	$39,499	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
100 to 249 acres				
lower quartile	$96,687	$235,385	$48,438	$370,981
median	$102,716	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
250 to 499 acres				
lower quartile	$89,033	$314,079	$87,949	$306,938
median	$94,111	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
500 acres or more				
500 to 999 acres				
lower quartile	$106,940	$533,607	$171,843	$385,272
median	$123,493	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
over 1000 acres				
lower quartile	$1,019,056	$583,369	$137,593	$430,307
median	$1,189,947	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
	$2,779,367	$1,769,187	$464,804	$1,927,244

Source: Applied Development Economics

TABLE 26 Direct Employment Impacts Resulting from Amount of Annual Compliance Cost Above Threshold: Scenario 2, Without Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres					
lower quartile	5.2	0.1	0.5	0.3	4.3
median	0.1	0.1			
upper quartile					
25 to 99 acres					
lower quartile	21.8	1.6	4.1	0.6	15.4
median	1.8	1.8			
upper quartile					
100 to 249 acres					
lower quartile	34.2	4.4	10.7	2.2	16.9
median	4.7	4.7			
upper quartile					
250 to 499 acres					
lower quartile	36.3	4.0	14.3	4.0	14.0
median	4.3	4.3			
upper quartile					
500 acres or more					
500 to 999 acres					
lower quartile	54.4	4.9	24.3	7.8	17.5
Median	0.0				
upper quartile					
over 1000 acres					
lower quartile	98.7	46.3	26.5	6.3	19.6
Median	54.1	54.1			
upper quartile					
	315.5	126.3	80.4	21.1	87.6

Source: Applied Development Economics

TABLE 27 Direct Employment Impacts As A Percent of Industry Employment: Scenario 2, without Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres					
lower quartile	0.005%	0.012%	0.004%	0.002%	0.005%
median	0.0001%	0.014%			
upper quartile					
25 to 99 acres					
lower quartile	0.020%	0.163%	0.032%	0.004%	0.020%
Median	0.002%	0.181%			
upper quartile					
100 to 249 acres					
lower quartile	0.032%	0.443%	0.083%	0.014%	0.022%
Median	0.004%	0.470%			
upper quartile					
250 to 499 acres					
lower quartile	0.034%	0.408%	0.111%	0.025%	0.018%
Median	0.004%	0.431%			
upper quartile					
500 acres or more					
500 to 999 acres					
lower quartile	0.050%	0.490%	0.188%	0.049%	0.022%
Median					
upper quartile					
over 1000 acres					
lower quartile	0.091%	4.665%	0.206%	0.039%	0.025%
Median	0.050%	5.448%			
upper quartile					
	0.293%	12.724%	0.624%	0.132%	0.112%

Source: Applied Development

SOCIOECONOMIC IMPACTS: SCENARIO 2: WITH MOYER FUNDS

This scenario also analyzes the impacts proposed amendments to Rule 4702 and it includes Moyer Funds, which could be available to reduce the annual compliance cost borne by AO from $31.4 million to $19.8 million. While the actual cost of the annual compliance associated with proposed amendments to Rule 4702 remains constant at $31.4 million in Scenario 2, because of the Moyer programs, the amount borne by affected stakeholders will decline to $19.8 million. Because of the Moyer program,

the amount borne by affected stakeholders above the threshold of significance declines from $2.78 million to $1.32 million in "Scenario 2 with Moyer Funds."

TABLE 28 Amount of Compliance Cost Above Threshold: Agricultural Operations Only: Scenario 2, With Moyer Funds San Joaquin Valley Region, 2003

	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres				
lower quartile	$1,670	$5,376	$3,698	$33,585
median	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
25 to 99 acres				
lower quartile	$22,126	$40,608	$7,320	$121,221
median	$12,376	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
100 to 249 acres				
lower quartile	$59,945	$105,345	$28,117	$132,405
median	$29,232	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
250 to 499 acres				
lower quartile	$55,200	$140,565	$51,051	$109,548
median	$26,444	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
500 acres or more				
500 to 999 acres				
lower quartile	$66,302	$238,813	$99,749	$137,505
median	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
over 1000 acres				
lower quartile	$631,805	$261,084	$79,868	$153,579
median	$415,444	below sig. threshold	below sig. threshold	below sig. threshold
upper quartile	below sig. threshold	below sig. threshold	below sig. threshold	below sig. threshold
	$1,321,491	$791,791	$269,804	$687,842

Source: Applied Development Economics

TABLE 29 Direct Employment Impacts Resulting from Amount of Annual Compliance Cost Above Threshold: Scenario 2, With Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres					
lower quartile	2.0	0.1	0.2	0.2	1.5
median					
upper quartile					
25 to 99 acres					
lower quartile	8.7	1.0	1.8	0.3	5.5
median	0.6	0.6			
upper quartile					
100 to 249 acres					
lower quartile	14.8	2.7	4.8	1.3	6.0
median	1.3	1.3			
upper quartile					
250 to 499 acres					
lower quartile	16.2	2.5	6.4	2.3	5.0
median	1.2	1.2			
upper quartile					
500 acres or more					
500 to 999 acres					
lower quartile	24.7	3.0	10.9	4.5	6.3
median					
upper quartile					
over 1000 acres					
lower quartile	51.2	28.7	11.9	3.6	7.0
median	18.9	18.9			
upper quartile					
	139.5	60.0	36.0	12.3	31.3

Source: Applied Development Economics

TABLE 30 Direct Employment Impacts As A Percent of Industry Employment: Scenario 2, with Moyer Funds San Joaquin Valley Region, 2003

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres					
lower quartile	0.002%	0.008%	0.002%	0.001%	0.002%
median					
upper quartile					
25 to 99 acres					
lower quartile	0.008%	0.101%	0.014%	0.002%	0.007%
median	0.001%	0.057%			
upper quartile					
100 to 249 acres					
lower quartile	0.014%	0.274%	0.037%	0.008%	0.008%
median	0.001%	0.134%			
upper quartile					
250 to 499 acres					
lower quartile	0.015%	0.253%	0.050%	0.014%	0.006%
median	0.001%	0.121%			
upper quartile					
500 acres or more					
500 to 999 acres					
lower quartile	0.023%	0.304%	0.084%	0.028%	0.008%
median					
upper quartile					
over 1000 acres					
lower quartile	0.047%	2.892%	0.092%	0.023%	0.009%
median	0.018%	1.902%			
upper quartile					
	0.129%	6.046%	0.279%	0.077%	0.040%

Source: Applied Development

6.5 IMPACT ON SMALL FARMS

In addition to analyzing the employment impacts of amendments to Rule 4702, state legislation requires that the socioeconomic analysis assess whether small businesses are disproportionately affected by air quality rules. According to the United States Department of Agriculture

(USDA), a small farm is any farm that earns less than $250,000 in sales.[11] Until the late 1990s, the threshold was $100,000: farms selling less than this amount were, by definition, small farms.[12] Although not a part of how the federal government currently defines small farms, the Food and Agricultural Act of 1977 employed a more stringent definition of small farms for the purposes of qualifying farms for particular programs related to that legislation, calling small farms any farms that earn less than $20,000 in sales.[13]

The tables directly below distribute small farms as defined by the USDA in California as whole by crop categories. The US Agricultural Census does not publish data on small farms by farm-size categories at the county level. In California, 81 percent of all cash grain farms smaller than 25 acres, 52 percent of all cash grain farms between 25 and 99 acres, and 40 percent of all cash grain operators between 100 and 249 acres are also small farms as defined by the USDA. For the other crop categories, the pattern is repeated wherein there is a greater proportion of "small farms" in farm size groupings no more than 250 acres. The super-majority of farms in farm size groupings above 250 acres are not "small farms" as defined by the USDA. Thus, 29 percent of all cash grain operators between 249 and 500 acres are small farms, meaning that 71 percent are large farms. Eight percent of all cash grain operators larger than 500 acres are small farms; conversely, 92 percent of all these farms are large farms as defined by the USDA (see Table 31).

If small farms in the San Joaquin Valley region are distributed in a manner similar to the state as a whole, we conclude that small farms are not disproportionately impacted by proposed amendments to Rule 4702. Across the four general crop categories, particularly for farms in farm size groups smaller than 250 acres, which consists predominantly of "small farms" as defined by the USDA, employment declines by less than one percent. As the tables show, the bulk of employment losses occurs in farm size groups greater than 250 acres, which consists predominantly of large farms.

[11]Dan Looker and Cheryl Tevis, "Not so small or insignificant. (National Commission on Small Farms report)," Successful Farming, March 15, 1998 (http://www.findarticles.com/ cf_dls/ m1204/ n5_v96/ 20510331/ p5/ article.jhtml?term=)

[12]University of California Cooperative Extension, "Family Farms in Fresno California" Miolinar and Yang, December, 2000 (http://ucce.ucdavis.edu/files/filelibrary/742/4900.pdf)

[13] Cheryl J. Steel, "Why US Agriculture and Rural Areas Have A Stake in Small Farms" (Rural Development perspective, vol. 12 number 2, 1997) (http://www.ers.usda.gov/publications/rdp/rdp0297/rdp0297e.pdf)

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TABLE 31 Small Farm Impact Analysis: Scenario 1: Without Moyer San Joaquin Valley Region, 2003

	Small Cash Grain Farms as Percent of all Cash Grain: California	Distribution of Annual Compliance Costs	Est. Number of Small Cash Grain Farms: SJVAB	Est. Number of Small Cash Grain Employment: SJVAB	Est. Number of Impacted Small Cash Grain Employment: SJVAB	Percentage Change
1 to 24 acres	81%	0.2%	155	157	0.01	-0.01%
25 to 99 acres	52%	3%	250	278	0.3	-0.1%
100 to 249 acres	40%	7%	192	268	1	-0.3%
250 to 499 acres	29%	7%	65	134	0.4	0%
500 acres or more		83%	13	896	44	-5%
500 to 999 acres	8%	34%	8	92	2	-2%
over 1000 acres		50%	5	804	23	-3%
	42%	100%	673	1,732	45	-4%

	Small Field Crop Farms as Percent of all Field Crop: California	Distribution of Annual Compliance Costs	Est. Number of Field Crop Farms: SJVAB	Est. Number of Small Field Crop Employment: SJVAB	Est. Number of Impacted Small Field Crop Employment: SJVAB	Percentage Change
1 to 24 acres	94%	1%	940	970	0.09	-0.01%
25 to 99 acres	73%	5%	1,020	1,241	0.8	-0.1%
100 to 249 acres	48%	13%	649	1,223	2	-0.2%
250 to 499 acres	23%	18%	209	975	2.2	0%
500 acres or more		63%	60	2,786	22	-0.8%
500 to 999 acres	7%	30%	39	1,342	5	-0.4%
over 1000 acres		33%	21	1,445	6	-0.4%
	57%	100%	2,877	7,196	27	-.4%

	Small Vegetable Farms as Percent of all Vegetables: California	Distribution of Annual Compliance Costs	Est. Number of Small Vegetables Farms: SJVAB	Est. Number of Small Vegetables Employment: SJVAB	Est. Number of Impacted Small Vegetables Employment: SJVAB	Percentage Change
1 to 24 acres	93%	2%	451	524	0.02	-0.004%
25 to 99 acres	37%	4%	69	227	0.02	-0.01%
100 to 249 acres	5%	16%	13	671	0.2	-0.03%
250 to 499 acres		29%				
500 acres or more	0.1%	48%	1	5,223	7	-0.14%
500 to 999 acres		21%				
over 1000 acres		27%				
	54%	100%	534	6,644	7	-.01%

	Small Fruit-Tree Nut Farms as Percent of all Fruit-Tree Nuts: California	Distribution of Annual Compliance Costs	Est. Number of Small Fruit-Tree Nuts Farms: SJVAB	Est. Number of Small Fruit-Treen Nuts Employment: SJVAB	Est. Number of Impacted Small Fruit-Treen Nuts Employment: SJVAB	Percentage Change
1 to 24 acres	99%	5%	8,056	10,583	0.45	-0.004%
25 to 99 acres	84%	17%	4,593	13,714	2.14	-0.02%
100 to 249 acres	38%	19%	838	10,800	1.8	-0.02%
250 to 499 acres		16%				
500 acres or more	5%	43%	101	30,247	16	-0.05%
500 to 999 acres		20%				
over 1000 acres		23%				
	84%	100%	13,588	65,344	20	-.03%

TABLE 32 Small Farm Impact Analysis: Scenario 1: With Moyer San Joaquin Valley Region, 2003

Farms by Size	Small Cash Grain Farms as Percent of all Cash Grain: California	Distribution of Annual Compliance Costs	Est. Number of Small Cash Grain Farms: SJVAB	Est. Number of Small Cash Grain Employment: SJVAB	Est. Number of Impacted Small Cash Grain Employment: SJVAB	Per Change
1 to 24 acres	81%	0.2%	155	157	0.01	-0.004%
25 to 99 acres	52%	3%	250	278	0.1	-0.1%
100 to 249 acres	40%	7%	192	268	0	-0.1%
250 to 499 acres	29%	7%	65	134	0.2	-0.1%
500 acres or more		83%	13	896	32	-4%
500 to 999 acres	8%	34%	8	92	0	0%
over 1000 acres		50%	5	804	27	-3%
	42%	100%	673	1,732	32	-3%

	Small Field Crop Farms as Percent of all Field Crop: California	Distribution of Annual Compliance Costs	Est. Number of Field Crop Farms: SJVAB	Est. Number of Small Field Crop Employment: SJVAB	Est. Number of Impacted Small Field Crop Employment: SJVAB	Per Change
1 to 24 acres	94%	1%	940	970	0.03	-0.003%
25 to 99 acres	73%	5%	1,020	1,241	0.3	-0.02%
100 to 249 acres	48%	13%	649	1,223	1	-0.1%
250 to 499 acres	23%	18%	209	975	0.7	-0.1%
500 acres or more		63%	60	2,786	8	-0.3%
500 to 999 acres	7%	30%	39	1,342	2	-0.1%
over 1000 acres		33%	21	1,445	2	-0.1%
	57%	100%	2,877	7,196	10	-0.1%

	Small Vegetable Farms as Percent of all Vegetables: California	Distribution of Annual Compliance Costs	Est. Number of Small Vegetables Farms: SJVAB	Est. Number of Small Vegetables Employment: SJVAB	Est. Number of Impacted Small Vegetables Employment: SJVAB	Per Change
1 to 24 acres	93%	2%	451	524	0.01	-0.002%
25 to 99 acres	37%	4%	69	227	0.01	-0.004%
100 to 249 acres	5%	16%	13	671	0.1	-0.02%
250 to 499 acres		29%				
500 acres or more	0.1%	48%	1	5,223	7	-0.13%
500 to 999 acres		21%				
over 1000 acres		27%				
	54%	100%	534	6,644	7	-0.1%

	Small Fruit-Tree Nut Farms as Percent of all Fruit-Tree Nuts: California	Distribution of Annual Compliance Costs	Est. Number of Small Fruit-Tree Nuts Farms: SJVAB	Est. Number of Small Fruit-Treen Nuts Employment: SJVAB	Est. Number of Impacted Small Fruit-Treen Nuts Employment: SJVAB	Per Change
1 to 24 acres	99%	5%	8,056	10,583	0.20	-0.002%
25 to 99 acres	84%	17%	4,593	13,714	0.98	-0.01%
100 to 249 acres	38%	19%	838	10,800	0.8	-0.01%
250 to 499 acres		16%				
500 acres or more	5%	43%	101	30,247	7	-0.02%
500 to 999 acres		20%				
over 1000 acres		23%				
	84%	100%	13,588	65,344	9	-0.01%

TABLE 33 Small Farm Impact Analysis: Scenario 2: Without Moyer San Joaquin Valley Region, 2003

	Small Cash Grain Farms as Percent of all Cash Grain: California	Distribution of Annual Compliance Costs	Est. Number of Small Cash Grain Farms: SJVAB	Est. Number of Small Cash Grain Employment: SJVAB	Est. Number of Impacted Small Cash Grain Employment: SJVAB	Per Change
1 to 24 acres	81%	0.2%	155	157	0.02	-0.01%
25 to 99 acres	52%	3%	250	278	0.5	-0.2%
100 to 249 acres	40%	7%	192	268	1	-0.5%
250 to 499 acres	29%	7%	65	134	0.6	-0.4%
500 acres or more		83%	13	896	63	-7%
500 to 999 acres	8%	34%	8	92	0	0%
over 1000 acres		50%	5	804	54	-7%
	42%	100%	673	1,732	65	-6%

	Small Field Crop Farms as Percent of all Field Crop: California	Distribution of Annual Compliance Costs	Est. Number of Field Crop Farms: SJVAB	Est. Number of Small Field Crop Employment: SJVAB	Est. Number of Impacted Small Field Crop Employment: SJVAB	Per Change
1 to 24 acres	94%	1%	940	970	0.08	-0.01%
25 to 99 acres	73%	5%	1,020	1,241	0.7	-0.1%
100 to 249 acres	48%	13%	649	1,223	2	-0.1%
250 to 499 acres	23%	18%	209	975	1.9	-0.2%
500 acres or more		63%	60	2,786	20	-0.7%
500 to 999 acres	7%	30%	39	1,342	5	-0.3%
over 1000 acres		33%	21	1,445	5	-0.4%
	57%	100%	2,877	7,196	24	-0.3%

	Small Vegetable Farms as Percent of all Vegetables: California	Distribution of Annual Compliance Costs	Est. Number of Small Vegetables Farms: SJVAB	Est. Number of Small Vegetables Employment: SJVAB	Est. Number of Impacted Small Vegetables Employment: SJVAB	Per Change
1 to 24 acres	93%	2%	451	524	0.02	-0.003%
25 to 99 acres	37%	4%	69	227	0.02	-0.01%
100 to 249 acres	5%	16%	13	671	0.2	-0.03%
250 to 499 acres		29%				
500 acres or more	0.1%	48%	1	5,223	13	-0.24%
500 to 999 acres		21%				
over 1000 acres		27%				
	54%	100%	534	6,644	13	-0.2%

	Small Fruit-Tree Nut Farms as Percent of all Fruit-Tree Nuts: California	Distribution of Annual Compliance Costs	Est. Number of Small Fruit-Tree Nuts Farms: SJVAB	Est. Number of Small Fruit-Treen Nuts Employment: SJVAB	Est. Number of Impacted Small Fruit-Treen Nuts Employment: SJVAB	Per Change
1 to 24 acres	99%	5%	8,056	10,583	0.69	-0.01%
25 to 99 acres	84%	17%	4,593	13,714	3.25	-0.02%
100 to 249 acres	38%	19%	838	10,800	2.8	-0.03%
250 to 499 acres		16%				
500 acres or more	5%	43%	101	30,247	23	-0.08%
500 to 999 acres		20%				
over 1000 acres		23%				
	84%	100%	13,588	65,344	30	-0.05%

TABLE 34 Small Farm Impact Analysis: Scenario 2: With Moyer San Joaquin Valley Region, 2003

	Small Cash Grain Farms as Percent of all Cash Grain: California	Distribution of Annual Compliance Costs	Est. Number of Small Cash Grain Farms: SJVAB	Est. Number of Small Cash Grain Employment: SJVAB	Est. Number of Impacted Small Cash Grain Employment: SJVAB	Per Change
1 to 24 acres	81%	0.2%	155	157	0.01	-0.004%
25 to 99 acres	52%	3%	250	278	0.2	-0.1%
100 to 249 acres	40%	7%	192	268	0	-0.2%
250 to 499 acres	29%	7%	65	134	0.2	-0.2%
500 acres or more		83%	13	896	34	-4%
500 to 999 acres	8%	34%	8	92	0	0%
over 1000 acres		50%	5	804	30	-4%
	42%	100%	673	1,732	35	-3%

	Small Field Crop Farms as Percent of all Field Crop: California	Distribution of Annual Compliance Costs	Est. Number of Field Crop Farms: SJVAB	Est. Number of Small Field Crop Employment: SJVAB	Est. Number of Impacted Small Field Crop Employment: SJVAB	Per Change
1 to 24 acres	94%	1%	940	970	0.04	-0.004%
25 to 99 acres	73%	5%	1,020	1,241	0.3	-0.03%
100 to 249 acres	48%	13%	649	1,223	1	-0.1%
250 to 499 acres	23%	18%	209	975	0.8	-0.1%
500 acres or more		63%	60	2,786	9	-0.3%
500 to 999 acres	7%	30%	39	1,342	2	-0.2%
over 1000 acres		33%	21	1,445	2	-0.2%
	57%	100%	2,877	7,196	11	-0.2%

	Small Vegetable Farms as Percent of all Vegetables: California	Distribution of Annual Compliance Costs	Est. Number of Small Vegetables Farms: SJVAB	Est. Number of Small Vegetables Employment: SJVAB	Est. Number of Impacted Small Vegetables Employment: SJVAB	Per Change
1 to 24 acres	93%	2%	451	524	0.01	-0.002%
25 to 99 acres	37%	4%	69	227	0.01	-0.004%
100 to 249 acres	5%	16%	13	671	0.1	-0.02%
250 to 499 acres		29%				
500 acres or more	0.1%	48%	1	5,223	7	-0.14%
500 to 999 acres		21%				
over 1000 acres		27%				
	54%	100%	534	6,644	8	-0.1%

	Small Fruit-Tree Nut Farms as Percent of all Fruit-Tree Nuts: California	Distribution of Annual Compliance Costs	Est. Number of Small Fruit-Tree Nuts Farms: SJVAB	Est. Number of Small Fruit-Treen Nuts Employment: SJVAB	Est. Number of Impacted Small Fruit-Treen Nuts Employment: SJVAB	Per Change
1 to 24 acres	99%	5%	8,056	10,583	0.24	-0.002%
25 to 99 acres	84%	17%	4,593	13,714	1.17	-0.01%
100 to 249 acres	38%	19%	838	10,800	1.0	-0.01%
250 to 499 acres		16%				
500 acres or more	5%	43%	101	30,247	8	-0.03%
500 to 999 acres		20%				
over 1000 acres		23%				
	84%	100%	13,588	65,344	10	-0.02%

6.6 INDIRECT AND INDUCED IMPACT ANALYSIS: AGRICULTURAL OPERATIONS ONLY

Using multiplier effects estimated using the IMPLAN Input-Output model for the eight county District region, the loss of income associated with the direct loss of positions per the different scenarios are identified in Table 35 below. In Scenario 1 without Moyer Funds, the total amount of jobs lost as a result of the annual cost compliance is 316.5. The loss of 269.1 direct jobs will lead to the indirect loss of an additional 38.1 workers in industries that supply affected sources with services and materials. In addition, the loss of 269.1 workers plus the 38.1 already mentioned will induce the loss of another 21.2 jobs in local serving industries such as retail and personal services as workers reduce their household expenditures, for a total of 328.4 lost jobs in Scenario 1 without Moyer Funds. The largest impact occurs in Scenario 2 without Moyer Funds, in which 385.0 jobs would be lost as a result of the annual compliance costs associated with proposed amendments to Rule 4702. Moyer Funds could reduce total job losses to anywhere between 147.4 jobs to 170.3 jobs, depending on the scenario. The loss of 147.4 to 385.0 jobs amounts to 0.01 percent to 0.03 percent of total jobs in the region. The loss of 147.4 to 385.0 jobs also amounts to 0.1 percent to 0.4 percent of total agricultural in the region.

Table 35 Direct, Indirect and Induced Employment Impacts

	Direct Employment Losses	Indirect Employment Losses	Induced Employment Losses	Total Employment Impact
Scenario 1: without Moyer	269.1	38.1	21.2	328.4
Scenario 1: with Moyer	120.8	17.1	9.5	147.4
Scenario 2: without Moyer	315.5	44.7	24.8	385.0
Scenario 2: with Moyer	139.5	19.8	11.0	170.3

Source: Applied Development Economics

6.7 NON-AGRICULTURAL INDUSTRIES IMPACT ANALYSIS

District staff also identified 104 non-agricultural operator (non-AO) diesel engines that are operating less than 1000 hours (low-use). Staff assumed that half (52) of the 104 engines would be subject to the emission limits of

Rule 4702 and these engines would incur additional costs to comply with the proposed amendments of Rule 4702. The other half would reduce the operating hours of the engines and be exempt from the emission limits of Rule 4702. The District indicates that, at this point, it is not possible to specifically identify which 52 engines of the 104 low-use engines would be subject to the emission limits of Rule 4702, although the District staff identified the SIC Major Groups of the businesses and organizations that operate the 104 low-use engines are identified. The Districts estimates that cost of compliance for non-AO engines will be approximately $1.46 million to $1.54 million a year. As the tables below demonstrate, the impacts are not significant.

TABLE 36 Socioeconomic Impact Analysis of Non-AO Industries: Lower Scenario

NAICS	Industry Description		Establishments	Emp	Value of Shipments	NON-AO	NON-AO Compliance cost	Profit Ratios	Est. Profits	Cost as % Profits	Signi-ficant
01-09	Agriculture		28,357	174,900	$16,590,015,600	9	$126,606	6.1%	$1,005,032,960	0.013%	No
21	Mining		135	3,275	$1,553,582,235	27	$379,817	5.2%	$80,872,586	0.470%	No
22	Utilities		329	19,390	$9,947,803,817						
23	Construction		4,272	39,855	$6,699,114,456	0					
31-33	Manufacturing		2,732	122,002	$29,510,023,000	16	$225,077	3.3%	$978,257,262	0.023%	No
42	Wholesale trade		3,254	44,125	$24,245,972,000	4	$59,083	7.2%	$1,747,505,982	0.003%	No
44-45	Retail trade		9,972	119,586	$21,682,656,000	2	$25,321	2.3%	$497,797,644	0.005%	No
48-49	Transportation & warehousing		1,714	27,197	$2,878,282,726	17	$239,144	7.2%	$207,449,562	0.115%	No
51	Information		572	15,800	$3,812,918,058						
52	Finance & insurance		2,217	25,391	$9,563,250,062						
53	Real estate & rental & leasing		2,301	12,549	$1,308,413,000						
54	Professional, scientific, & technical services	Taxable	3,691	27,816	$2,086,325,515						
		Exempt	250	6,378	$700,703,964						
55	Management of companies & enterprises		441	22,558	$557,551,731						
56	Administrative & support & waste management		2,085	41,219	$1,474,457,000	11	$147,707	3.9%	$57,995,305	0.255%	No
61	Educational services	Taxable	559	4,629	$251,305,000						
		Exempt	81	658	$40,397,398						
62	Health care & social assistance	Taxable	5,690	56,914	$3,888,418,000	2	$24,618	3.3%	$129,613,933	0.019%	No
		Exempt	1,087	48,596	$3,540,767,000	2	$24,618	3.3%	$118,025,567	0.021%	No
71	Arts, entertainment, & recreation	Taxable	483	7,824	$539,339,000						
		Exempt	111	1,748	$64,280,000						
72	Accommodation & foodservices		4,717	68,383	$2,230,130,000						
81	Other services (except public administration)	Taxable	3,443	19,953	$1,475,796,000						
		Exempt	592	3,163	$224,913,000						
	Auxiliaries, exc corp, subsidiary, & regnl offices										
	Public Administartion			128,142	$1,572,025,043	3	$42,202		$157,025,043	0.003%	No
	Unidentified					12	$168,808	3.4%			No
			79,085	1,042,051	$146,438,439,606	104	$1,463,000				

TABLE 37 Socioeconomic Impact Analysis of Non-AO Industries: Upper Scenario

NAICS	Industry Description		Establishments	Emp	Value of Shipments	NON-AO	NON-AO Compliance cost	Profit Ratios	Est. Profits	Cost as % Profits	Signi-ficant
01-09	Agriculture		28,357	174,900	$16,590,015,600	9	$133,442	6.1%	$1,005,032,960	0.013%	No
21	Mining		135	3,275	$1,553,582,235	27	$379,817	$400,327	$80,872,586	0.495%	No
22	Utilities		329	19,390	$9,947,803,817						
23	Construction		4,272	39,855	$6,699,114,456	0					
31-33	Manufacturing		2,732	122,002	$29,510,023,000	16	$225,077	$237,231	$978,257,262	0.024%	No
42	Wholesale trade		3,254	44,125	$24,245,972,000	4	$59,083	$62,273	$1,747,505,982	0.004%	No
44-45	Retail trade		9,972	119,586	$21,682,656,000	2	$25,321	$26,688	$497,797,644	0.005%	No
48-49	Transportation & warehousing		1,714	27,197	$2,878,282,726	17	$239,144	$252,058	$207,449,562	0.122%	No
51	Information		572	15,800	$3,812,918,058						
52	Finance & insurance		2,217	25,391	$9,563,250,062						
53	Real estate & rental & leasing		2,301	12,549	$1,308,413,000						
54	Professional, scientific, & technical services	Taxable	3,691	27,816	$2,086,325,515						
		Exempt	250	6,378	$700,703,964						
55	Management of companies & enterprises		441	22,558	$557,551,731						
56	Administrative & support & waste management		2,085	41,219	$1,474,457,000	11	$147,707	$155,683	$57,995,305	0.268%	No
61	Educational services	Taxable	559	4,629	$251,305,000						
		Exempt	81	658	$40,397,398						
62	Health care & social assistance	Taxable	5,690	56,914	$3,888,418,000	2	$25,947	3.3%	$129,613,933	0.020%	No
		Exempt	1,087	48,596	$3,540,767,000	2	$25,947	3.3%	$118,025,567	0.022%	No
71	Arts, entertainment, & recreation	Taxable	483	7,824	$539,339,000						
		Exempt	111	1,748	$64,280,000						
72	Accommodation & foodservices		4,717	68,383	$2,230,130,000						
81	Other services (except public administration)	Taxable	3,443	19,953	$1,475,796,000						
		Exempt	592	3,163	$224,913,000						
	Auxiliaries, exc corp, subsidiary, & regnl offices										
	Public Administartion			128,142	$1,572,025,043	3	$44,481		$157,025,043	0.003%	No
	Unidentified					12	$177,923	3.4%			No
			79,085	1,042,051	$146,438,439,606	104	$1,542,000				

7. APPENDIX A: A NOTE ON RECENT AGRICULTURE-RELATED SOCIOECONOMIC IMPACT ANALYSES

The federal government has classified the San Joaquin Valley Air Basin (SJVAB) as a serious non-attainment area for a variety of air quality thresholds. As such, the District is required by federal law to implement what are called Best Available Control Measures (BACM) and Best Available Control Technologies (BACT) on all significant sources of emissions. The District is also required to demonstrate attainment of the various air quality performance standards at the earliest possible date.

To meet its requirements with regards to improving air quality, the San Joaquin Valley Unified Air Pollution Control District has analyzed and adopted a number of socioeconomic impact analyses in the past year. These include Conservation Management Practices Program (CMP), Regulation VIII (Fugitive PM10 Prohibitions), and Rule 4204 (Cotton ginning). Below are brief reviews of these recent socioeconomic impact analyses.

The CMP Program is applicable to agricultural sources that grow crops or are Animal Feeding Operations (AFOs) such as dairy, feedlot, chicken, and turkey operations. The CMP applies to farms larger than 100 acres. In aggregate, the analysis determined that the cost of the new rules on affected agricultural industries is estimated to range from .005 percent (based on District cost analysis) to 1 percent of aggregate profits (based on affected stakeholder cost analysis).

The Regulation VIII report analyzed the annual cost of compliance impacts of $129,000 in costs borne by the agricultural industry, an amount of impacts which translates to approximately 0.02 percent of net profits.

The socioeconomic analysis on Rule 4204 applies primarily to cotton ginning facilities and cotton growers. Because cotton growers operate ginning facilities either directly, as part of their cotton production, or indirectly, as part of a cooperative of members, they ultimately bear the compliance costs that ginning operations will incur as a result of Rule 4204. The analysis determined that Rule 4204 would result in impacts amounting to approximately two percent of net profits.

8. APPENDIX B: LIST OF CROPS BY CROP CATEGORIES

TABLE B. List of Crops by Crop Categories

	011 Cash grains	013 Field crops, except cash grains	016 Vegetables	017 Fruit and tree nuts	Grand Total
ALMOND HULLS				1	1
ALMONDS ALL				1	1
ANISE (FENNEL)			1		1
APPLES ALL				1	1
APRICOTS ALL				1	1
ARTICHOKES			1		1
ASPARAGUS FRESH MARKET			1		1
ASPARAGUS UNSPECIFIED			1		1
AVOCADOS ALL				1	1
BARLEY FEED	1				1
BARLEY MALTING	1				1
BARLEY SEED	1				1
BARLEY UNSPECIFIED	1				1
BEANS BLACKEYE (PEAS)		1			1
BEANS DRY EDIBLE UNSPEC.		1			1
BEANS FRESH UNSPECIFIED		1			1
BEANS GARBANZO		1			1
BEANS KIDNEY RED		1			1
BEANS LIMA BABY DRY		1			1
BEANS LIMA GREEN		1			1
BEANS LIMA LG. DRY		1			1
BEANS LIMA UNSPECIFIED		1			1
BEANS PINK		1			1
BEANS SEED		1			1
BEANS SNAP FRESH MARKET		1			1
BEANS SNAP UNSPECIFIED		1			1
BEETS GARDEN		1			1
BERRIES BUSHBERRIES UNSPEC.				1	1
BERRIES RASPBERRIES				1	1
BERRIES STRAWBERRIES F MKT				1	1
BERRIES STRAWBERRIES PROC.				1	1
BERRIES STRAWBERRIES UNSPEC				1	1
BIOMASS FOR ENERGY				1	1
BIOMASS ORCHARD				1	1
BROCCOLI FOOD SERVICE			1		1
BROCCOLI FRESH MARKET			1		1
BROCCOLI PROCESSING			1		1
BROCCOLI UNSPECIFIED			1		1
BRUSSELS SPROUTS			1		1
CABBAGE CH. & SPECIALTY			1		1

	011 Cash grains	013 Field crops, except cash grains	016 Vegetables	017 Fruit and tree nuts	Grand Total
CABBAGE HEAD			1		1
CARROTS FOOD SERVICE			1		1
CARROTS FRESH MARKET			1		1
CARROTS PROCESSING			1		1
CARROTS UNSPECIFIED			1		1
CAULIFLOWER FOOD SERVICE			1		1
CAULIFLOWER FRESH MARKET			1		1
CAULIFLOWER UNSPECIFIED			1		1
CELERY FOOD SERVICE			1		1
CELERY FRESH MARKET			1		1
CELERY UNSPECIFIED			1		1
CHERRIES SWEET				1	1
CHIVES			1		1
CILANTRO			1		1
CITRUS BY-PRODUCTS MISC.				1	1
CITRUS UNSPECIFIED				1	1
CORN GRAIN	1				1
CORN SILAGE	1				1
CORN SWEET ALL	1				1
CORN WHITE	1				1
COTTON LINT PIMA		1			1
COTTON LINT UNSPECIFIED		1			1
COTTON LINT UPLAND		1			1
COTTON SEED PLANTING		1			1
COTTONSEED		1			1
CUCUMBERS			1		1
CUCUMBERS GREENHOUSE			1		1
DATES			1		1
EGGPLANT ALL			1		1
ENDIVE ALL			1		1
ESCAROLE ALL			1		1
FIELD CROP BY-PRODUCTS		1			1
FIELD CROPS SEED MISC.		1			1
FIELD CROPS UNSPECIFIED		1			1
FIGS DRIED				1	1
FRUITS & NUTS UNSPECIFIED				1	1
GARLIC ALL			1		1
GRAPEFRUIT ALL				1	1
GRAPES RAISIN				1	1
GRAPES TABLE				1	1
GRAPES UNSPECIFIED				1	1
GRAPES WINE				1	1
GREENS TURNIP & MUSTARD			1		1
HAY ALFALFA		1			1
HAY GRAIN		1			1

	011 Cash grains	013 Field crops, except cash grains	016 Vegetables	017 Fruit and tree nuts	Grand Total
HAY GREEN CHOP		1			1
HAY OTHER UNSPECIFIED		1			1
HAY SUDAN		1			1
HAY WILD		1			1
HORSERADISH			1		1
JOJOBA			1		1
KALE			1		1
KIWIFRUIT				1	1
KUMQUATS				1	1
LEEKS			1		1
LEMONS ALL				1	1
LETTUCE BULK SALAD PRODS.			1		1
LETTUCE HEAD			1		1
LETTUCE LEAF			1		1
LETTUCE ROMAINE			1		1
LETTUCE UNSPECIFIED			1		1
LIMES ALL				1	1
MACADAMIA NUTS				1	1
MELONS CANTALOUPE				1	1
MELONS HONEYDEW				1	1
MELONS UNSPECIFIED				1	1
MELONS WATERMELON				1	1
MINT				1	1
MUSHROOMS			1		1
NECTARINES				1	1
OATS GRAIN	1				1
OATS SEED	1				1
OKRA			1		1
OLIVES				1	1
ONIONS			1		1
ONIONS GREEN & SHALLOT			1		1
ORANGES NAVEL				1	1
ORANGES UNSPECIFIED				1	1
ORANGES VALENCIA				1	1
PARSLEY			1		1
PEACHES CLINGSTONE				1	1
PEACHES FREESTONE				1	1
PEACHES UNSPECIFIED				1	1
PEARS ASIAN				1	1
PEARS BARTLETT				1	1
PEARS UNSPECIFIED				1	1
PEAS DRY EDIBLE			1		1
PEAS EDIBLE POD (SNOW)			1		1
PEAS GREEN PROCESSING			1		1
PEAS GREEN UNSPECIFIED			1		1

	011 Cash grains	013 Field crops, except cash grains	016 Vegetables	017 Fruit and tree nuts	Grand Total
PEAS SEED			1		1
PECANS				1	1
PEPPERS BELL			1		1
PEPPERS CHILI HOT			1		1
PERSIMMONS				1	1
PISTACHIOS				1	1
PLUMS				1	1
PLUMS DRIED				1	1
POMEGRANATES				1	1
POTATOES IRISH ALL		1			1
POTATOES SEED		1			1
POTATOES SWEET		1			1
PUMPKINS				1	1
QUINCE			1		1
RADICCHIO			1		1
RADISHES			1		1
RAPPINI			1		1
RICE MILLING	1				1
RICE SEED	1				1
RICE WILD	1				1
RYE GRAIN	1				1
RYE SEED	1				1
SAFFLOWER	1				1
SAFFLOWER SEED PLANTING	1				1
SALAD GREENS NEC.			1		1
SEED ALFALFA		1			1
SEED VEG & VINECROP			1		1
SILAGE	1				1
SORGHUM GRAIN	1				1
SORGHUM SILAGE	1				1
SPICES AND HERBS			1		1
SPINACH FOOD SERVICE			1		1
SPINACH FRESH MARKET			1		1
SPINACH UNSPECIFIED			1		1
SQUASH			1		1
STRAW			1		1
SUGAR BEETS		1			1
SUNFLOWER SEED PLANTING		1			1
SWISS CHARD			1		1
TANGELOS				1	1
TANGERINES & MANDARINS				1	1
TOMATILLO				1	1
TOMATOES CHERRY				1	1
TOMATOES FRESH MARKET				1	1
TOMATOES PROCESSING				1	1

	011 Cash grains	013 Field crops, except cash grains	016 Vegetables	017 Fruit and tree nuts	Grand Total
TOMATOES UNSPECIFIED				1	1
TURNIPS ALL			1		1
VEGETABLES ORIENTAL ALL			1		1
VEGETABLES UNSPECIFIED			1		1
WALNUTS BLACK				1	1
WALNUTS ENGLISH				1	1
WHEAT ALL	1				1
WHEAT SEED	1				1
Grand Total	22	34	68	59	183

Source: Applied Development Economics, based on California Agricultural Statistical Service

9. APPENDIX C: ESTIMATED WATER USE: ACRE-FEET OF WATER

TABLE C. Estimated Water Use: Acre-Feet of Water

	Region	Cash Grains	Field Crops	Vegetables	Fruit and Tree Nuts
1 to 24 acres	307,674	4,445	28,820	11,608	262,801
25 to 99 acres	1,248,089	58,894	217,682	22,974	948,539
100 to 249 acres	1,848,581	159,559	564,718	88,248	1,036,056
250 to 499 acres	1,917,873	146,927	753,515	160,232	857,199
500 acres or more	7,267,154	1,858,180	2,679,763	451,506	2,277,705
500 to 999 acres	2,845,713	176,478	1,280,190	313,078	1,075,968
over 1000 acres	4,533,691	1,681,702	1,399,574	250,678	1,201,737
	12,589,371	2,228,005	4,244,499	734,568	5,382,299

Source: Applied Development Economics, estimates based US Census Agricultural Census 2002, California Agricultural Statistical Service, and California Department of Water Resources

10. APPENDIX D: OVERVIEW OF UC COOP. EXTENSION CASE STUDIES

						Costs Per Acre: UC Coop Ext. Crop Studies ($2005)				Gross Rev.: UC CE: Crop Studies ($2005)	
Category	Crop	Year	Location	Coop Extension Assumptions	Acres	Operating	Cash Overhead	Non-Cash Overhead	Total Cost per Acre	Gross Rev per Acre	Net Profit Above Total Cost
Cash grains	Barley	1995	San Luis Obispo	5000 ac. conventionally tilled	5,000	$624,422	$271,317	$98,654	$994,393	$1,108,400	10.3%
Cash grains	Wheat	1999	San Joaquin Valley	1200 ac., 300 ac. double-cropped	300	$92,320	$28,714	$11,994	$133,028	$103,951	-28.0%
Cash grains	Wheat Silage	1999	San Joaquin Valley	1200 ac., 300 ac. double-cropped	300	$59,608	$28,714	$11,267	$99,589	$103,951	4.2%
Cash grains	Wild Rice	2000	Shasta Lassen		80	$65,336	$29,101	$2,253	$96,689	$55,197	-75.2%
Cash grains	Corn Silage	2001	San Joaquin Valley		300	$236,955	$84,554	$18,411	$339,920	$214,794	-58.3%
Cash grains	Rice	2001	Sacramento Valley	180 ac.	180	$123,762	$43,572	$25,571	$192,905	$154,652	-24.7%
Cash grains	Corn grain	2003	San Joaquin Valley	field corn // 1200 acres	1,200	$759,885	$205,962	$51,171	$1,017,018	$639,634	-59.0%
Cash grains	Wheat	2004	Sacramento Valley	irrigated / 2900 ac	2,900	$479,080	$326,373	$113,782	$919,235	$958,160	4.1%
Cash grains	Wheat	2004	Imperial Valley			$0					
Cash grains	Winterforage	2004	No. San Joaquin Valley	300 acres, of which 150 acre	150	$54,361	$10,222	$2,478	$67,061	$57,923	-15.8%
Cash grains	Rice	2004	Sacramento Valley	750 acres	750	$501,795	$152,552	$102,218	$756,564	$668,286	-13.2%
Field crops	Potatoes	2000	Imperial Valley								
Field crops	Alfalfa	2003	San Joaquin Valley	50 acres /// 4.5 acre feet of water	50	$24,626	$2,772	$12,100	$39,497	$46,640	15.3%
Field crops	Alfalfa	2003	San Joaquin Valley	1,200 acres, 300 acres	300	$155,700	$23,100	$120,000	$298,800	$291,600	-2.5%
Field crops	Beans	2005	No. San Joaquin Valley	dry beans - double-cropped/ 1200, of which 200	200	$124,933	$41,094	$5,989	$172,015	$170,363	-1.0%
Field crops	Beans	2005	So. San Joaquin Valley	long beans // 10 ac.	10	$89,960	$3,810	$2,790	$96,560	$99,000	2.5%
Field crops	Cotton	2003	San Joaquin Valley	40 inch row alcala, 1500 ac, of which 750	750	$583,666	$133,524	$83,152	$800,342	$849,913	5.8%
Field crops	Cotton	2003	San Joaquin Valley	30 inch row alcala, 1500 ac, of which 750	750	$588,463	$133,524	$84,751	$806,738	$910,679	11.4%
Field crops	Cotton	2003	San Joaquin Valley	transgenic herbicide resistant, 1500 ac, of which 750	750	$536,493	$133,524	$81,553	$751,570	$849,913	11.6%
Field crops	Cotton	2003	San Joaquin Valley	Pima type	750	$632,438	$153,512	$83,152	$869,102	$827,526	-5.0%
Field crops	Safflower	2002	So. San Joaquin Valley	1600 acres, of which 160 acres	160	$49,840	$14,441	$48,255	$112,536	$68,684	-63.8%
Field crops	Sunflowers	2004	Sacramento Valley	1500 acres	1,500	$497,149	$210,630	$230,764	$938,543	$1,006,688	6.8%
Field crops	Sugarbeets	2004	Imperial Valley		80	$117,953			$117,953	$133,713	11.8%
Fruits and Tree nuts	Figs	1994	San Joaquin Valley	500 ac.	500	$671,762	$116,589	$160,695	$949,046	$1,181,101	19.6%

Fruits and Tree nuts	Almonds	1997	So. San Joaquin Valley	105 ac.	105	$211,289	$33,633	$106,187	$351,109	$387,861	9.5%
Fruits and Tree nuts	Olives	1997	So. San Joaquin Valley	40 ac.	40	$107,253	$19,012	$50,113	$176,378	$154,989	-13.8%
Fruits and Tree nuts	Almonds	1998	No. San Joaquin Valley	100 ac.	100	$186,387	$39,529	$142,355	$368,272	$350,258	-5.1%
Fruits and Tree nuts	Cherries	2000	No. San Joaquin Valley		40	$373,426	$22,717	$74,817	$470,960	$545,402	13.6%
Fruits and Tree nuts	Prunes	2001	Sacramento Valley		100	$296,961	$14,320	$86,031	$397,312	$363,672	-9.3%
Fruits and Tree nuts	Blueberries	2002	So. San Joaquin Valley		20	$388,482	$17,809	$46,230	$452,521	$536,130	15.6%
Fruits and Tree nuts	Boysenberries	2002	No. San Joaquin Valley	40 ac. farm, 15 ac. Boysenberries	15	$201,478	$10,137	$6,901	$218,517	$772,694	71.7%
Fruits and Tree nuts	Tomatoes	2002	So. San Joaquin Valley	4000 acres, inluding other crops	4,000	$6,472,134	$1,113,912	$237,752	$7,823,797	$9,069,793	13.7%
Fruits and Tree nuts	Almonds	2003	So. San Joaquin Valley	flood irrigation // 105 acres	105	$260,587	$19,701	$82,945	$363,232	$344,763	-5.4%
Fruits and Tree nuts	Almonds	2002	No. San Joaquin Valley	flood irrigation // 100 acres (40 acre INCHES of water)	100	$156,190	$23,555	$120,857	$300,602	$275,176	-9.2%
Fruits and Tree nuts	Apples	2001	No. San Joaquin Valley	80 acres	80	$925,819	$18,365	$101,374	$1,045,558	$1,391,047	24.8%
Fruits and Tree nuts	Apricots	2003	San Joaquin Valley	micro-sprinkler irrigation / 100 ac.	100	$360,860	$32,941	$107,885	$501,686	$746,239	32.8%
Fruits and Tree nuts	Grapes	2004	San Joaquin Valley	table grapes // 120 ac./flame seedless	120	$760,320	$48,960	$134,040	$943,320	$924,000	-2.1%
Fruits and Tree nuts	Grapes	2004	San Joaquin Valley	table grapes // 120 ac./thompson seedless	120	$824,183	$49,808	$134,060	$1,008,050	$1,090,320	7.5%
Fruits and Tree nuts	Nectarines	2004	So. San Joaquin Valley	fresh market	10	$97,231	$2,117	$11,440	$110,787	$99,120	-11.8%
Fruits and Tree nuts	Olives	2004	Sacramento Valley	40 ac.	40	$86,813	$12,431	$29,530	$128,773	$87,763	-46.7%
Fruits and Tree nuts	Peaches	2004	So. San Joaquin Valley	100 ac.	100	$1,029,093	$21,270	$115,434	$1,165,796	$1,011,850	-15.2%
Fruits and Tree nuts	Peppermint oil	2004	Intermountain ranges	500 acres, 60 ac peppermint	60	$56,560	$9,231	$15,611	$81,402	$60,401	-34.8%
Fruits and Tree nuts	Pistachios	2004	San Joaquin Valley	low-volume irrigation / 100 ac, 95 pistachios	95	$185,287	$25,503	$108,877	$319,667	$264,836	-20.7%
Fruits and Tree nuts	Strawberries	2004	San Joaquin Valley		10	$110,808	$27,341	$4,760	$142,908	$138,149	-3.4%
Fruits and Tree nuts	Olive oil	2005	Sacramento Valley	35 acres	35	$46,865	$13,370	$36,960	$97,195	$78,750	-23.4%
Fruits and Tree nuts	Pecans	2005	San Joaquin Valley and Sacramento Valley	60 acres, 58 pecans	58	$79,402	$14,616	$45,472	$139,490	$139,200	-0.2%
Fruits and Tree nuts	Walnuts	2005	No. San Joaquin Valley	100 acres, 75 for walnuts	75	$105,525	$18,750	$75,675	$199,950	$210,000	4.8%
Fruits and Tree nuts	Wine grapes	2005	Napa Valley	cabernet sauvignon // 10% slope, 10 acres	10	$38,210	$20,400	$110,600	$169,210	$196,400	13.8%
Fruits and Tree nuts	Wine grapes	2005	Intermountain ranges	6 acres	6	$11,886	$8,808	$29,766	$50,460	$31,500	-60.2%
Fruits and Tree nuts	Wine grapes	2005	San Joaquin Valley	120 acres	120	$151,800	$49,800	$138,360	$339,960	$288,000	-18.0%
Fruits and Tree nuts	Melons	2004	Imperial Valley	40 acre field	40	$192,747	$0	$0	$192,747	$173,460	-11.1%
Fruits and Tree nuts	Raspberries	2003	Central Coast	45, of which 15	15	$309,583	$36,859	$56,688	$403,129	$399,771	-0.8%
Fruits and Tree nuts	Plums	2004	So. San Joaquin Valley	100, of which 10	10	$83,096	$2,106	$9,933	$95,135	$92,925	-2.4%
Fruits and Tree nuts	Oranges	2002	So. San Joaquin Valley	60, of which 10	10	$49,444	$3,863	$13,550	$66,857	$48,431	-38.0%
Pasture	Pasture	2002	Lassen	1000 Ac.	1,000	$205,831	$51,733	$77,049	$334,614	$279,579	-19.7%
Pasture	Pasture	2002	Mendocino	2500 : 40 planted, 160 mature, 2290 rangeland	200	$19,152	$3,963	$42,707	$65,822	$29,719	-121.5%
Vegetables	Carrots	2003	Imperial Valley			$0					
Vegetables	Eggplant	2005	So. San Joaquin Valley	10 ac	10	$125,140	$3,780	$3,190	$132,110	$168,000	21.4%
Vegetables	Lemon grass	2005	So. San Joaquin Valley	10 ac	10	$86,560	$3,680	$2,040	$92,280	$112,800	18.2%
Vegetables	Lettuce	2005	Central Coast	200 ac.	200	$1,229,600	$225,200	$20,000	$1,474,800	$1,350,000	-9.2%

Vegetables	Radishes	2005	So. San Joaquin Valley	10 acres	10	$25,290	$3,640	$1,420	$30,350	$52,000	41.6%
Vegetables	Cherry tomatoes	2005	So. San Joaquin Valley	small farm // 10 acres	10	$181,200	$3,790	$3,260	$188,250	$302,500	37.8%
Vegetables	Broccoli	2003	Imperial Valley								
Vegetables	Broccoli	2004	Central Coast	1200, of which 400	400	$2,296,693	$397,306	$19,824	$2,713,823	$2,197,160	-23.5%
Vegetables	Onions	2003	Imperial Valley								
Vegetables	Celery	2000	Ventura	1300, half?	650	$4,654,102	$610,937	$136,526	$5,401,565	$7,987,177	32.4%
Vegetables	Cauliflower	2003	Imperial Valley								
Vegetables	Cabbage	2000	Imperial Valley								
Vegetables	Broccoli	2000	Imperial Valley								
Vegetables	Broccoli	2001	Central Coast	1200 - of which 400	400	$1,935,191	$254,571	$20,911	$2,210,673	$2,055,658	-7.5%
Vegetables	Artichoke	2003	Imperial Valley								
Vegetables	Aspargus	2000	Imperial Valley								
Vegetables	Aspargus	2003	Imperial Valley								
					25,589	$31,988,983	$5,437,060	$3,912,129	$41,338,172	$45,308,258	8.8%

	Net Costs				Gross Revenues		
	Acres (study set)	Aggregate Operating (study set)	Aggregate Cash Overhead (study set)	Aggregate Non-Cash Overhead (study set)	Aggregate Total Cost (study set)	Aggregate Gross Rev (study set)	Net Profit Ratio Above Total Cost
Cash Grains	11,160	$2,997,524	$1,181,080	$437,798	$4,616,402	$4,064,947	-13.6%
Field Crops	5,300	$3,401,220	$849,929	$752,506	$5,003,655	$5,254,718	4.8%
Vegetables	1,690	$10,533,776	$1,502,903	$207,172	$12,243,851	$14,225,294	13.9%
Fruits and Tree nuts	6,239	$14,831,480	$1,847,452	$2,394,896	$19,073,828	$21,454,001	11.1%
Pasture	1,200	$224,984	$55,696	$119,756	$400,436	$309,298	-29.5%
Total	24,389	$31,763,999	$5,381,365	$3,792,372	$40,937,736	$44,998,960	9.0%
Total with pasture	25,589	$31,988,983	$5,437,060	$3,912,129	$41,338,172	$45,308,258	8.8%