SOCIOECONOMIC ANALYSIS OF PROPOSED RULE 11-17: LIMITED USE STATIONARY COMPRESSION IGNITION ENGINES IN AGRICULTURAL USE

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Prepared for

Bay Area Air Quality Management District

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BAY AREA AIR QUALITY MANAGEMENT DISTRICT

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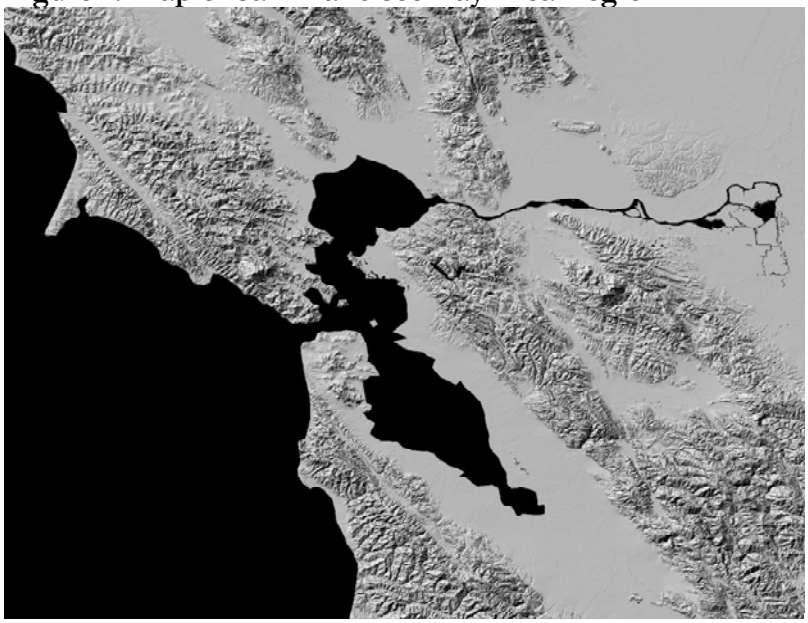
SECTION ONE: INTRODUCTION

The Bay Area Air Quality Management District ("BAAQMD" or the "Air District") seeks to adopt Rule 11-17, on low-use agricultural engines. After this introduction, this report discusses in greater detail Regulation 11-17 (Section Two). After that discussion, the report summarizes the economic impact analyses conducted by the California Air Resources Board in adoption of the Air Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines adopted by the California Air Resources Board (CARB) for these sources (Section Three). Then, the report describes the socioeconomic impact analysis methodology and data sources (Section Four). The report describes population and economic trends in the nine-county San Francisco Bay Area (Section Five), which serves as a backdrop against which the District is contemplating proposed Rule 11-17. Finally, Section Six of the report analyzes the economic benefits, detriments and the socioeconomic impacts stemming from the proposed rule's option to extend the ATCM's compliance deadline.

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 the proposed requirements, and can assist staff in preparing a refined version of the rule for consideration by the District's Board of Directors. Figure 1 is a map of the nine-county region that comprises the San Francisco Bay Area Air Basin.

Figure 1. Map of San Francisco Bay Area Region



SECTION TWO: RULE 11-17 BACKGROUND

The Bay Area Air Quality Management District (District) is proposing Regulation 11, Rule 17: Limited Use Stationary Compression Ignition Engines in Agricultural Service as a local regulation that is equivalent to the Air Toxic Control Measure (ATCM) for Stationary Compression Ignition (CI – also known as diesel) Engines adopted by the California Air Resources Board (CARB) for the same category of sources. The intent of this regulation is to adopt CARB requirements for stationary engines in agricultural operations, but to also make some changes to better address local needs. The proposed Rule is specifically intended to address local compliance issues faced by a sub-group of affected sources, low-use stationary agricultural diesel engines primarily used by vineyard owners and operators to pump water to protect vines from frost on cold winter nights.

Proposed Regulation 11, Rule 17 (Rule 11-17) would exempt from emissions control requirements any agricultural engine that operates fewer than 20 hours per year, and is located more than 1000 feet from a residential area, school, or health facility. The owner or operator of the exempt engine is required to maintain records of use to substantiate the exempt status.

Under the proposed Regulation 11, Rule 17, the owner or operator of an agricultural diesel engine must comply with the provisions of the ATCM or may apply for alternate compliance by petitioning for approval of an Alternative Compliance Plan (ACP). Approval of an ACP enables an owner or operator to extend the compliance date for the ATCM through December 31, 2020 or December 31, 2025, depending on the "tier" of the engine currently in use. Engine tiers refer to compression ignition (diesel) engines that are certified to meet the progressively more stringent Tier 1, Tier 2, Tier 3, or Tier 4 Off-Road Compression Ignition Certification Standards for diesel particulate emissions specified in Title 13, California Code of Regulations, Section 2423. Any engine not certified to meet any of these standards is defined as a Tier 0 engine.

There are six criteria for an agricultural engine to be eligible for an ACP:

- The engine must be used exclusively for an agricultural operation;
- The engine must be equipped with a non-resettable hour meter;
- The engine must be registered with the District's Agricultural Engine Registration Program;
- The engine must be located more than 1000 feet from a residential area, school or health facility; or if the engine is located 1000 feet or less from a residential area, school or health facility the owner/operator must conduct a Health Risk Screening Analysis for that engine to demonstrate that the health risks from the engine, at the location of the residential area, school or health facility, are less than 10 in a million and $PM_{2.5}$ ground level concentration is less than 0.3 micrograms per cubic meter (μg/m3), and that the

cumulative risk from all sources within 1000 feet is less than 100 in a million and cumulative $PM_{2.5}$ ground level concentration is less than 0.8 $\mu g/m^3$.;

- The engine must operate fewer than 100 hours per year averaged over three years and operate fewer than 150 hours per year during any year.
- The owner or operator of the engine is required to maintain records of use to substantiate compliance with the provisions of the ACP.

If the ACP is approved by the APCO, the engine may continue to operate until the time that proposed District Regulation 11, Rule 17 requires compliance with the emissions standards of the ATCM. The proposed alternate deadlines for ATCM compliance are based on the engine Tier of the currently operating engine, as follows:

- Tier 0 engines and Tier 1 engines may continue to operate through December 31, 2020.
- Tier 2 engines may continue to operate through December 31, 2025.

Each engine must be replaced with an electric motor, or a Tier 4 engine, or the highest tier (lowest emissions) engine available for purchase at the time of replacement. The ACP deadlines are designed to enable replacement of existing engines with Tier 4 engines. Tier 4 engines are not yet available, but will emit less than the Tier 3 engines available to currently comply with the ATCM. Consequently, although proposed Regulation 11, Rule 17 provides an option to comply at a later date, those engine owners and operators who choose to do so will ultimately reduce their emissions to a greater extent than they would through compliance with the ATCM.

Strategic Incentive Funding is available to help owner/operators replace agricultural engines through two grant programs administered by the District. Incentive funding is available from the Agricultural Assistance Program for early compliance, or greater emission reductions than are required. These funds have been used to fund up to 85% (more typically 60 – 75%) of the cost of a replacement engine. The proposed rule defers the deadlines for replacement, and may allow continued availability of incentive funds for replacement of these agricultural diesel engines. Incentive funding can be an important aspect of easing the economic burden of engine replacement.

SECTION THREE: CARB ECONOMIC IMPACT ANALYSIS

In September 2006, California Air Resources Board staff analyzed economic impacts stemming from their proposed requirements for stationary diesel in-use agricultural engines. At the time, CARB staff estimated that the total cost of the proposed amendments to affected businesses would range from $34 million to $42 million over a 22-year period. The state agency concluded that approximately 3,900 businesses directly affected by the proposed amendments would be farms and ranches using CI (diesel) powered engines (of greater than or equal to 50 HP) for purposes of raising crops and/or animals.

Directly-affected businesses would either absorb or pass on their compliance costs, according to CARB. Those businesses that have a majority of the share of the market for their products (walnuts, for example) will be able to pass on their costs, since they are able to set the market price, to a degree. California businesses selling products that are produced in other states and for which California businesses do not have a majority of the market share (oranges, for example) will have to absorb the compliance costs, as reported by CARB in its September 2006 report. Due to the long lead time given for compliance and a range of compliance options, CARB staff reported that most businesses will be able to meet the compliance costs. However, it is possible that a small number of businesses (those with marginal profitability) may have difficulty in complying with CARB's rule. CARB staff concluded that the ATCM for agricultural in-use diesel engines would result in little to no significant changes in the total number of businesses or jobs.

The CARB analysis was based on diesel engine driven water pumps operating 1000 hours per year, with an expected 20 year life. Engines used for frost protection and other infrequent uses averaging less than 100 hours per year have a much longer useful life. Replacement of low-use engines to comply with the ATCM will have a greater economic impact on affected agricultural operations than indicated by the CARB economic analysis.

SECTION FOUR: METHODOLOGY

Applied Development Economics (ADE) began the analysis by preparing a statistical description of the industry groups of which the affected sources are a part, analyzing data on the number of establishments, jobs, and payroll. We also estimated sales generated by impacted industries, as well as net profits for each affected industry.

This report relies heavily on the most current data available from a variety of sources, particularly the State of California's Employment Development Department (EDD) Labor Market Information Division. In addition, this report relied on data from the State of California's Annual Agricultural Commissioners' Reports., as well as the 2007 Agricultural Census. For purposes of estimating profits, ADE reviewed industry-specific financial ratios issued by the US Internal Revenue Service.

With the above information, ADE was able to estimate net after tax profit ratios for sources affected by the proposed rule. ADE calculated ratios of profit per dollar of revenue for affected 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 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. In some instances, particularly where consumers are the ultimately end-users of goods and services subject to the proposed rule, we also analyzed whether costs could be passed to households in the region.

When analyzing the socioeconomic impacts of proposed new rules and amendments, ADE attempts to work closely within the parameters of accepted methodologies discussed in a 1995 California Air Resources Board report called "Development of a Methodology to Assess the Economic Impact Required by SB513/AB969" (by Peter Berck, PhD, UC Berkeley Department of Agricultural and Resources Economics, Contract No. 93-314, August, 1995). The author of this report reviewed a methodology to assess the impact that California Environmental Protection Agency proposed regulations would have on the ability of California businesses to compete. The California Air Resources Board (ARB) has incorporated the methodologies described in this report in its own assessment of socioeconomic impacts of rules generated by ARB. One methodology relates to determining a level above or below which a rule and its associated costs is deemed to have significant impacts. When analyzing the degree to which its rules are significant or insignificant, ARB employs a threshold of significance that ADE follows. Berck reviewed the threshold in his analysis and wrote, "The Air Resources Board's (ARB) use of a 10 percent change in [Return on Equity] ROE (i.e. a change in ROE from 10 percent to a ROE of 9 percent) as a threshold for a finding of no significant, adverse impact on either competitiveness or jobs seems reasonable or even conservative."

SECTION FIVE: REGIONAL DEMOGRAPHIC AND ECONOMIC TRENDS

This section of the report tracks economic and demographic contexts within which District staff and officials are contemplating Rule 11-17. Table 1 tracks population growth in the nine-county San Francisco Bay Area between 1999 and 2009, including data for the year 2004. Between 1999 and 2004, the region grew by less than one percent a year, at 0.6 percent. Between 2004 and 2009, the region grew annually by slightly over one percent, at 1.1 percent a year. Overall, there are 7,459,858 people in the region. At 1,880,876, Santa Clara County has the most people, while Napa has the least, at 138,917.

TABLE 1
REGIONAL DEMOGRAPHIC TRENDS: 1999-2009
POPULATION GROWTH: SAN FRANCISCO BAY AREA

	Population			Percent Change		
	1999	2004	2009	99-04	04-09	99-09
California	34,336,091	36,676,931	38,648,090	1.3%	1.1%	1.2%
Bay Area	6,878,214	7,073,168	7,459,858	0.6%	1.1%	0.8%
Alameda County	1,454,302	1,498,967	1,574,857	0.6%	1.0%	0.8%
Contra Costa County	930,025	1,016,407	1,073,055	1.8%	1.1%	1.4%
Marin County	249,671	251,586	260,651	0.2%	0.7%	0.4%
Napa County	127,005	132,280	138,917	0.8%	1.0%	0.9%
San Francisco County	801,377	806,433	856,095	0.1%	1.2%	0.7%
San Mateo County	730,029	720,042	754,285	-0.3%	0.9%	0.3%
Santa Clara County	1,736,722	1,753,041	1,880,876	0.2%	1.4%	0.8%
Solano County	399,026	418,876	427,837	1.0%	0.4%	0.7%
Sonoma County	450,057	475,536	493,285	1.1%	0.7%	0.9%

Source: Applied Development Economics, based on total population estimates from The California Department of Finance (E-5 Report)

Data in Table 2 describe the larger economic context within which officials are contemplating the proposed Rule 11-17. Businesses in the region employ over three million workers, or 3,193,427. The number of jobs in the region grew annually by 1.2 percent between 2004 and 2009, after having declined dramatically between 1999 and 2004 by 2.4 percent a year. Of the 3,193,427 positions, almost 14 percent are in the public sector. In the state, slightly over 16 percent of all jobs are in the public sector. Relative to the state as a whole, manufacturing, professional/business services, and education/health service sectors comprise a greater proportion of the employment base. In the region, these sectors comprise 10.1 percent (manufacturing), 17.4 percent (professional/business services), and 12.1 percent

(private education/health services) respectively of total employment. In the state, these sectors comprise 8.8 percent, 14.1 percent, and 11.5 percent of the statewide job base. In other words, as a percent of total workforce, the region employs more people in sectors with occupations that presumptively require more skills and are higher-paying.

TABLE 2
SAN FRANCISCO BAY AREA EMPLOYMENT TRENDS, 1999-2009

	SF Bay Area Employment			Distribution		1999-2004		2004-2009	
	1999	2004	2009	SFBA 2009	California '09	Change	CAGR	Change	CAGR
Private and Public	**3,391,178**	**3,009,512**	**3,193,427**	**100.00%**	**100.0%**	**-381,666**	**-2.4%**	**183,915**	**1.2%**
Total, all industries (private sector)	2,960,921	2,594,905	2,748,225	86.10%	83.6%	-366,016	-2.6%	153,320	1.2%
Goods-Producing	662,086	521,729	493,895	15.50%	16.0%	-140,357	-4.7%	-27,834	-1.1%
Natural Resources and Mining	29,454	23,678	21,799	0.70%	2.7%	-5,776	-4.3%	-1,879	-1.6%
Construction	171,832	169,409	150,514	4.70%	4.4%	-2,423	-0.3%	-18,895	-2.3%
Manufacturing	460,800	328,642	321,582	10.10%	8.8%	-132,158	-6.5%	-7,060	-0.4%
Service-Providing	2,298,835	2,073,176	2,254,329	70.60%	67.6%	-225,659	-2.0%	181,153	1.7%
Trade, Transportation, and Utilities	602,544	521,223	526,983	16.50%	18.0%	-81,321	-2.9%	5,760	0.2%
Information	121,893	110,639	112,229	3.50%	3.0%	-11,254	-1.9%	1,590	0.3%
Financial Activities	198,588	197,996	183,446	5.70%	5.4%	-592	-0.1%	-14,550	-1.5%
Professional and Business Services	629,658	502,453	556,256	17.40%	14.1%	-127,205	-4.4%	53,803	2.1%
Education and Health Services	326,645	323,039	385,503	12.10%	11.5%	-3,606	-0.2%	62,464	3.6%
Leisure and Hospitality	290,783	284,461	324,850	10.20%	10.2%	-6,322	-0.4%	40,389	2.7%
Other Services	128,724	133,027	157,909	4.90%	5.0%	4,303	0.7%	24,882	3.5%
Unclassified	0	338	7,155	0.20%	0.4%				
Government Ownership:	430,257	414,607	445,202	13.90%	16.4%	-15,650	-0.7%	30,595	1.4%
Federal Government	60,971	52,493	51,320	1.60%	1.7%	-8,478	-2.9%	-1,173	-0.5%
State Government	77,744	81,082	86,757	2.70%	3.1%	3,338	0.8%	5,675	1.4%
Local Government	291,542	281,032	307,125	9.60%	11.6%	-10,510	-0.7%	26,093	1.8%

Source: Applied Development Economics, Inc., based on California EDD LMID

Table 2 also shows precipitous decline in employment in industries most-affected by the downturn in the economy that began in late 2007, namely housing. Construction employment declined by 2.3 percent per year between 2004 and 2009, with financial activities (which includes real estate) declining by 1.5 percent annually over the same period.

While Table 2 shows the larger context within which the District is contemplating Rule 11-17, Table 3 tracks trends for specific industries potentially affected by the proposed rule. Table 3 includes agricultural trends in the last five years between 2004 and 2009. Agricultural employment declined by eight percent per year, although employment in fruit and tree nuts increased by four percent annually over the same period. Dairy employment dropped by 17 percent annually between 2004 and 2009.

TABLE 3

AGRICULTURAL TRENDS: SAN FRANCISCO BAY AREA, 2004-2009

		2004			2009			04-09	
NAICS	Industry	Estab.	Emp	Avg Wages	Estab.	Emp	Avg Wages	Emp Chg	Emp Per Chg
11	Agriculture	1,991	21,787	$24,463	1,628	20,058	$29,136	-1,729	-8%
111	Crop Production	1,261	14,949	$25,274	1,004	12,796	$29,747	-2,153	-14%
1111	Oilseed and Grain Farming	31	86	$21,473	32	61	$26,717	-25	-29%
1112	Vegetable and Melon Farming	92	2,222	$21,469	88	1,505	$25,496	-717	-32%
1113	Fruit and Tree Nut Farming (including grapes)	796	6,639	$24,250	651	6,908	$29,283	269	4%
1114	Greenhouse and Nursery Production	217	4,754	$28,864	160	3,217	$33,126	-1,537	-32%
1119	Other Crop Farming	127	1,248	$27,701	73	1,105	$27,410	-143	-11%
112	Animal Production	324	1,718	$24,720	252	1,469	$31,304	-249	-14%
1121	Cattle Ranching and Farming	224	1,070	$24,469	177	894	$30,411	-176	-16%
11212	Dairy Cattle and Milk Production	115	728	$23,431	95	604	$27,257	-124	-17%
1122	Hog and Pig Farming				1	6	$25,723	6	
1123	Poultry and Egg Production	37	461	$27,328	15	324	$34,514	-137	-30%
1125	Animal Aquaculture	4	12	$19,723	18	114	$34,057	102	
1129	Other Animal Production	59	175	$19,723	41	131	$27,326	-44	-25%
113	Forestry and Logging	9	56	$27,424	9	44	$24,035	-12	-21%
114	Fishing, Hunting and Trapping	28	54	$27,424	22	58	$19,392	4	7%
115	Agriculture & Forestry Support Activity	369	5,010	$24,474	341	5,691	$29,350	681	14%

Source: ADE, Inc., based on US BLS / CA EDD LMID

TABLE 4
SAN FRANCISCO BAY AREA: AGRICULTURAL TRENDS: AGGREGATE VALUE

	2004	2005	2006	2007	2008	04-08 Chg.	04-08 CAGR
	$1,848,466,116	$2,110,311,771	$1,909,135,828	$1,967,516,400	$1,734,893,700	-$113,572,416	-1.6%
Crop Production	$1,528,193,213	$1,810,375,632	$1,662,292,325	$1,658,167,200	$1,483,747,800	-$44,445,413	-0.7%
Oilseed and Grain Farming	$152,516,832	$139,724,233	$149,260,524	$145,720,600	$197,710,000	$45,193,168	6.7%
Cash grains	$21,873,717	$14,075,277	$25,057,079	$21,699,700	$45,988,900	$24,115,183	20.4%
Field crops	$130,643,116	$125,648,956	$124,203,445	$124,020,900	$151,721,100	$21,077,984	3.8%
Vegetable and Melon Farming	$167,613,408	$160,238,124	$139,932,641	$173,005,900	$120,138,800	-$47,474,608	-8.0%
Fruit and Tree Nut Farming (incl. grapes)	$803,476,473	$1,123,184,305	$1,015,924,550	$979,977,100	$876,458,600	$72,982,127	2.2%
Greenhouse and Nursery Production	$404,586,499	$387,228,970	$357,174,610	$359,463,600	$289,440,400	-$115,146,099	-8.0%
Animal Production							
Cattle Ranching and Farming	$320,272,903	$299,936,139	$246,843,503	$309,349,200	$251,145,900	-$69,127,003	-5.9%
Other cattle	$159,648,984	$155,669,032	$138,231,260	$154,567,400	$103,327,800	-$56,321,184	-10.3%
Dairy Cattle and Milk Production	$160,623,919	$144,267,107	$108,612,244	$154,781,800	$147,818,100	-$12,805,819	-2.1%

Source: ADE, Inc., based on California Agricultural Commissioners

Table 4 provides additional information on agriculture in the region. The most up-to-date data shows that this sector in the Bay Area generates over $1.7 billion in revenues, with a high of $2.1 billion in 2005. Between 2004 and 2008, aggregate revenue declined by over $113 million, for an annual decline of 1.6 percent. Grape vineyards in the northern section of the Bay Area, with pumped water frost protection, are the sector of the agricultural industry most likely to be affected by Regulation 11, Rule 17.

SECTION SIX: SOCIOECONOMIC IMPACT ANALYSIS

This section of the report analyzes socioeconomic impacts stemming from proposed Rule 11-17. The impacts of this proposal are less than the threshold of significance for both small and large agricultural operations, primarily because this proposal provides compliance flexibility. Although the proposed rule provides a deferred compliance option, the alternative compliance plan is not a requirement, so any incremental costs do not have to be incurred by engine operators. The benefit of this proposal is that, providing it is found to be equivalent to the CARB ATCM, the deferred replacement deadlines will allow further recovery of useful engine life, and will allow Agricultural Assistance Program funding to remain available until the proposed compliance dates (providing funds continue to be available). These funds can provide funding to offset up to 85% (typically 60 – 75%) of the cost of a replacement engine. The following summarizes the options available to each engine operator:

- individual farmers are allowed to proceed with replacing their engine - immediately.
- individual farmers with Tier 0 engines are allowed to wait until 2020 to replace their engines, but they will need to replace with a Tier 4 engine at that time. Tier 4 engines may cost significantly more than Tier 3 engines.
- individual farmers with Tier 1 engines are allowed to wait until 2020 to replace their engines. The ATCM requires Tier 1 engines to be replaced with Tier 4 engines by the end of 2015, or 12 years after their initial installation.
- individual farmers with Tier 2 engines are allowed to wait until 2025 to replace their engines. The ATCM requires Tier 2 engines to be replaced with Tier 4 engines by the end of 2015, or 12 years after their initial installation.

There are currently 335 engines in the District's databases that are potentially affected by the proposed rule. Of the 335, information on 279 engines was available in August, 2010 and serves as the basis for this analysis, particularly with respect to whether these engines operate below twenty hours, between 20 and 100 hours, and more than 100 hours but less than 200 hours. Based on information on the 279 engines, the District estimates how many are exempt from the proposed rule, how many are not exempt, and how many are possibly eligible for the Alternate Compliance Plan, as shown in Table 5.

TABLE 5
PROFILE OF LOW USE AGRICULTURAL ENGINES:
SAN FRANCISCO BAY AREA

	Aug, 2010
	279
<20 hours potentially exempt	**64**
propane (exempt)	*4*
proximity to residential (not exempt)	*12*
possibly eligible for exemption	*49*
>20 and < 100 hours: potential ACPs	**90**
Tier 3 standard (exempt)	*3*
propane (exempt)	*3*
proximity to residential (not exempt)	*5*
possibly eligible for exemption	*79*
>100 and < 200 hours: potential ACPs	**38**
proximity to residential (not exempt)	*3*
possibly eligible for exemption	*35*
Others	**87**

Source: BAAQMD

Feedback from farmers, cattlemen, dairymen and agricultural equipment suppliers indicate there may be significantly more diesel engines in the field that have not yet been registered. There may be up to two or three times as many engines in the field affected by this proposed rule. However, this analysis is based on an individual engine replacement, and its business and economic impact on the owner/operator.

Table 6 includes cost data for new compliant engines as indicated in the District workshop report for the January 2010 workshops. It is important to note that, as indicated by the District, costs for Tier 4 engines when available in 2015 are not known at this time, as most engine manufacturers have not yet determined the technology that will be necessary to meet the stringent emissions standards required for Tier 4 engines. Interim Tier 4 engines are just now becoming commercially available, so a range of costs are shown. Table 7 compares the annualized costs of Tier 3 and Tier 4 engines.

TABLE 6
TOTAL COST OF COMPLIANT LOW-USE AG ENGINES

Engine Size	Tier 3 Cost	Interim Tier 4 Cost	Estimated Final Tier 4 Cost
▪ 50 HP	$10,577	$15,000 – 20,000	$21,000
▪ 100 HP	$13,887	$20,000 – 26,000	$28,000
▪ 200 HP	$20,507	$28,000 – 38,000	$41,000
▪ 300 HP	$27,126	$38,000 – 51,000	$54,000
▪ 400 HP	$33,746	$47,000 – 63,000	$67,000
▪ 500 HP	$40,365	$56,000 – 75,000	$81,000

Source: BAAQMD

TABLE 7
ANNUALIZED COST OF COMPLIANT LOW-USE AG ENGINES

Engine Size	Tier 3 Cost	Est. Final Tier 4 Cost
50 HP	$1,269	$2,538
100 HP	$1,666	$3,333
200 HP	$2,461	$4,922
300 HP	$3,255	$6,510
400 HP	$4,050	$8,099
500 HP	$4,844	$9,688

Source: BAAQMD

PROFILE OF SOURCES AFFECTED BY PROPOSED RULE 11-17

In January, 2011 the District held nine workshops to discuss and obtain stakeholder input on the proposed Rule 11-17. Of the stakeholders who participated in the workshop, a number were operators of vineyards, orchards and/or crop farms larger than 100 acres. Of these farms, 75.8 percent were larger than 100 acres, suggesting that potentially impacted sources are larger-sized farms. Farms larger than 100 acres are, on average, 888 acres, whereas farms smaller than 100 acres are 36 acres. Likewise, dairies with at least 100 cows represented almost 82 percent of all operators of contained animal facilities (CAFs) who attended the workshop, underscoring types of businesses possibly most affected by the proposed rule. Dairies with more than 100 cows contain, on average, almost 500 cows. Profiles of potentially affected sources are summarized in Table 8.

TABLE 8
PROFILE OF AFFECTED SOURCES: PROPOSED RULE 11-17

	Crops				Livestock
Distribution	Vineyards (N = 26)	Other crops (N = 7)	All Crops	Distribution	Dairies, etc. (N = 11)
less than 100 acres	23.1%	28.6%	24.2%	less than 100 units	18.2%
more than 100 acres	76.9%	71.4%	75.8%	more than 100 units	81.8%
Average Size (acres)	**Vineyards**	**Other crops**	**All Crops**	**Average Size (units)**	**Dairies, etc.**
less than 100 acres	36	80	47	less than 100 units	30
more than 100 acres	888	230	850	more than 100 units	494

Source: ADE, Inc., based on BAAQMD

While data for dairies are included in Tables 4, 8 and 9, it is important to note that the District does not believe dairies are affected because they mostly use diesel engines for backup emergency generators (for their milking machines) which are exempt from the ATCM.

Table 9 presents estimates on revenues and net profits generated by average size farms and confined animal facilities potentially subject to the proposed rule. On average, vineyards smaller than 100 acres generate $209,150 in annual revenues and $12,340 in after tax net profits. In comparison, the average size vineyard larger than 100 acres generates $5.9 million in revenues and $347,400 in annual net profits. The table also shows revenue and net profit estimates for other crops and dairies.

TABLE 9
ECONOMIC PROFILE OF AFFECTED SOURCES: PROPOSED RULE 11-17

	Crops				Livestock
Average Size (acres)	**Vineyards**	**Other crops**	**All Crops**	***Average Size (nos. of units)***	**Dairies, etc.**
Less than 100 acres	36	80	47	less than 100 units	30
more than 100 acres	888	230	850	more than 100 units	494
Revenues Per Farm By Size	**Vineyards**	**Other crops**	**All Crops**	**Revenues Per Contained Animal Facility**	**Dairies, etc.**
Less than 100 acres	$209,147	$207,159	$416,306	less than 100 units	$148,473
more than 100 acres	$5,888,305	$1,015,688	$6,903,993	more than 100 units	$1,401,224
Est. Net Profits Per Farm By Size	**Vineyards**	**Other crops**	**All Crops**	**Est. Net Profits Per CAF**	**Dairies, etc.**
Less than 100 acres	$12,340	$10,565	$22,905	less than 100 units	$5,627
more than 100 acres	$347,410	$51,800	$399,210	more than 100 units	$64,022
Est. Incremental Cost Threshold	**Vineyards**	**Other crops**	**All Crops**	**Est. Incremental Cost Threshold**	**Dairies, etc.**
Less than 100 acres	$1,234	$1,057	$2,290	less than 100 units	$563
more than 100 acres	$34,741	$5,180	$39,921	more than 100 units	$6,402

Source: ADE, Inc., based on BAAQMD, US Agricultural Census, and California Agricultural Commissioners

Table 9 also provides information that can be used to determine whether the cost of technology required for compliance with Rule 11-17 is less than significant or not. These estimates are based on the ten percent of net profit threshold of significance. For example, a small farm (average 47 acres) would need a 200 HP diesel engine pump for frost protection, and generates $22,905 in after tax net profits. The threshold of significance for any proposal's cost is ten percent of net profit. In this case, the threshold of significance is $2,290. Annualized capital cost for a replacement 200 HP Tier 3 diesel engine (estimated at 12% of total capital) is $2,461. The annualized capital cost for a replacement 200 HP Tier 4 engine in 2020 is $4,922. It is important to remember that, for purposes of comparing the incremental cost stemming from replacement with a Tier 4 engine in 2020 versus a Tier 3 engine in 2011, we must perform a net present value calculation of the annualized $4,922 cost in 2020 for the year 2011. The net present value of $4,922 in 2020 is $3,180 in 2011, assuming the money is alternately invested in a 30 Year Treasury Bond from 2011 through 2020. The difference in these costs is $3,181 - $2,461 = $720. Thus, the incremental impact attributable to BAAQMD's proposed rule, in the event an owner/operator replaces their non-compliant 200 HP Tier 0 engine with compliant Tier 4 engine is $720.

Similarly, for farms larger than 100 acres, the cost associated with the ten percent threshold is $39,921. Capital costs for replacement engines are typically 20 – 40% less on a per acre basis because large farms can take advantage of economies of scale. Table 10 shows that impacts are less than significant, when annual costs borne by average size farms of all varieties less than one hundred acres, and those greater than one hundred acres are compared against estimated annual net profits generated by affected sources.

In addition, proposed Rule 11-17 has the added benefit of resetting the compliance deadlines, allowing further recovery of useful engine life, and potentially allowing Agricultural Assistance Program funding to remain available until the proposed compliance dates (providing funds continue to be available). These funds can provide funding to offset up to 85% (typically 60 – 75%) of the cost of a replacement engine.

TABLE 10: SOCIOECONOMIC IMPACT ANALYSIS:
PROPOSED RULE 11-17:
INCREMENTAL DIFFERENCE BETWEEN
CARB TIER 0-TO-TIER 3 [2011] ANNUAL COST VS.
DISTRICT TIER 0-TO-TIER 4 [2020] ANNUAL COST

		Crops	
Average Size (acres)	**Vineyards**	**Other crops**	**All Crops**
Less than 100 acres	36 acres	80 acres	47 acres
More than 100 acres	888 acres	230 acres	850 acres
Est. Net Profits Per Farm By Size	**Vineyards**	**Other crops**	**All Crops**
Less than 100 acres	$12,340	$10,565	$22,905
More than 100 acres	$347,410	$51,800	$399,210
Est. Incremental Cost Per Farm By Size: CARB Tier 0-Tier 3 [2011] vs. District Tier 0-Tier 4 [2020]	**Vineyards**	**Other crops**	**All Crops**
Less than 100 acres	$720	$720	$720
More than 100 acres	$16,730	$2,007	$12,045
Incremental Cost to Annual Net Profit	**Vineyards**	**Other crops**	**All Crops**
Less than 100 acres	5.8%	6.8%	3.1%
More than 100 acres	4.8%	3.9%	3.0%

Source: ADE, Inc., based on Ca. Ag Commissioners, USDA Ag Census, BAAQMD, and US IRS

SOCIOECONOMIC IMPACT ANALYSIS CONCLUSION: LESS THAN SIGNIFICANT

As stated above, proposed Rule 11-17 has no significant impact on required replacement of Tier 0 engines. If engines are replaced now with Tier 3 engines, the impact is equal to that of the ATCM. If the owner/operator chooses to delay replacement until 2020, the impacts are below the threshold of significance.

Proposed Rule 11-17 also requires sources with Tier 1 engines to replace these engines in one of two ways. Owner/operators of Tier 1 engines can abide by CARB ATCM, in which case the Tier 1 engines must be replaced by 2015 (or 12 years after initial installation) with Tier 4 engines. The District's proposed rule also allows the option to replace their Tier 1 engines with Tier 4 engines by 2020. There is no incremental cost impact stemming from the District's proposal to extend the deadline for Tier 1 engines through 2020.

The proposed rule also requires Tier 2 engines to be replaced in one of two ways. Owner/operators of Tier 2 engines can abide by CARB ATCM, in which case the Tier 2 engines must be replaced by 2015 (or 12 years after initial installation) with Tier 4 engines. The District's proposed rule also allows the option to replace their Tier 2 engines with Tier 4 engines by 2025. There is no incremental cost impact stemming from the District's proposal to extend the deadline for Tier 2 engines through 2025.

CONSUMER IMPACTS

Consumers indirectly purchase most wine and agricultural products through supermarkets and other retail outlets. Economic impacts of the proposed rule are less than significant, so producers can typically absorb these costs without hardship. Most agricultural operations' products are typically considered commodities at the wholesale level, so it is unlikely that they will be able to pass on any additional costs. This is especially true if alternate products are imported from foreign sources. Since there are products on the market that come from outside the Bay Area, farmers would likely need to absorb most of these costs.

AFFECTED INDUSTRY AND REGIONAL EMPLOYMENT IMPACTS

Since on average, the proposed Rule amendment would not result in significant economic impacts to both small and large agricultural operations, and consumers may bear some portion of the compliance cost burden, the proposed Rule will not impact the affected industry or regional employment.

REGIONAL INDIRECT AND INDUCED IMPACTS

Indirect and induced impacts refer to regional multiplier effects of increasing or decreasing regional economic activity. If the Rule were to significantly impact local businesses, any closures would result in direct regional economic losses. Firms would no longer buy goods from local suppliers, thereby resulting in reduced indirect impacts, or business-to-business expenditures. In addition, firms would no longer employ regional residents, resulting in reduced induced impacts, or household spending.

However, since the proposed amendment to the Rule is not expected to result in significant direct impacts, its adoption would not result in any indirect or induced impacts either.