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Proposed Changes to the Air District's Air Toxics New Source Review (NSR) Program

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DESCRIPTION OF PROPOSED RULE AMENDMENT

The Bay Area Air Quality Management District ("Air District" or "BAAQMD") proposes to amend Regulation 2, Rule 5 (Rule 2-5), the New Source Review ("NSR") of Toxic Air Contaminants ("TACs"). This section describes the proposed amendments in detail, largely repeating the description found in the Staff Report describing the proposed amendments.[1]

This report assesses socioeconomic impacts related to these proposed changes to the Air District's Air Toxics New Source Review (NSR) Program, including amendments to Rule 2-5 and associated procedures. The Air Toxics NSR Program is a health risk-based program, where program requirements are based on results of health risk assessments (HRA). HRA is an analysis that estimates the increased likelihood of health risk for individuals in the affected population that may be exposed to emissions of one or more toxic substances.

The goals of the Air Toxics NSR Program are to:

- Evaluate and mitigate potential increases in public health risks resulting from new and modified sources emitting TACs; and
- Provide net health risk benefits by improving the level of control when existing sources are modified or replaced.

Rule 2-5 requires an assessment of the health impacts from these new and/or modified projects if the TAC emissions exceed Air District specified de minimis risk screen trigger levels. Rule 2-5 also sets health risk thresholds that trigger mandatory use of best available control technology for toxics (TBACT) and establishes health risk limits (permit denial levels) for these projects.

In accordance with Regulation 2, Rule 5, project health impacts are determined through preparation of a health risk assessment (HRA), which is completed following the Air District's HRA Guidelines. The Air District's HRA guidelines generally conform to the health risk assessment methodology that was developed by Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) specifically for air pollution control programs in California and to the risk management guidance for stationary sources adopted by the California Air Resources Board (CARB) and the California Air Pollution Control Officers Association (CAPCOA). The OEHHA Health Risk Assessment Guidelines contain several sections which identify (a) overall methodology, (b) exposure assessment assumptions and procedures, and (c) health effects data such as cancer potency factors and reference exposure levels. The CARB/CAPCOA risk management guidelines provide additional recommendations regarding specific types of projects.

[1] From BAAQMD Staff Report, "Workshop Report - Proposed Amendments to Air District Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants" henceforth referred to as the "Staff Report," January 2016.

The Air District's current HRA Guidelines generally follow the 2003 OEHHA Guidelines, except that the Air District's HRA Guidelines use OEHHA health effects values adopted as of January 1, 2010 and the Air District's cancer risk calculation procedures include the age sensitivity factors (ASFs) discussed in OEHHA's June 1, 2009 Technical Support Document for Cancer Potency Factors. These ASFs are one part of the 2015 revisions to OEHHA's HRA Guidelines. In addition, the Air District's current HRA Guidelines incorporate CARB's 2003 Interim Risk Management Policy for inhalation-based residential cancer risk assessments.

OEHHA periodically updates health effects values and health risk assessment procedures to reflect advances in science. Most recently, as mandated under the Children's Environmental Health Protection Act of 1999 (SB25), OEHHA developed major revisions to these health risk assessment guidelines that considered protection of children's health. Advances in science have shown that early-life exposures to air toxics contribute to an increased lifetime risk of developing cancer compared to exposures that occur in adulthood. OEHHA's 2015 risk assessment methodology reflects both this greater sensitivity and more refined data in childhood and adult exposure to air toxics. In addition, OEHHA has adopted a number of updates to health effects values since the Air District's HRA Guidelines were last revised.

In response to these OEHHA updates, CARB and CAPCOA adopted an updated Risk Management Guidance Document for Stationary Sources of Air Toxics on July 23, 2015. This document provides risk management guidance for sources subject to stationary source permitting and Air Toxic Hot Spots programs including an updated Risk Management Policy for Inhalation Risk Assessments that replaces the 2003 Interim Risk Management Policy.

The primary purpose of this Toxics NSR rule amendment is to incorporate OEHHA's 2015 Health Risk Assessment Guidelines and CARB/CAPCOA's 2015 Risk Management Guidelines into the Air District's Toxics NSR rule. This rule amendment will also include new and revised health effects values that have been adopted by OEHHA since January 2010, as well as revised risk assessment trigger levels. The Air District is proposing several rule amendments related to modified sources to improve the transparency of HRA results and to streamline procedures for these projects. The Air District is proposing a few additional amendments to this rule to exempt small engines, remove unnecessary language, and clarify requirements. The Air District is delaying implementation of the 2015 risk assessment and risk management guidelines for gasoline dispensing facilities (GDFs), but GDFs will be subject to the updated health effect limits and other Rule 2-5 amendments. The Air District is not proposing any changes to the current TBACT thresholds or project risk limits.

The overall effect of the Air District's proposed rule revisions is that cancer risk will increase for many projects even though emissions remain the same. This is because estimating cancer risk using the new and better scientific information contained in the revised OEHHA and CARB/CAPCOA guidelines will result in higher risk numbers for many toxic air contaminants. For most toxic air contaminants, the cancer risk will increase by about 40 percent for the same emissions level compared to the cancer risk calculated using the Air District's current HRA Guidelines. For a dozen TACs, the cancer

risk could increase by up to a factor of five. The net result of these proposed revisions is that projects will trigger HRA and TBACT requirements and will reach project risk limits at lower emission rates. More projects will be required to control TAC emissions and to reduce project health impacts than would otherwise be required to do so under the current rule.

METHODOLOGY

BAE Urban Economics (BAE) has analyzed the socioeconomic impacts of the rule in part by following the methodology used by Applied Development Economics (ADE) in their 2009 analysis (the "ADE Report") of previous revisions to the same Rule. Where relevant, this will allow consistency in comparing the impacts at that time and the impacts of the current New Source Review rule revisions.

The analysis begins with an overview of current demographic and economic conditions in the Air District region, to provide context for the impact analysis that follows. Following that overview, BAE provides more detail on specific industries that may be affected by the rule revisions, including data on number of establishments as classified by number of employees, estimated revenues per employee, and net profits for each affected industry.

This report uses data from a number of sources, including County Business Patterns, the 2012 Economic Census, the US Bureau of Labor Statistics, the State of California's Employment Development Department (EDD) Labor Market Information Division and Department of Finance, the Internal Revenue Service, and the Air District itself.

Using this information, BAE generated an overview of regional demographic and economic trends, developed a profile of potentially impacted business establishments and estimate net income as percent of revenues. These figures were then compared to the compliance costs associated with the revised Rule, and determined the potential for these costs to be a significant portion of estimated profits (using a 10 percent impact threshold). Then, to the extent that the impacts on profit could result in job losses, BAE analyzed the direct and indirect job losses using the IMPLAN input-output model. Finally, the potential for impacts on small businesses is assessed.

REGIONAL TRENDS

Regional Demographic Trends

Table 1 shows the population and household trends for the nine county Bay Area and California between 2000 and 2015. During this time, the Bay Area's population increased by 10.7 percent, compared to 14.3 percent for California as a whole. Similarly, the number of Bay Area households grew by 8.5 percent, compared to 11.5 percent growth statewide, as average household size increased in both geographies.

Table 1: Population and Household Trends, 2000-2015

Bay Area (a)	**2000**	**2015**	**Total Change 2000-2015**	**% Change 2000-2015**
Population	6,784,348	7,510,942	726,594	10.7%
Households	2,466,020	2,675,537	209,517	8.5%
Average Household Size	2.69	2.75		
California				
Population	33,873,086	38,714,725	4,841,639	14.3%
Households	11,502,871	12,830,035	1,327,164	11.5%
Average Household Size	2.87	2.95		

Notes:
(a) Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.

Sources: California State Department of Finance, 2015; US Census, 2000; BAE 2015.

The Bay Area's slower growth is tied to its relatively built-out environment, compared to the state overall. While Central Valley locations, such as the Sacramento region, experienced large increases in the number of housing units, the Bay Area only experienced moderate increases in housing units.

Regional Economic Trends

Table 2 shows jobs by sector in 2010 and 2015[2] for the Bay Area and California. In the five-year period between 2010 and 2015, the Bay Area's employment base grew by 17.5 percent, increasing from 3.2 million jobs to 3.7 million jobs, as the area economy has recovered from the depths of the Great Recession and continued to grow. The state saw somewhat smaller job growth, increasing by 12.3 percent from 14.7 million jobs in 2010 to 16.5 million jobs in 2015.

The largest non-government sectors in the Bay Area economy are Professional & Business Services; Education & Health Services; Leisure & Hospitality; and Retail Trade. These sectors each constituted nine percent or more of the region's total jobs in 2015. Overall, the Bay Area's economic base largely reflects the state's base, sharing a similar distribution of employment across sectors. One noteworthy variation is the high employment in the Professional & Business Services, which makes up 19.2 percent of employment in the Bay Area compared to only 15.1 percent statewide.

All industry sectors showed an increase in employment in the Bay Area between 2010 and 2015, with increases of greater than 20 percent in Mining, Logging, & Construction; Information; Professional & Business Services; and Leisure & Hospitality. Statewide growth was also over 20 percent in three of these four sectors; Information only grew by 12.6 percent, compared to 44.4 percent in the Bay Area, where the tech economy is driving growth. For both the Bay Area and the state, the slowest growth was in the Government sector.

Summary of Regional Trends

The Bay Area economy is currently strong, with strong growth and recovery from the recession, particularly in professional services and technology-related industries. Population is also growing, albeit at a slower rate than jobs.

[2] Most recent year for which full-year employment data are available.

Table 2: Jobs by Sector, 2010-2015 (a)

	Bay Area					California				
	2010 (b)		2015 (c)		% Change	2010 (b)		2015 (c)		% Change
Industry Sector	Jobs	% Total	Jobs	% Total	2010-2015	Jobs	% Total	Jobs	% Total	2010-2015
Agriculture	20,900	0.7%	21,800	0.6%	4.3%	382,800	2.6%	423,300	2.6%	10.6%
Mining, Logging, and Construction	132,600	4.2%	179,800	4.8%	35.6%	586,700	4.0%	756,400	4.6%	28.9%
Manufacturing	307,500	9.7%	333,600	9.0%	8.5%	1,244,000	8.5%	1,291,900	7.8%	3.9%
Wholesale Trade	113,200	3.6%	127,800	3.4%	12.9%	644,000	4.4%	721,200	4.4%	12.0%
Retail Trade	309,700	9.8%	345,700	9.3%	11.6%	1,517,700	10.3%	1,663,100	10.1%	9.6%
Transportation, Warehousing, and Utilities	89,500	2.8%	106,200	2.9%	18.7%	466,300	3.2%	554,000	3.4%	18.8%
Information	113,500	3.6%	163,900	4.4%	44.4%	429,000	2.9%	483,000	2.9%	12.6%
Financial Activities	168,400	5.3%	180,100	4.8%	6.9%	759,700	5.2%	797,400	4.8%	5.0%
Professional & Business Services	546,500	17.3%	716,100	19.2%	31.0%	2,076,900	14.2%	2,493,800	15.1%	20.1%
Educational & Health Services	474,500	15.0%	552,300	14.8%	16.4%	2,123,400	14.5%	2,456,200	14.9%	15.7%
Leisure & Hospitality	325,900	10.3%	405,100	10.9%	24.3%	1,501,600	10.2%	1,830,000	11.1%	21.9%
Other Services, except Public Administration	108,500	3.4%	123,600	3.3%	13.9%	484,900	3.3%	545,700	3.3%	12.5%
Government (d)	458,200	14.5%	468,100	12.6%	2.2%	2,448,400	16.7%	2,458,800	14.9%	0.4%
Total, All Employment (e)	**3,168,000**	**100.0%**	**3,723,800**	**100.0%**	**17.5%**	**14,665,300**	**100.0%**	**16,474,800**	**100.0%**	**12.3%**

Notes:
(a) Includes all wage and salary employment.
(b) Represents annual average employment for calendar year 2010.
(c) Represents annual average employment for calendar year 2015.
(d) Government employment includes workers in all local, state and Federal workers, not just those in public administration. For example, all public school staff are in the Government category.
(e) Totals may not sum from parts due to independent rounding.
(f) Santa Clara County data is for MSA, which includes San Benito County. As of 2014, San Benito had approximately 16,100 wage and salary jobs, an insignificant number relative to the Bay Area total.

Sources: California Employment Development Department, 2016; BAE, 2016.

SOCIO-ECONOMIC IMPACTS

This section of the report analyzes socio-economic impacts stemming from the revisions to Rule 2-5. In order to estimate the economic impacts of the changes to the Rule, this report compares the affected industries' annualized compliance costs with their profit ratios. The following analysis uses data from the Air District, 2014 US Census County Business Patterns, the IRS, and the 2012 US Economic Census.

BAAQMD has identified the potential project types, and based on that information, has evaluated the types of industries and establishments that would likely be impacted by the rule revisions. Detail on the project types and the industries affected can be found below. In determining the typical source categories identified below, the Air District analyzed its databases and identified a number of types of businesses that might be subject to the rule changes.

In addition to direct impacts, any decline in revenues for the directly affected industries may result in a "ripple effect" through the regional economy. These effects are analyzed by utilizing the IMPLAN input-output model, as discussed in the section on regional indirect and induced impacts below.

Affected Industries

Based on an analysis of past trends, the Air District estimated the number of affected projects by project type on an annual average basis as shown in Table 3.[3] This table also shows potential modifications and controls to meet the revised Rule. For diesel engines, more detailed industry assumptions are available from the previous study for this rule conducted in 2009. Based on additional discussions with BAAQMD regarding industries historically affected by the Rule, Table 4 shows detail on the industries likely to be affected by the proposed rule changes. According to the estimates derived from the US Census, in 2014, the Bay Area had approximately 17,000 establishments in industries potentially affected, with a total of 485,000 jobs, or an average of 28 jobs per establishment. It is important to note, however, that while the rule may affect specific businesses in this broad spectrum of industries, BAAQMD analysis as shown in Table 3 indicates the actual number of projects subject to the Rule in any given year is extremely small. The Rule covers many types of industries in large part due to the regulations associated with emergency diesel-powered generators, which are used across a broad variety of businesses and institutions. Furthermore, some of the affected industries include real estate operators whose properties are occupied by other businesses.

[3] Note that some of these uses have an annual average occurrence <1, but are shown here to show all impacted potential industries.

Table 3: Annual Average Number of Projects That May Require Project Modifications and Potential Controls

Types of Projects	Projected Total Number of Projects Per Year	Limit Throughput Rate or Operating Time	Diesel Particulate Filters	Oxidation Catalysts	Enclosures/ Baghouses	Carbon Absorbers	Thermal or Catalytic Oxidizers	Other Risk Reduction Measures
Diesel Engines – emergency	45	37	4					4 – increase stack height
Diesel Engines – fire pump	1		1					
Diesel Engs – portable/prime	2		2					
Gas Engines – power plant	1	possible		1				increase stack height or revise source location
Crematory – pet or human	1	1 or …						increase stack height or revise source location
Other Combustion	1	1 or …						increase stack height or revise source location
Gas Stations – new/modified	1	1						For new stations, possibly revise source locations
Remediation – SVE	3	possible				possible	3	If proposed project already has oxidizers, use other possible control measures or increase stack height or change source location
Cement, Concrete, and Asphalt	2	possible			2			revise source location
Coating and Solvent	1	possible				possible	1	increase stack height
Landfill Modifications	1							1 - Set TAC Concentration Limits for LFG
Solid Material Handling	1				1			

Table 4: Profile of Affected Industries

General Use Description	NAICS	Employment (a)	Average Employment per Establishment	Number of Establishments (by workforce size) 1-4	5-9	10-19	20-49	50-99	100+	Total
Office	531120	10,449	5	1,658	406	131	35	11	6	2,247
Industrial	31-33	237,546	31	3,130	1,503	1,214	1,011	436	450	7,744
Refinery	324110	3,570	298	4	1	1	-	1	5	12
Institutional: education	6111	30,494	43	139	85	97	198	115	72	706
Institutional: cultural	712	5,416	32	77	33	23	11	12	13	169
Institutional: Hospital	622	115,053	1,085	7	1	2	-	2	94	106
Institutional: residential	531110	10,449	5	1,658	406	131	35	11	6	2,247
Institutional: Hotel/Motel	721110	47,367	42	252	143	257	270	79	114	1,115
Cell phone tower	517210	5,072	19	59	43	79	65	9	6	261
Retail Center	531120	5,130	5	837	165	60	26	11	2	1,101
Gas Engines	22111	915	16	21	11	10	13	3	-	58
Other Combustion	562211,562213	612	28	9	5	1	3	3	1	22
Crematories	812220	830	14	17	15	16	11	2	-	61
Gas Dispensing Facilities	4471	9,090	7	450	580	194	49	3	-	1,276
Remediation - SVE	562910	2,685	28	20	18	18	23	11	5	95
Cement, Concrete, and Asphalt	3273	2,773	27	20	20	25	24	9	4	102
Coating and Solvent	332812	828	15	16	12	15	9	3	-	55
Landfill modifications	562212	458	20	6	2	5	8	2	-	23
Solid Material Handling	562920	872	42	8	2	3	3	3	2	21
Totals		**485,211**	**28**							**17,354**

Notes:
(a) For counties where the actual employment number is not disclosed for confidentiality purposes, the analysis uses the midpoint employment number for each size cohort.
(b) Eliminated double counting for duplicated sectors.

Sources: U.S. Census County Business Patterns, 2014; BAE, 2016.

Compliance Costs

The Air District has identified a range of compliance measures for potential impacted projects. These include the following:

- Limiting Throughput or Operating Hours
- Diesel Particulate Filters
- Oxidation Catalysts
- Enclosures
- Baghouses
- Carbon Absorbers
- Thermal or Catalytic Oxidizers
- Other Risk Reduction Measures (including stack height extension and revised source location)

Following is a brief discussion of each of these compliance measures

Limiting Throughput or Operating Hours

This option is largely available for emergency diesel generators and gas stations; the primary ways to limit throughput involve reduced operating hours, or in the case of gas stations, reduced sales (through either reduced hours or higher prices). Thus, there is no direct cost associated with this option, but for gas stations, it could result in reduced profitability through constraints on operation.

Diesel Particulate Filters

The ADE Report assumed that diesel particulate filter costs were roughly proportional to engine size, with costs in 2009 ranging from $20,000 to $65,000 per engine. Adjusting for inflation and using current factors for annualized costs, this translates into $3,500 to $11,400 annually. BAAQMD provided data on costs for two more recent projects; one of these cost $60,300 with an annualized cost of $8,930, but the other was considerably more expensive, with a cost of $430,000 and an annualized cost of $63,681.[4]

Oxidation Catalysts

BAAQMD provided two cost estimates for this mitigation measure; for a project with a gas pre-treatment system in place, the annualized costs were $14,450; for a project without such a system in place, costs were estimated to be considerably higher, at $116,400 on an annual basis.

[4] For both of these projects, the proposed engines did not meet TBACT requirements. The applicant had purchased (prior to Air District review) older model engines that had diesel PM emission rates greater than the TBACT limit (0.15 grams/bhp-hour). Engines not meeting TBACT are limited to the TBACT threshold of one in a million cancer risk, while a project cancer risk of 10 in a million is allowed, if the engines in the project meet TBACT. As a result, diesel particulate filter costs were high for these projects because the site had to retrofit older model engines to meet TBACT. Newer engines meet TBACT and some already include diesel particulate filters. Applicants are more likely to choose a new engine that meets TBACT or that has an integral diesel particulate filter than to retrofit an existing older model engine. However, should they choose to retrofit an older model engine, the costs could be in the ranges shown.

Enclosures and Baghouses

Air District staff provided estimated annualized baghouse costs of $7,000 per unit, based on an analysis of data from similar installations.

Carbon Absorbers

Air District staff provided estimated annualized baghouse costs of $40,000 per unit, based on an analysis of data from similar installations.

Thermal or Catalytic Oxidizers

No data was provided by the Air District on costs for thermal or catalytic oxidizers. For project types where this is shown as a potential modification or control, alternatives with costs available were assumed.

Other Risk Reduction Measures

One potential compliance measure for several types of projects is increased stack height or revising the source location. BAAQMD provided data on one soil vapor extraction project where the cost of an increased stack was reported as $10,000, for a total annualized cost of $1,481. Since the costs for moving the source location may be variable or unknown, for projects which may have the option of increased stack height or revised source location, increased stack height is assumed in order to measure potential economic impacts.

For landfill modifications, the risk reduction measure presented is to set TAC concentration limits for landfill gas. When calculating fugitive TAC emissions from landfills, the District relies on site-specific landfill gas concentration analyses (if available) or EPA approved default concentration data from AP-42 Chapter 2.4 if data is not available. For one landfill project, TAC emission limits were set based on AP-42 data. A later proposed modification of this landfill (to increase the cumulative amount of waste disposal allowed) was evaluated, and the District found that the existing TAC limits resulted in unacceptable project risks (> 10 in a million cancer risk). The site agreed to use lower TAC limits that would keep them under 10 in a million cancer risk and that are verified by annual laboratory analysis of the landfill gas, which the site was already required to do anyway per Title V requirements. There were not any sort of control or new procedures involved in setting these permit condition limits, so no costs were available for this project. Future landfill modification projects would likely see the same kind of action. At most, the District would add an annual analysis of the landfill gas, if the site were not already doing this. Blue Sky Environmental provided a cost estimate of $770 per run for typical toxic compound analysis of landfill gas. BAAQMD would typically require three runs per test, for a maximum cost of $2,310 per year.

Impacts on Affected Industries

Estimated Rate of Return

The analysis here measures impacts based on changes in net income. In its report on returns of active corporations, the Internal Revenue Service (IRS) provides annual data on total sales and net income for public companies across the broad spectrum of the private sector. For this analysis, 10-

year averages were used such that the impacts of any particular year's performance due to economic fluctuations are lessened. The rates of return for each industry under analysis are presented in the Tables below.

Diesel Fired Emergency Generator Engines

The Air District estimates that in a given year, on average 45 projects of this type will require modifications and potential controls to meet the revised standards. As noted previously, a broad array of locations have emergency generators, ranging from office buildings to hospitals to retail centers. The mix of establishments here is based on the ADE Report, assuming the same mix of location types as found in their analysis in 2009. The impacted industries include the following:

- Office
- Industrial
- Refinery
- Institutional: education
- Institutional: cultural
- Institutional: Hospital
- Institutional: residential
- Institutional: Hotel/Motel
- Cell phone tower
- Retail Center

Table 5 below shows potential impacts on profits estimated based on the assumption that users would be required to install diesel particular filters, which is likely the highest cost solution. The costs have been scaled assuming that larger firms would require larger backup generators, based on the range of costs as discussed above. It should be noted that for the estimated 45 projects affected annually, 37 of them would be able to limit operating time, four would need to increase stack height, and only four would require particulate filters, so this table represents a "worst-case" scenario. For all the sectors except the hotel/motel sector, on average the decline in profits would be less than significant (<10%). For the accommodation sector, a more detailed look (see Appendix A) indicates that the average estimated decline in profits is less than 10 percent for establishments with 100 or more employees; these larger hotels may be the types that would be most likely to install or require a backup power source.

Table 5: Cost Impacts of Installing Diesel Particulate Filters for Emergency Generator Users

User Type	Number of Establish-ments	Average Annual Sales per Establishment	Average Profit Margin 2003-2012	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
Office	2,247	$3,513,366	20.56%	$722,219	$7,599	1.05%
Industrial	7,744	$11,156,742	6.81%	$759,223	$20,263	2.67%
Refinery	12	$881,377,600	6.70%	$59,050,710	$35,533	0.06%
Institutional: education	706	$3,429,812	11.51%	$394,725	$32,256	8.17%
Institutional: cultural	169	$3,183,958	12.92%	$411,419	$19,243	4.68%
Institutional: Hospital	106	$33,130,692	4.22%	$1,398,693	$58,591	4.19%
Institutional: residential	2,247	$1,963,133	20.56%	$403,548	$7,599	1.88%
Institutional: Hotel/Motel	1,115	$3,859,500	4.44%	$171,458	$28,746	16.77%
Cell phone tower	261	$17,656,083	5.79%	$1,022,075	$24,595	2.41%
Retail Center	1,101	$3,706,714	20.56%	$761,964	$7,621	1.00%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.

Diesel Engines: Fire Pump

Fire pumps provide additional pressure as required for building sprinkler systems; as such, they would most likely be found in larger commercial structures or large residential structures. The Air District indicates that the required control measure for these units would be diesel particulate filters, as analyzed above. Thus, the cost impacts would mirror those found above, which are below significant levels for all users except possibly hotels.

Diesel Engines: Portable/Prime

The mitigation measure for these engines is also through particulate filters. These could have a variety of use types. As indicated above by a broad range of uses, the filter costs are generally well below the level of significance for most users.

Gas Engines – Power Plant

The modification assumed for these engines is an oxidation catalyst, with the results of the analysis for this and several other project types found below in Table 6. Based on information provided by the Air District on costs, the industry shows profit losses greater than the 10 percent threshold, but as noted below in Appendix B, this is due to the business data including a substantial number of establishments with only one to four employees; these are not likely to be the businesses undertaking this type of project. Furthermore, oxidation catalysts are not the only possible control option for these projects. One facility reduced the project size from three engines to two engines to meet current Regulation 2-5 requirements and another changed the proposed stack location, rather than putting on oxidation catalysts.

Gas Stations

In the course of developing these Rule revisions, the Air District has determined that it is difficult to predict how many stations will be impacted by such throughput limits and how these limits may impact an individual station or the whole Bay Area gasoline market. In addition, CARB and CAPCOA are planning to develop Industrywide Guidelines for sources such as gasoline dispensing facilities that support essential goods or public services, and CARB is working on updates to gasoline

dispensing facility emission factors. Air District staff will need additional time to consider these new guidelines and emission factors and to evaluate the potential impacts to gas stations.

Given these uncertainties, the Air District has decided to continue using its current health risk calculation procedures for gas stations, rather than using the 2015 updated procedures, until CARB and CAPCOA provide the updated Industrywide Guidelines for gas stations. These health risk calculation procedures for gas stations will be described in the Air District's proposed HRA Guidelines. Overall, these HRA guidelines will ensure that gas station health risks are calculated in a manner that is at least as stringent as the current Regulation 2, Rule 5 procedures.

For new or modified Gas Stations, the Air District will use the updated health effects values for toxic air contaminants. For modified gas stations, the Air District will use its proposed revised emission calculation procedure, basing the HRA on the total proposed emissions from the modified gas station rather than the post-1987 increases in emissions at the gas station. Thus, health risk calculations for modified gas stations may include a somewhat larger gasoline throughput rate than current procedures. The worst-case outcome would be that a gas station requesting a throughput increase might not be allowed to have an increase, if the current health risk exceeds 10 in a million. This rule would not require any gas station to reduce an existing throughput limit.

The possible project controls are not changing, but the new health effects values may result in one more gas station per year being subject to a lower throughput limit than they originally requested (probably for a modified station request rather than for a new station request), worst case would be denial of a throughput increase request for a modified station. As a result, there are no socioeconomic impacts related to existing facilities to assess at this time.

Other Combustion Sources

In the last five years, there were three "other combustion" sources in the Bay Area subject to review under this Rule. Two were portable thermal oxidizers used to abate tank degassing operations (often located at petroleum refineries or large chemical plants), but owned by an independent contractor. The other project was a pathological waste incinerator at a VA medical center. Per the independent contractor, the impacts have been assessed relative to waste remediation services. In order to assess impacts, it is assumed here that there will be one project per year. These sources are assumed to be associated with waste treatment facilities and analysis here assumes the use of increased stack height to establish potential costs. The costs of for this measure do not significantly impact profits in this industry overall, with an overall decrease of only 0.15 percent of profits.

Crematories

The two options presented for crematories that might need to make project modifications or add controls are limiting throughput/operating time or increasing stack height. Overall, the compliance costs for crematories are well below significance thresholds, at only 1.13 percent of profits.

Remediation – Soil Vapor Extraction

The companies conducting SVE projects (average of three per year over last five years) included a mix of business types, including petroleum producing companies and environmental remediation firms. For this type of project, the possible modifications and controls include limiting throughput rate or operating time, carbon absorbers, thermal or catalytic oxidizers, and increasing stack height/revising source location. The analysis here assumes the use of carbon absorbers, for which data were available as provided by the Air District and which entail a higher cost than stack height increases, in order to be conservative in the analysis. On average, the impact on profits is estimated at 9.42 percent, slightly below the significance threshold.

Cement, Concrete, and Asphalt

Over the last five years there were two cement plant projects (both at Lehigh), one hot mix asphalt plant project, and eight concrete batch plant projects averaging two projects per year. Available modifications and controls include limiting throughput rate or operating time, enclosures and baghouses, and increasing stack height/revising source location. The analysis here assumes the use of baghouses. The resulting analysis shows profit impacts below the level of significance, at only 1.67 percent.

Coating and Solvent

For this category there have been three projects in five years; it is assumed here that there will be one project per year. This has been for processes across three disparate industries. For the purposes of the analysis here, the impact has been assessed per metal coating, engraving, and allied services to manufacturers, and relies on carbon absorbers. This may be a more expensive option than others provided (e.g., increased stack height), thus representing a more conservative scenario. Assuming this control mechanism, the impacts on profits are estimated at 16.91 percent, above the threshold of significance.

Landfill Modifications

The modification option provided for landfill modifications is to set TAC concentration limits for landfill gas (see Table 3 above). As discussed above, the only costs potentially associated with this are minimal tests associated with testing; assuming these costs, the impacts on profits are well below the level of significance, at only 0.27 percent.

Solid Material Handling

Over the past five years, the Air District has seen five similar projects, at various solid materials handling companies. Assuming the use of baghouses, the impact on profits is estimated at only 0.72 percent, well below the threshold of significance.

Table 6: Cost Impacts for Other Modifications and Potential Controls by Industry

User Type	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
Gas Engines	58	$14,405,791	$975,526	$116,400	11.93%
Other Combustion	22	$11,946,841	$975,377	$1,481	0.15%
Crematories	61	$2,516,392	$131,038	$1,481	1.13%
Remediation - SVE	95	$5,200,597	$424,593	$40,000	9.42%
Cement, Concrete, & Asphalt	102	$7,849,201	$418,202	$7,000	1.67%
Coating and Solvent	55	$2,931,662	$236,523	$40,000	16.91%
Landfill modifications	23	$10,367,780	$846,458	$2,310	0.27%
Solid Material Handling	21	$11,826,756	$965,573	$7,000	0.72%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.

Affected Industries and Regional Impacts

On average, the proposed Rule revision would not result in significant economic impacts in most of the affected industries. The three potentially affected user types are hotels and motels, gas engines at power plants, and projects providing coating and solvents. The associated industries are as follows:

- Hotels (except Casino Hotels) and Motels
- Electric Power Generation
- Metal Coating, Engraving, and Allied Services to Manufacturers

While perhaps overstating the impacts, the following analysis assumes that because of the impact on return, these businesses would close rather than implement modifications or controls. Furthermore, the analysis is based on the most expensive possible control cost, and less expensive control options are available for each of these industries. Based on this and assuming an average size business for each sector, annual lost sales would total approximately $34.7 million with a loss of 156 jobs. This analysis also assumes these businesses would not be replaced by others.

Table 7: Annual Direct Losses Due to Rule Revisions

NAICS	Name of Industry	Project Type	Permits per Year (a)	Average Sales per Establishment	Total Annual Lost Sales	Employment Loss (b)
721110	Hotels (except Casino Hotels) & Motels	Emergency Diesel Engines	4.5	$3,859,500	$17,367,748	139.5
22111	Electric Power Generation	Gas Engines	1	$14,405,791	$14,405,791	4.6
332812	Metal Coating, Engraving, & Allied Services to Manufacturers	Coating and Solvent	1	$2,931,662	$2,931,662	12.0
Total			**6.5**		**$34,705,201**	**156.1**

(a) BAAQMD estimates a total of 45 projects annually involving emergency diesel generators spread across 10 industries (per previous ADE analysis).
(b) Direct employment loss as estimated by IMPLAN model based on revenues.

Sources: BAAQMD; ADE, 2009; 2012 Economic Census; 2014 County Business Patterns; IMPLAN; BAE, 2016.

These impacts could potentially lead to indirect job or other economic losses at other businesses. An analysis of potential indirect impacts follows.

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 induced impacts due to decreases in household spending. Because the proposed amendments could result in significant direct impacts in the three sectors listed above, the analysis uses the IMPLAN input-output model to estimate the indirect or induced impacts.

IMPLAN Input-Output Model

Regional and national input-output models have been used for years by economists as a tool to understand the extremely complex interactions among the various parts of an economy. The economic model used in this analysis, IMPLAN ("IMpact analysis for PLANning"), is a PC-based computer software package that automates the process of developing input-output models for regions within the United States. At the heart of the model is an input-output dollar flow table. For the specified region, the input-output table accounts for all of the dollar flows between the different sectors within the economy. Using this information, the IMPLAN software models the way income injected into one sector is then spent, and re-spent in other sectors of the economy, generating waves of economic activity, or so-called "economic multiplier" effects.

Regions studied using the IMPLAN model can be defined at various geographic levels to fit the particular analysis. The developers of the IMPLAN model maintain large databases of economic and trade data that are collected and published by the federal government, which they compile and format for use in the computer model. The data regarding input-output relationships between sectors used in the model for this analysis are from 2014 (latest currently available), and have been adjusted to provide results expressed in 2016 dollar figures. The data that IMPLAN uses are customized to reflect the specific, detailed economic characteristics of each individual county that is included within the specified regional study area. The IMPLAN model in turn is able to summarize the economic effects of a given economic "event" that is input into the model, expressing the impacts in terms of direct, indirect, and induced jobs and output by industry sector.

- Direct Impacts. Direct impacts refer to the dollar value of economic activity available to circulate through the economy.

- Indirect Impacts. The indirect impacts refer to the inter-industry impacts of the input-output analysis, which would include any payments that the directly impacted industries make to other businesses in the region for goods and services.

- Induced Impacts. The induced impacts refer to the impacts of household expenditures in the model. When households earn income, they spend part of that income on goods and services. The model treats households as an "industry" in determining their local expenditure patterns in the model, based on the availability of goods and services within the geography.

The IMPLAN model is well respected as the industry standard for projecting economic impacts resulting from future "events." In this study, the projected loss of sales in the three impacted industries makes up the "events" in the IMPLAN model.

Economic Impacts of Loss of Sales in Impacted Industries

Table 8 shows the direct, indirect, and induced regional impacts from annual economic output due to the decline in operating revenues flowing through the Air District economy. The total reduction in annual economic output is estimated at approximately $57.6 million annually, with a related annual loss of 284 jobs. It should be noted that this is based on assumptions derived from a variety of sources regarding average firm size, revenues, net income, and modification/control costs. For a particular business establishment, these factors may vary considerably from the assumptions here. In particular, to the extent that mitigation costs are fixed, larger firms would be better able to absorb these costs.

As context, the IMPLAN model estimates the gross regional product for the nine-county Bay Area at approximately $675 billion; the possible reduction in output is equivalent to 0.09 percent of this total for the region.

Table 8: Regional Economic Impacts

Economic Impact	Direct (a)	Indirect (b)	Induced (c)	Total
Output	-$34,705,201	-$9,370,520	-$13,554,608	-$57,630,329
Employment	-156.1	-48.5	-78.9	-283.5

(a) Based on the iniital loss of sales and employment, direct impacts measure the reduction of dollars available to then flow through the local economy.
(b) Indirect Impacts refer to business-to-business impacts.
(c) Induced impacts occur when workers spend their household incomes throughout the local economy.

Sources: IMPLAN; BAE, 2016, based on information provide in other tables.

Impacts on Small Businesses

According to California Government Code 14835, a small business is any business that meets the following requirements:

- Must be independently owned and operated;
- Cannot be dominant in its field of operation;
- Must have its principal office located in California;
- Must have its owners (or officers in the case of a corporation) domiciled in California; and
- Together with its affiliates, be either:
    - A business with 100 or fewer employees, and average annual gross receipts of $10 million or less over the previous three tax years, or
    - A manufacturer with 100 or fewer employees.

While the available data by industry and establishment does not specify principal office location or owner address, or affiliate status, County Business Patterns does provide data by employment class size, making it possible to estimate the number of potentially affected business establishments with less than 100 employees.

Based on the detailed analysis as shown in Appendix A and Appendix B, small businesses in the following industries may be significantly impacted as measured by a 10 percent or greater impact on net income:

- NAICS 6111, Educational Services
- NAICS 712, Museums, Historical Sites, and Similar Institutions
- NAICS 622, Hospitals
- NAICS 721110, Hotels (except Casino Hotels) and Motels
- NAICS 562910, Remediation Services
- NAICS 3273, Cement and Concrete Product Manufacturing
- NAICS 332812, Metal Coating, Engraving, and Allied Services to Manufacturers
- NAICS 562920, Materials Recovery Facilities

Following is a brief discussion covering these industries.

Educational Services and Museums, Historical Sites, and Similar Institutions

These institutional users are listed due to their potential use of diesel backup generators. The use of backup generators is likely associated with larger institutions with a total number of employees greater than the 100+ employment threshold, and that some of these users are government entities that are not subject to an evaluation of profits or net income.

Hospitals

Once again, the larger institutions not impacted as greatly in this category are likely the full-service hospitals that require diesel backup generators. The smaller institutions may be businesses specializing in psychiatric and substance abuse services or other types of care, and may not require the use of emergency generators. Additionally, some of these hospitals may be publicly or non-profit owned.

Hotels and Motels

Smaller hotel operators would see substantial impacts on net income in order to comply with the revised Rule based on worst-case control costs (less expensive control options are available). However, these hotels may be less likely to use backup generators, due to the overall costs relative to their operating margins.

Remediation Services

This category includes the firms associated with SVE projects. Based on historic risk screens, these include larger firms such as full-service petroleum product firms and environmental firms. While some of these environmental firms have less than 100 employees, these are contractors completing cleanup projects for other firms that would be absorbing increased costs.

Cement and Concrete Product Manufacturing

The analysis shows that only extremely small businesses in this sector (with one to four employees) would be significantly impacted. The historic data indicate that the actual businesses that fall under the Rule are larger, e.g., the Lehigh Hanson Cement Plant outside Cupertino.

Metal Coating, Engraving, and Allied Services to Manufacturers

This industry was selected to represent projects using coatings and solvents; however, BAAQMD reports that the only three businesses affected by the Rule over the last five years include a company providing microwave transmission, reception, and related products, a uniform rental company with facilities across the US and Canada, and a satellite manufacturer that is a subsidiary of a larger corporation. Based on corporate financial filings and website descriptions, these companies all have well over 100 employees, and thus are not small businesses as considered here.

Materials Recovery Facilities

The analysis shows that only extremely small businesses in this sector (with one to four employees) would be significantly impacted. Air District staff reports five projects in the last five years that would have been potentially affected by the new guidelines; the firms involved all have more than four workers.

APPENDICES

Appendix A: Detailed Cost Impacts of Diesel Particulate Filters for Emergency Generator Users

Offices

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	1,658	$1,650,126	$339,205	$3,000	0.88%
5-9	406	$4,620,353	$949,775	$15,200	1.60%
10-19	131	$9,570,731	$1,967,391	$27,400	1.39%
20-49	35	$22,771,740	$4,681,033	$39,600	0.85%
50-99	11	$49,173,757	$10,108,318	$51,800	0.51%
100+	6	$115,178,800	$23,676,530	$64,000	0.27%
Total/Average	**2,247**	**$3,513,366**	**$722,219**	**$7,599**	**1.05%**

Based on 2012 Economic Census data for NAICS 531120, Lessors of Nonresidential Buildings (except Miniwarehouses)

Average revenues per employee	$660,050
Average Profit Margin 2003-2012	20.56%

Industrial

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	3,130	$1,187,857	$80,834	$3,000	3.71%
5-9	1,503	$3,325,999	$226,336	$15,200	6.72%
10-19	1,214	$6,889,569	$468,839	$27,400	5.84%
20-49	1,011	$16,392,423	$1,115,514	$39,600	3.55%
50-99	436	$35,398,131	$2,408,864	$51,800	2.15%
100+	450	$82,912,402	$5,642,238	$64,000	1.13%
Total/Average	**7,744**	**$11,156,742**	**$759,223**	**$20,263**	**2.67%**

Based on 2012 Economic Census data for NAICS 31-33, Manufacturing Sector

Average revenues per employee	$475,143
Average Profit Margin 2003-2012	6.81%

Refineries

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	4	$27,022,308	$1,810,446	$3,000	0.17%
5-9	1	$75,662,461	$5,069,248	$15,200	0.30%
10-19	1	$156,729,384	$10,500,586	$27,400	0.26%
20-49	-	$372,907,845	$24,984,153	$39,600	0.16%
50-99	1	$805,264,767	$53,951,287	$51,800	0.10%
100+	5	$1,886,157,071	$126,369,122	$64,000	0.05%
Total/Average	**12**	**$881,377,600**	**$59,050,710**	**$35,533**	**0.06%**

Based on 2012 Economic Census data for NAICS 324110, Petroleum Refineries

Average revenues per employee	$10,808,923
Average Profit Margin 2003-2012	6.70%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.

Appendix A, continued: Detailed Cost Impacts of Diesel Particulate Filters for Emergency Generator Users

Education

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	139	$199,714	$22,984	$3,000	13.05%
5-9	85	$559,198	$64,356	$15,200	23.62%
10-19	97	$1,158,339	$133,309	$27,400	20.55%
20-49	198	$2,756,047	$317,184	$39,600	12.48%
50-99	115	$5,951,464	$684,933	$51,800	7.56%
100+	72	$13,940,006	$1,604,307	$64,000	3.99%
Total/Average	**706**	**$3,429,812**	**$394,725**	**$32,256**	**8.17%**

Based on 2012 Economic Census data for NAICS 6111, Educational Services
Average revenues per employee $79,885
Average Profit Margin 2003-2012 11.51%

Cultural

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	77	$312,915	$40,434	$3,000	7.42%
5-9	33	$876,162	$113,214	$15,200	13.43%
10-19	23	$1,814,908	$234,516	$27,400	11.68%
20-49	11	$4,318,229	$557,986	$39,600	7.10%
50-99	12	$9,324,871	$1,204,925	$51,800	4.30%
100+	13	$21,841,476	$2,822,275	$64,000	2.27%
Total/Average	**169**	**$3,183,958**	**$411,419**	**$19,243**	**4.68%**

Based on 2012 Economic Census data for NAICS 712, Museums, Historical Sites, and Similar Institutions
Average revenues per employee $125,166
Average Profit Margin 2003-2012 12.92%

Hospitals

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	7	$528,718	$22,321	$3,000	13.44%
5-9	1	$1,480,412	$62,499	$15,200	24.32%
10-19	2	$3,066,567	$129,463	$27,400	21.16%
20-49	-	$7,296,314	$308,032	$39,600	12.86%
50-99	2	$15,755,808	$665,170	$51,800	7.79%
100+	94	$36,904,545	$1,558,015	$64,000	4.11%
Total/Average	**106**	**$33,130,692**	**$1,398,693**	**$58,591**	**4.19%**

Based on 2012 Economic Census data for NAICS 622, Hospitals
Average revenues per employee $211,487
Average Profit Margin 2003-2012 4.22%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.

Appendix A, continued: Detailed Cost Impacts of Diesel Particulate Filters for Emergency Generator Users

Residential

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	1,658	$922,027	$189,535	$3,000	1.58%
5-9	406	$2,581,675	$530,698	$15,200	2.86%
10-19	131	$5,347,756	$1,099,302	$27,400	2.49%
20-49	35	$12,723,970	$2,615,581	$39,600	1.51%
50-99	11	$27,476,400	$5,648,139	$51,800	0.92%
100+	6	$64,357,474	$13,229,532	$64,000	0.48%
Total/Average	**2,247**	**$1,963,133**	**$403,548**	**$7,599**	**1.88%**

Based on 2012 Economic Census data for NAICS 531120, Lessors of Nonresidential Buildings (except Miniwarehouses)
Average revenues per employee $368,811
Average Profit Margin 2003-2012 20.56%

Hotels/Motels

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	252	$265,960	$11,815	$3,000	25.39%
5-9	143	$744,688	$33,083	$15,200	45.95%
10-19	257	$1,542,569	$68,528	$27,400	39.98%
20-49	270	$3,670,250	$163,050	$39,600	24.29%
50-99	79	$7,925,613	$352,094	$51,800	14.71%
100+	114	$18,564,020	$824,704	$64,000	7.76%
Total/Average	**1,115**	**$3,859,500**	**$171,458**	**$28,746**	**16.77%**

Based on 2012 Economic Census data for NAICS 721110, Hotels (except Casino Hotels) and Motels
Average revenues per employee $106,384
Average Profit Margin 2003-2012 4.44%

Cell Phone Towers

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	59	$2,074,288	$120,076	$3,000	2.50%
5-9	43	$5,808,006	$336,214	$15,200	4.52%
10-19	79	$12,030,869	$696,443	$27,400	3.93%
20-49	65	$28,625,171	$1,657,053	$39,600	2.39%
50-99	9	$61,813,775	$3,578,274	$51,800	1.45%
100+	6	$144,785,286	$8,381,326	$64,000	0.76%
Total/Average	**261**	**$17,656,083**	**$1,022,075**	**$24,595**	**2.41%**

Based on 2012 Economic Census data for NAICS 517210, Wireless Telecommunications Carriers
Average revenues per employee $829,715
Average Profit Margin 2003-2012 5.79%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.

Appendix A, continued: Detailed Cost Impacts of Diesel Particulate Filters for Emergency Generator Users

Retail Centers

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	837	$1,650,126	$339,205	$3,000	0.88%
5-9	165	$4,620,353	$949,775	$15,200	1.60%
10-19	60	$9,570,731	$1,967,391	$27,400	1.39%
20-49	26	$22,771,740	$4,681,033	$39,600	0.85%
50-99	11	$49,173,757	$10,108,318	$51,800	0.51%
100+	2	$115,178,800	$23,676,530	$64,000	0.27%
Total/Average	**1,101**	**$3,706,714**	**$761,964**	**$7,621**	**1.00%**

Based on 2012 Economic Census data for NAICS 531120, Lessors of Nonresidential Buildings (except Miniwarehouses)

Average revenues per employee	$660,050
Average Profit Margin 2003-2012	20.56%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.

Appendix B: Detailed Cost Impacts for Other Modifications and Potential Controls by Industry

Gas Engines - Power Plant

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	21	$2,206,909	$149,447	$116,400	77.89%
5-9	11	$6,179,346	$418,451	$116,400	27.82%
10-19	10	$12,800,075	$866,791	$116,400	13.43%
20-49	13	$30,455,350	$2,062,364	$116,400	5.64%
50-99	3	$65,765,901	$4,453,510	$116,400	2.61%
100+	-	$154,042,278	$10,431,376	$116,400	1.12%
Total/Average	**58**	**$14,405,791**	**$975,526**	**$116,400**	**11.93%**

Based on 2012 Economic Census data for NAICS 22211, Electric Power Generation

Average revenues per employee	$882,764
Average Profit Margin 2003-2012	6.77%

Other Combustion

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	9	$1,145,730	$93,541	$1,481	1.58%
5-9	5	$3,208,045	$261,915	$1,481	0.57%
10-19	1	$6,645,235	$542,538	$1,481	0.27%
20-49	3	$15,811,077	$1,290,865	$1,481	0.11%
50-99	3	$34,142,760	$2,787,521	$1,481	0.05%
100+	1	$79,971,967	$6,529,160	$1,481	0.02%
Total/Average	**22**	**$11,946,841**	**$975,377**	**$1,481**	**0.15%**

Based on 2012 Economic Census data for NAICS 562211, Hazardous Waste Treatment and Disposal, and 562213, Solid Waste Combustors and Incinerators

Average revenues per employee	$458,292
Average Profit Margin 2003-2012	8.16%

Crematories

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	17	$422,632	$22,008	$1,481	6.73%
5-9	15	$1,183,369	$61,623	$1,481	2.40%
10-19	16	$2,451,265	$127,647	$1,481	1.16%
20-49	11	$5,832,321	$303,712	$1,481	0.49%
50-99	2	$12,594,432	$655,841	$1,481	0.23%
100+	-	$29,499,710	$1,536,165	$1,481	0.10%
Total/Average	**61**	**$2,516,392**	**$131,038**	**$1,481**	**1.13%**

Based on 2012 Economic Census data for NAICS 812220, Crematories

Average revenues per employee	$169,053
Average Profit Margin 2003-2012	5.21%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.

Appendix B, continued: Detailed Cost Impacts for Other Modifications and Potential Controls by Industry

Remediation - SVE

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	20	$422,632	$34,505	$40,000	115.93%
5-9	18	$1,183,369	$96,614	$40,000	41.40%
10-19	18	$2,451,265	$200,129	$40,000	19.99%
20-49	23	$5,832,321	$476,169	$40,000	8.40%
50-99	11	$12,594,432	$1,028,249	$40,000	3.89%
100+	5	$29,499,710	$2,408,448	$40,000	1.66%
Total/Average	**95**	**$5,200,597**	**$424,593**	**$40,000**	**9.42%**

Based on 2012 Economic Census data for NAICS 562910, Remediation Services

Average revenues per employee	$169,053
Average Profit Margin 2003-2012	8.16%

Cement, Concrete, and Asphalt

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	20	$728,100	$38,793	$7,000	18.04%
5-9	20	$2,038,679	$108,620	$7,000	6.44%
10-19	25	$4,222,979	$224,999	$7,000	3.11%
20-49	24	$10,047,777	$535,342	$7,000	1.31%
50-99	9	$21,697,373	$1,156,028	$7,000	0.61%
100+	4	$50,821,364	$2,707,743	$7,000	0.26%
Total/Average	**102**	**$7,849,201**	**$418,202**	**$7,000**	**1.67%**

Based on 2012 Economic Census data for NAICS 3273, Cement and Concrete Product Manufacturing

Average revenues per employee	$291,240
Average Profit Margin 2003-2012	5.33%

Coating and Solvent

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	16	$460,427	$37,147	$40,000	107.68%
5-9	12	$1,289,194	$104,011	$40,000	38.46%
10-19	15	$2,670,474	$215,451	$40,000	18.57%
20-49	9	$6,353,887	$512,625	$40,000	7.80%
50-99	3	$13,720,713	$1,106,972	$40,000	3.61%
100+	-	$32,137,777	$2,592,840	$40,000	1.54%
Total/Average	**55**	**$2,931,662**	**$236,523**	**$40,000**	**16.91%**

Based on 2012 Economic Census data for NAICS 332812, Metal Coating, Engraving, and Allied Services to Manufacturers

Average revenues per employee	$184,171
Average Profit Margin 2003-2012	8.07%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.

Appendix B, continued: Detailed Cost Impacts for Other Modifications and Potential Controls by Industry

Landfill Modifications

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	6	$1,132,284	$92,443	$2,310	2.50%
5-9	2	$3,170,394	$258,841	$2,310	0.89%
10-19	5	$6,567,245	$536,170	$2,310	0.43%
20-49	8	$15,625,514	$1,275,716	$2,310	0.18%
50-99	2	$33,742,053	$2,754,806	$2,310	0.08%
100+	-	$79,033,399	$6,452,532	$2,310	0.04%
Total/Average	**23**	**$10,367,780**	**$846,458**	**$2,310**	**0.27%**

Based on 2012 Economic Census data for NAICS 562212, Solid Waste Landfill

Average revenues per employee	$452,913
Average Profit Margin 2003-2012	8.16%

Solid Material Handling

Number of Employees	Number of Establishments	Average Annual Sales per Establishment	Average Annual Profit per Establishment	Compliance Costs per Establishment	Compliance Costs as % of Profits
1-4	8	$824,027	$67,276	$7,000	10.40%
5-9	2	$2,307,277	$188,373	$7,000	3.72%
10-19	3	$4,779,359	$390,202	$7,000	1.79%
20-49	3	$11,371,579	$928,411	$7,000	0.75%
50-99	3	$24,556,018	$2,004,830	$7,000	0.35%
100+	2	$57,517,116	$4,695,876	$7,000	0.15%
Total/Average	**21**	**$11,826,756**	**$965,573**	**$7,000**	**0.72%**

Based on 2012 Economic Census data for NAICS 562920, Materials Recovery Facilities

Average revenues per employee	$329,611
Average Profit Margin 2003-2012	8.16%

Sources: Economic Census, 2012; County Business Patterns 2014; Internal Revenue Service, 2003-2012; BAAQMD, 2016; BAE, 2016.