Proposed Amendments to BAAQMD Regulation 9, Rule 7

APPENDIX B

Socioeconomic Analysis

SOCIOECONOMIC ANALYSIS PROPOSED RULE

PROPOSED AMENDMENTS TO REGULATION 9, RULE 7: NITROGEN OXIDES AND CARBON MONOXIDE FROM INDUSTRIAL, INSTITUTIONAL, AND COMMERCIAL BOILERS, STEAM GENERATORS, AND PROCESS HEATERS

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Prepared for

Bay Area Air Quality Management District

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1. DESCRIPTION OF THE PROPOSED RULE

In proposing amendments to Regulation 9, Rule 7, the Bay Area Air Quality Management District ("District") seeks to reduce emissions of nitrogen oxides (NOx) by lowering the current NOx emission limits, as well as by extending applicability of the regulation to particular boilers, steam generators and process heaters operating in various industrial, commercial and institutional settings. As it is, the existing regulation is a non-industry specific rule that applies to almost any combustion device that is not subject to a more specific combustion rule, including new and existing:

- Small boilers used to provide hot water or steam to office buildings, commercial establishments, schools, hospitals, hotels and industrial facilities;
- Larger boilers used to provide hot water or steam for industrial uses; and
- Process heaters used to heat material streams at industrial facilities.

Regulation 9, Rule 7 currently does not apply to space heating, except where hot water or steam is used for heating; to devices that burn only natural gas or liquefied petroleum gas (LPG) fuel and that have an input heat rating less than 10 million BTU/hr (10 MM BTU/hr); to devices that burn non-gaseous fuel and that have an input heat rating less than 1 MM BTU/hr; or to devices classified as ovens, kilns, furnaces or dryers. Similarly, no Air District Permit to Operate is required for natural gas or LPG-fueled devices rated less than 10 MM BTU/hr. The proposed amendments will:

- Expand the rule applicability for natural gas/LPG devices from an input heat rating of 10 MM BTU/hr or more to a rating of greater than 2 MM BTU/hr and establish NOx and CO emission limits for this size category;
- Reduce the NOx emission limit for devices already subject to this rule – gas-fired devices

with an input heat rating of 10 MM BTU/hr or more;

- Establish a manufacturer certification requirement for new devices with a heat rating greater than 2 and less than 10 MM BTU/hr and operator registration requirements for new and existing devices in this size range; and
- Establish insulation requirements, stack gas temperature limits and tune-up requirements to ensure reasonable energy efficiency which will reduce fuel used, the resultant NOx emissions and greenhouse gas emissions.

In conjunction with the proposed amendments to Regulation 9, Rule 7, the District also proposes to amend *Regulation 3: Fees, Schedule R: Equipment Registration Fees*. A fee of $425 is proposed for devices required to be registered under Regulation 9, Rule 7. This fee will cover the Air District's costs of inspecting boilers and reviewing certifications.

2. IMPACT OF PROPOSED RULE AMENDMENTS

This section of the socioeconomic analysis describes demographic and economic trends in the San Francisco Bay Area (Bay Area) region. Following an overview of the methodology for the socioeconomic analysis, the first part of this section compares the Bay Area against California and provides a context for understanding demographic and economic changes that have occurred within the Bay Area between 1996 and 2006. After an overview of Bay Area industries, we focus on industries impacted by the proposed Regulation 9, Rule 7.

For the purposes of this report, the Bay Area region is defined as Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.

METHODOLOGY

The socioeconomic analysis of the proposed amendments involves the use of information provided directly by BAAQMD, as well as secondary data used to describe the industries affected by the proposed rule amendments.

Based on information provided by BAAQMD staff, ADE determined that the impacts could affect a number of businesses in a wide range of industries in the private and public sectors, with a certain amount of these devices used especially by hospitals and larger manufacturers. Based on information sources including Pacific Gas and Electric (PG&E), the District believes that there are approximately 8,000 gas-fired heaters in the Bay Area rated less than 10 MM BTU/hr, and that about 1/3 of these, approximately 2,634 are rated greater than 2 and less than 10 MM BTU/hr, and therefore will become subject to the amended Regulation 9, Rule 7. These 2,634 heaters are estimated to be distributed in about 1,100 business establishments. In addition to these heaters rated less than 10 MM BTU/hr, the BAAQMD also estimates that there are 311 heaters rated 10 MM BTU/hr or more operating at 151 business establishments.

In addition to identifying industries affected by the proposed amendments, understanding the broader economic context within which District staff and leaders are contemplating certain proposed rules is important part of the socioeconomic analysis. To this end, ADE analyzed industry trends with respect to a number of indicators such as business formation, job creation, revenue and profit generation, among others. Because the District organized cost data by land use categories of "commercial", "industrial", and "institutional," ADE translated economic data from the California Employment Development Department (EDD) into land use categories consistent with those of the District. As a result, analyses with respect to number of establishments by industry, employment, revenues and net profits are tracked by the commercial, institutional and industrial land use categories, not by industry. As part of its analysis, ADE excluded the five petroleum refineries operating in the Bay Area, as these facilities are subject to a separate rule, Regulation 9, Rule 10.

With data from the US Economic Census and other sources such as US IRS, ADE was able to estimate revenues and profit ratios for many of the industries and land use categories impacted by the proposed rule amendments. In calculating aggregate revenues generated by Bay Area businesses in affected industries, ADE first estimated annual revenue based upon available data. Using annual reports, publicly available data and data from Dun and Bradstreet, ADE calculated ratios of profit per dollar of sales for the businesses on which the analysis focused. In addition, ADE compared annual costs associated with proposed amendments to Regulation 9, Rule 7 to net profits generated by the average or typical establishment within a given land use category, adjusting for size of business in terms of number of workers.

In many of its previous socioeconomic analyses, ADE typically compared aggregate annual costs against aggregate annual industry revenues and estimated net profits, especially in analyses involving new rules or proposed amendments that affected all businesses in specific industries. While District staff knows for the most part what industries are affected by the existing rule and proposed amendments - namely large

manufacturers, regional medical centers, and certain commercial buildings - any number of businesses in a variety of industries are also potentially affected by this rule, in so far as these entities operate in facilities utilizing devices controlled by Regulation 9, Rule 7 as amended. For example, a large commercial building with an industrial boiler could contain any number of businesses in a variety of different industries. The analysis controls for multi-tenant settings, such as such as a shopping center, a large office complex, or industrial projects where many tenants operate within a common building.

The result of the socioeconomic analysis shows what proportion of profit the compliance costs represent. Based on a given threshold of significance, ADE discusses in the report whether the affected sites are likely to reduce jobs as a means of recouping the cost of compliance or as a result of reducing business operations. ADE also examines whether affected industries can pass costs to consumers. To the extent that such job losses appear likely, the indirect multiplier effects of the job losses area estimated using a regional IMPLAN input-output model.

REGIONAL DEMOGRAPHIC TRENDS

The Bay Area experienced moderate population growth from 1996 to 2006. Between 1996 and 2001, the nine-county region increased by 1.3 percent annually, from 6.5 million in 1996 to almost 6.8 million in 2001. From 1996 to 2006, the population increase was from 6.5 million to close to 7.1 million for an increase of approximately one percent annually. Over the same period, California grew at a faster rate of 1.4 percent per year.

Within the Bay Area, the greatest percentage increase occurred in Contra Costa County. From 1996 to 2006 Contra Costa increased its population by nearly 1.7 percent annually. All other Bay Area counties had population increases slower than Contra Costa County and the State. The smallest percentage increase occurred in Marin County where population grew annually by 0.5 percent from 1996 to 2006.

TABLE 1
Population Growth: San Francisco Bay Area

	Population			Annual Percent Change		
	1996	2001	2006	96-01	01-06	96-06
California	32,222,873	34,441,561	37,195,240	1.3%	1.6%	1.4%
Bay Area	6,454,434	6,872,313	7,135,505	1.3%	0.8%	1.0%
Alameda County	1,356,339	1,465,753	1,509,981	1.6%	0.6%	1.1%
Contra Costa County	872,631	966,845	1,030,732	2.1%	1.3%	1.7%
Marin County	239,251	248,994	253,818	0.8%	0.4%	0.6%
Napa County	118,381	126,093	134,326	1.3%	1.3%	1.3%
San Francisco County	759,833	784,031	800,099	0.6%	0.4%	0.5%
San Mateo County	693,815	712,527	726,336	0.5%	0.4%	0.5%
Santa Clara County	1,620,744	1,701,665	1,780,449	1.0%	0.9%	0.9%
Solano County	371,453	401,662	421,542	1.6%	1.0%	1.3%
Sonoma County	421,987	464,743	478,222	1.9%	0.6%	1.3%

Source: Applied Development Economics, based on household population estimates from The California Department of Finance

REGIONAL ECONOMIC TRENDS

The Bay Area is one of the world's greatest regional economies. It benefits from pre-eminent knowledge-based industries, with competitive strength flowing from an unmatched culture of entrepreneurship, world-leading research institutions, and some of the nation's best educated and most highly skilled workforce. However, in the five year period between 2001 and 2006, the Bay Area economy has not grown significantly with respect to employment, which contrasts with robust employment growth in the Bay Area between 1996 and 2001.

As Table 2 shows, as of 2006, the professional and business services sector was the largest employer in the region, at 554,576 jobs or 17 percent of all private and public sector jobs. This is a slight change from 1996 when professional and business services accounted for 16 percent of all Bay Area employment. While professional and business services increased annually by a rapid rate of four percent between 1996 and 2001, between 2001 and 2006 employment actually declined in this sector by an annual clip of two percent. The broad category of Trade, Transportation and Utilities also boasts large workforce at 17 percent of total public and private employment; but a large part of this category consists of workers in Retail, a sub-sector within Trade,

Transportation and Utilities. Another large industry in the Bay Area is public service, or government, with 442,000 jobs, or almost 14 percent of the total. Within the public sector, employment has risen fastest since 2001 in state government, whereas local government employment barely grew at a 0.2 percent annual pace between 2001 and 2006, and employment in federal agencies declined over the five year period. Employment in manufacturing accounted for slightly over 10 percent of total employment, but this sector declined significantly between 2001 and 2006, dropping annually by over five percent. Overall, since 2001, total public and private employment dropped slightly by over one percent a year, going from 3,484,800 workers in 2001 to 3,275,600 workers in 2006.

TABLE 2
Employment Profile of the San Francisco Bay Area, 1996-2006

Industry	1996	2001	2006	% of Total Employment in 2006	Annual Percent Change 1996 - 2001	Annual Percent Change 2001 - 2006
Total, all private industries	2,654,847	3,047,015	2,833,513		2.8%	-1.4%
Goods-Producing	612,549	682,135	567,697		2.2%	-3.6%
Natural Resources and Mining	26,861	29,517	22,760	0.7%	1.9%	-5.1%
Construction	128,937	192,338	192,897	5.9%	8.3%	0.1%
Manufacturing	456,754	460,281	352,040	10.7%	0.2%	-5.2%
Service-Providing	2,042,295	2,364,884	2,265,815		3.0%	-0.9%
Trade, Transportation, and Utilities	563,672	608,241	561,357	17.1%	1.5%	-1.6%
Information	96,876	147,581	112,820	3.4%	8.8%	-5.2%
Financial Activities	194,069	208,854	213,378	6.5%	1.5%	0.4%
Professional and Business Services	509,591	619,989	554,576	16.9%	4.0%	-2.2%
Education and Health Services	285,917	337,874	360,678	11.0%	3.4%	1.3%
Leisure and Hospitality	273,778	304,944	320,772	9.8%	2.2%	1.0%
Other Services	117,887	131,398	142,238	4.3%	2.2%	1.6%
Government Ownership:						
Federal Government	83,162	57,652	53,001	1.6%	-7.1%	-1.7%
State Government	108,771	81,895	87,874	2.7%	-5.5%	1.4%
Local Government	231,635	298,251	301,173	9.2%	5.2%	0.2%
Total, all public and private industries	3,078,415	3,484,813	3,275,561	100.00%	2.5%	-1.2%

Source: Applied Development Economics, Inc., based on Labor Market Information Division of the California Employment Development Department (California EDD-LMID)

Table 3 is similar to Table 2 except data is organized by general land use and building types. In addition, data is segregated by private and public sectors. Data is for 2006.

TABLE 3: Economic Profile By Land Use Categories and By Public-Private Ownership: San Francisco Bav Area. 2006

Ownership	NAICS	Industry Description	Type	Establishment	Employment
Private	11	Agriculture, Forestry, Fishing & Hunting	Other	1,836	21,213
Private	21	Mining	Industrial	76	2,076
Private	22	Utilities	Industrial	120	5,688
Private	23	Construction	Other Industrial	16,834	192,897
Private	31-33	Manufacturing	Industrial	9,134	352,040
Private	42	Wholesale Trade	Other	10,277	129,113
Private	44-45	Retail Trade	Commercial	20,846	336,232
Private	48-49	Transportation and Warehousing	Other Industrial	3,157	92,610
Private	51	Information	Office	3,834	112,820
Private	52	Finance and Insurance	Office	11,019	151,360
Private	53	Real Estate and Rental and Leasing	Office	9,991	62,020
Private	54	Professional and Technical Services	Office	29,299	312,042
Private	55	Management of Companies and Enterprises	Office	1,015	56,807
Private	56	Administrative and Waste Services (office)	Office	9,113	89,315
Private	56	Administrative and Waste Services (other industrial)	Other Industrial	395	96,408
Private	61	Educational Services	Institutional	2,681	69,327
Private	62	Health Care and Social Assistance (office)	Office	17,862	140,113
Private	62	Health Care and Social Assistance (institutional)	Institutional	775	151,240
Private	71	Arts, Entertainment, and Recreation	other	2,651	50,976
Private	72	Accommodation and Food Services	Commercial	15,430	269,797
Private	81	Other Services	Commercial	72,201	142,107
Private	99	Unclassified	other	53	131
Federal	44-45	Retail Trade	Commercial	7	761
Federal	48-49	Transportation and Warehousing	Other Industrial	272	22,856
Federal	51	Information	Office	1	10
Federal	52	Finance and Insurance	Office	6	272
Federal	54	Professional and Technical Services	Office	16	491
Federal	62	Health Care and Social Assistance	Institutional	4	6,650
Federal	71	Arts, Entertainment, and Recreation	other	11	717
Federal	72	Accommodation and Food Services	Commercial	5	84
Federal	81	Other Services	Commercial	1	41
Federal	92	State Government	Office	292	21,118
State	54	Professional and Technical Services	Office	2	201
State	61	Educational Services	Institutional	666	37,579
State	62	Health Care and Social Assistance (office)	Office	241	2,756
State	62	Health Care and Social Assistance (institutional)	Institutional	14	3,632
State	92	State Government	Office	697	23,270
Local	11	Agriculture, Forestry, Fishing & Hunting	Other	1	12
Local	22	Utilities	Industrial	80	7,790
Local	23	Construction	Other Industrial	24	3,258
Local	48-49	Transportation and Warehousing	Other Industrial	53	11,829
Local	51	Information	Office	45	4,320
Local	52	Finance and Insurance	Office	6	603
Local	53	Real Estate and Rental and Leasing	Office	5	502
Local	54	Professional and Technical Services	Office	5	502
Local	56	Administrative and Waste Services	Other Industrial	13	1,306
Local	61	Educational Services	Institutional	2,229	161,039
Local	62	Health Care and Social Assistance (office)	Office	27	9,780
Local	62	Health Care and Social Assistance (institutional)	Institutional	2	12,888
Local	71	Arts, Entertainment, and Recreation	other	58	9,787
Local	72	Accommodation and Food Services	Commercial	4	74
Local	81	Other Services	Commercial	20	574
Local	92	State Government	Office	384	94,526
				243,790	3,275,561

Source: ADE, Inc., based on California EDD-LMID

In Tables 4 and 5, we re-organize Table 3 data in terms of size of businesses by employment. These tables focus on the private and public sectors respectively. Of the 235,594 private establishments in the region, an estimated 136,631 employ between one and four workers (see Table 4). Of the 5,191 public establishments in the region, 2,496 employ between one and four workers (see Table 4).

TABLE 4
Establishments By Land Use Types and By Size of Business (Estimate): SF Bay Area, 2006: Private Sector (Excluding Refineries)

Type of Use	Establishments	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Commercial\Office	190,609	114,984	30,750	21,860	14,691	5,062	2,449	518	157	139
Industrial	9,325	3,812	1,834	1,467	1,214	553	294	99	29	24
Other industrial	20,386	10,931	3,821	2,449	1,489	1,000	544	113	25	15
Institutional	3,456	1,693	410	278	189	555	240	56	21	14
Other	14,817	8,211	2,848	1,885	1,315	366	158	23	10	2
	238,594	139,631	39,663	27,938	18,898	7,536	3,685	809	241	194

Source: Applied Development Economics, based on California EDD LMID

TABLE 5
Establishments By Land Use Types and By Size of Business (Estimate): SF Bay Area, 2006: Public Sector

Type of Use	Establishments	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Commercial\Office	1,765	857	323	264	177	83	49	8	3	1
Industrial	80	0	0	0	0	80	0	0	0	0
Other industrial	362	141	53	42	22	8	95	2	1	0
Institutional	2,914	1,498	564	443	234	88	55	20	7	6
Other	70	0	0	1	0	11	58	0	0	0
	5,191	2,496	940	749	433	270	257	30	10	6

Source: Applied Development Economics, based on California EDD LMID

Tables 6 and 7 are similar to the tables directly above; these tables distribute number of workers by land use and business size categories.

TABLE 6
Estimated Employment By Land Use Types and By Size of Business (Estimate): SF Bay Area, 2006: Private Sector (Excluding Refineries)

Type of Use	Employment	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Commercial\Office	1,672,613	155,055	147,341	218,137	344,409	220,442	257,878	120,655	71,751	136,944
Industrial	359,804	10,395	16,734	27,830	55,209	52,428	64,697	47,274	27,881	57,355
Other industrial	381,915	19,000	23,199	30,817	44,596	76,529	94,537	42,753	20,603	29,883
Institutional	220,567	6,717	5,696	7,988	12,939	53,688	54,340	27,420	20,459	31,321
Other	201,433	18,593	21,953	29,888	49,106	29,734	30,094	9,724	7,902	4,438
	2,836,332	209,759	214,924	314,659	506,259	432,822	501,545	247,827	148,595	259,941

Source: Applied Development Economics, based on California EDD LMID

TABLE 7
Estimated Employment By Land Use Types and By Size of Business (Estimate): SF Bay Area, 2006: Public Sector

Type of Use	Employment	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Commercial\Office	159,887	10,119	13,340	21,875	28,685	21,068	27,039	18,607	12,592	6,562
Industrial	7,790	0	0	0	0	7,790	0	0	0	0
Other industrial	39,249	1,377	1,815	2,954	3,716	2,756	20,419	3,061	2,072	1,080
Institutional	221,788	11,966	15,774	25,667	32,289	27,449	40,105	30,496	20,637	17,406
Other	10,516	0	0	12	0	717	9,787	0	0	0
	439,230	23,462	30,929	50,507	64,690	59,779	97,350	52,164	35,300	25,048

Source: Applied Development Economics, based on California EDD LMID

Tables 8 and 9 estimate revenues generated by the private and public sectors. With respect to the private sector, revenues are based on a revenue per workers formula, data for which comes from the Economic Census 2002. To estimate public sector allocations, the analysis employed a per capita rate based on typical average wages, benefits, and capital outlays at the local, state and federal levels. On average, the public sector per capita rate ranged from $120,000 to $160,000. Averages were then multiplied against aggregate number of workers organized by Table 7 above. Table 10 includes estimates on net profits generated by establishments within the various land use categories and employment size ranges. Estimated net profits are based on industry-specific rates gathered over a ten year period so as to control for period when rates might have been unusually high and periods when rates might have been unusually low, if not negative. Net profit data comes from the US IRS.

TABLE 8
Aggregate Revenue By Land Use Types and By Size of Business (Estimate): SF Bay Area, 2006: Private Sector
(Excluding Refineries)

Type of Use	Aggregate Rev ('000)	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Commercial\Office	277,519,904	21,993,227	22,700,715	34,743,145	53,609,189	38,293,169	47,541,414	22,347,614	12,297,291	23,994,141
Industrial	109,514,116	3,657,014	5,643,911	9,425,583	18,904,615	17,195,881	21,168,366	14,870,594	7,136,502	11,511,652
Other industrial	58,729,314	3,137,277	3,917,655	5,170,945	7,433,494	11,621,966	14,342,392	6,319,459	2,765,265	4,020,862
Institutional	20,100,851	464,941	394,324	552,961	895,653	5,102,169	5,164,108	2,605,835	1,944,316	2,976,544
Other	112,723,414	9,434,453	12,334,792	17,207,554	29,280,463	17,263,290	17,386,451	5,106,798	4,339,490	370,122
	578,587,598	38,686,911	44,991,397	67,100,188	110,123,412	89,476,474	105,602,730	51,250,300	28,482,864	42,873,322

Source: Applied Development Economics, based on California EDD LMID and US Economic Census

TABLE 9
Aggregate Revenue By Land Use Types and By Size of Business (Estimate): SF Bay Area, 2006: Public Sector

Type of Use	Aggregate Rev ('000)	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Commercial\Office	22,357,486	1,416,703	1,867,618	3,062,451	4,015,886	2,949,475	3,758,851	2,604,941	1,762,812	918,750
Industrial	1,090,636	0	0	0	0	1,090,636	0	0	0	0
Other industrial	4,694,870	144,579	190,596	310,129	390,149	289,332	2,717,733	321,449	217,530	113,373
Institutional	30,541,816	1,675,187	2,208,373	3,593,348	4,520,518	3,734,986	5,457,189	4,149,580	2,808,098	2,394,537
Other	1,471,854	0	0	1,284	0	100,380	1,370,190	0	0	0
	60,156,661	3,236,470	4,266,587	6,967,212	8,926,553	8,164,808	13,303,962	7,075,969	4,788,440	3,426,660

Source: Applied Development Economics, based on California EDD LMID and California State Controller

TABLE 10
Aggregate Net Profits By Land Use Types and By Size of Business (Estimate): SF Bay Area, 2006: Private Sector
(Excluding Refineries)

Type of Use	Est. Net Profits ('000)	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Commercial\Office	$10,573,293	$892,499	$896,485	$1,352,752	$2,046,465	$1,397,561	$1,703,543	$909,191	$567,544	$807,252
Industrial	$3,425,909	$146,761	$203,400	$343,782	$713,012	$568,591	$701,731	$470,955	$163,394	$114,282
Other industrial	$1,893,355	$98,607	$125,828	$165,079	$235,801	$385,953	$464,251	$202,312	$87,046	$128,477
Institutional	$693,224	$17,745	$15,050	$21,105	$34,184	$173,525	$175,632	$88,625	$66,126	$101,232
Other	$2,331,625	$198,344	$256,097	$355,644	$601,773	$354,851	$357,669	$105,632	$89,310	$12,306
	$18,917,405	$1,353,957	$1,496,860	$2,238,361	$3,631,235	$2,880,481	$3,402,826	$1,776,714	$973,420	$1,163,549

Source: Applied Development Economics, based on California EDD LMID and US Economic Census

Table 11 translates aggregate net profit estimates in Table 10 into average net profit figures. For purposes of the socioeconomic analysis, public sector costs will compared against estimated gross revenues.

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TABLE 11
Average Net Profits By Land Use Types and By Size of Business: SF Bay Area, 2006 (Estimate): Private Sector (Excluding Refineries)

Type of Use	Est. Avg. Net Profits	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Commercial\Office	$55,471	$7,762	$29,154	$61,882	$139,304	$276,099	$695,701	$1,756,163	$3,613,898	$5,801,305
Industrial	$367,390	$38,503	$110,914	$234,390	$587,121	$1,028,783	$2,385,321	$4,749,300	$5,729,735	$4,807,688
Other industrial	$92,873	$9,021	$32,931	$67,409	$158,403	$385,912	$853,446	$1,797,860	$3,546,674	$8,308,011
Institutional	$200,578	$10,484	$36,693	$76,007	$180,845	$312,581	$732,153	$1,571,297	$3,144,693	$7,132,725
Other	$157,361	$24,155	$89,923	$188,688	$457,667	$969,995	$2,265,913	$4,564,473	$9,389,540	$6,835,736
	$79,287	$9,697	$37,739	$80,118	$192,153	$382,252	$923,536	$2,196,318	$4,045,059	$5,986,018

Source: Applied Development Economics, based on California EDD LMID and US Economic Census

Socioeconomic Impact Analysis: Commercial, Industrial and Industrial Boilers, Steam Generators and Process Heaters

This section of the report compares annual costs stemming from the rule against industry revenues and net profits. In making that comparison, this section of the report shows what proportion of profit the compliance costs represent. Based on a given threshold of significance, ADE discusses in the report whether the affected sites are likely to reduce jobs as a means of recouping the cost of compliance or as a result of reducing business operations. ADE also examines whether affected industries can pass costs to consumers. To the extent that such job losses appear likely, the indirect multiplier effects of the job losses area estimated using a regional IMPLAN input-output model.

When analyzing the socioeconomic impacts of proposed new rules and amendments, ADE works 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 that 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. Berck reviewed CARB's significance 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." Because industry equity data is not easily readily available, particularly data that is relevant to the nine-county Bay Area, ADE compares annual costs against estimated annual net profits as defined as after-tax return on revenue or sales.

Table 12 below identifies the total cost of new devices that comply with Regulation 9, Rule 7 as amended. For purposes of a conservative analysis, we analyze the socioeconomic

impacts of the *total annual* cost of compliant devices, not the incremental portion of the total cost, even though the proposed amendments do not require businesses to replace or retrofit their respective heaters, steam generators and or process heaters until they have used at least part of the heater service life (5 or 10 years, depending on heater size). As Table 12 shows, on a weighted average basis, the total cost of compliant devices below and above 10 MM BTU\hr is $139,230 and $110,886 respectively.

TABLE 12
Total Cost of Devices Within Specified Ratings

Size Range (MM BTU/hr)	Avg Size (MM BTU/hr)	Number	Installed Cost Per Device
>2 to 5	4.2	1,238	$91,000
>5 to <10	4.2	1,396	$182,000
10 to <20	12.8	164	$87,600
20 to <75	32	125	$117,600
75 to < 410	120	5	$429,000
410	410	1	$1,500,000
Subtotals >2 to <10: Average	*4.2*		*$139,230*
Subtotals 10 and up: Average	*180.8*		*$110,886*

Source: ADE, Inc., based on BAAQMD (Note: Sub-Total averages based on all data set)

Table 13 below annualizes total costs presented in Table 12. As Table 13 shows, sources directly affected by the proposed amendment will incur $13,658 a year per device, for devices less than 10 MM BTU/hr. For devices greater than 10 MM BTU/hr, annual cost amounts to $10,878. As indicated earlier, these are *total* costs, which, for purposes of a conservative socioeconomic analysis, overstate actual impacts since the proposed amendments do not require businesses to replace or retrofit their respective heaters, steam generators and or process heaters until they have used at least part of the heater service life (5 or 10 years, depending on heater size). In other words, even if the proposed amendment is *not*

adopted, affected sources will still need to purchase a new device in the event their existing non-compliant boiler exhaust its useful life. Thus, in actuality, the impact stemming from the proposed amendments is the cost of the service life of the existing device that is not used, plus the difference between the new, code-compliant model and the older, non-compliant model, *not* the total cost of the new model. In any event, the analysis examines impacts stemming from the total cost of the new model.

TABLE 13
Annual Cost: Proposed Amendments Regulation 9, Rule 7

	< 10 MM BTU/hr	> 10 MM BTU/hr
Total Cost	$139,230	$110,886
Other Cost Factor	0.09	0.09
Capital Recovery Factor	0.09	0.09
TOTAL COST (Annualized)	$13,658	$10,878

Source: ADE, Inc., based on BAAQMD

It is important to note that, of the business impacted by the proposed amendments, a number will bear *a share* of total costs described in Table 13 above. Suppose a two-story commercial office complex with ten separate businesses uses a boiler less than 10 MM BTU/hr. While the average annual cost for this device is $13,658, the *share* of the Regulation 9, Rule 7 cost to affected businesses would be distributed among the different businesses within the affected building. In order to control for these instances, ADE examined the District's database to understand what kinds of facilities employ which devices, the MM BTUs of which are included in the District's database. Using a variety of sources and standard analytic factors with respect to square feet per workers, ADE then determined how many workers worked at these companies' facilities. Table 14 below is based on ADE's analysis, and it depicts an amount of MM BTU per worker. Table 14 divides information by land use types and number of employees. Thus, for the typical industrial establishment in the BAAQMD database that employs less

than 1000 workers, the input heat rating (MM BTU\Hr) per workers is 0.07488.

TABLE 14
MM BTU\hr per Bay Area Worker

	Commercial	Industrial	Institutional
< 1000 workers	0.01341	0.07488	0.01145
> 1000 workers	0.00216	0.02366	0.01145

Source: ADE, Inc., based on BAAQMD

Since the *average* input heat rating for the device less than 10 MM BTU\hr annually costing $13,658 is 4.2 MM BTU\hr, we can estimate minimum amount of MM BTU's needed for the *typical* establishment in the Bay Area. Table 15 below shows that, on average, a small business employing less than 50 workers in the commercial-office land use category employs five workers. If as Table 14 above shows, commercial operations employing less than 1000 workers exhibit input heat rating (MM BTU\Hr) per worker ratios of 0.01341, then the *typical* very small commercial-office establishment's MM BTU\Hr requirement is 0.0637.[1] This factor is then multiplied against $13,658 at 4.2 MM BTU\Hr to calculate the *annual share* of the total cost that a small business would absorb in the event it was located at a multi-tenant site that was purchasing a new compliant device (4.2 MM BTU\Hr @ $13,658 a year). Across the board, Tables 15 through 18 show that annual costs stemming from the proposed amendments are less than significant from the vantage point of the average Bay Area business within various land use categories and sizes.

[1] 0.0637 = 0.01341 x 5

TABLE 15
Socioeconomic Impact Analysis: Estimated Net Profits By Average Commercial Establishment By Size of Establishment Versus Share of Cost Attributable To Average Commercial Establishment

Private Commercial\Office	AVG EMP	AVG REV	NET PROFITS	AVG Device Size-Share	Share of Annual Cost Per Device: < 10 BTU\Hr Scenario	Annual Cost As Percent of Net Profits: < 10 BTU\Hr Scenario	Sshare of Annual Cost Per Device: > 10 BTU\Hr Scenario	Annual Cost As Percent of Net Profits: > 10 BTU\Hr Scenario
1 - 49	5	729,880	28,462	0.0637	$207	0.73%	$4	0.013%
50-99	44	7,565,112	276,099	0.5842	$1,900	0.69%	$35	0.013%
100-249	105	19,415,182	695,701	1.4127	$4,594	0.66%	$85	0.012%
250-499	233	43,165,897	1,756,163	3.1263	$10,167	0.58%	$188	0.011%
500-999	457	78,304,292	3,613,898	6.1289	$19,931	0.55%	$369	0.010%
1000+	984	172,433,598	5,801,305	2.1256	$6,913	0.12%	$128	0.002%

Source: ADE, Inc., based on California EDD and BAAQMD

TABLE 16
Socioeconomic Impact Analysis: Estimated Net Profits By Average Industrial Establishment By Size of Establishment Versus Share of Cost Attributable To Average Industrial Establishment

Industrial	AVG EMP	AVG REV	NET PROFITS	AVG Device Size-Share	Share of Annual Cost Per Device: < 10 BTU\Hr Scenario	Annual Cost As Percent of Net Profits: < 10 BTU\Hr Scenario	Sshare of Annual Cost Per Device: > 10 BTU\Hr Scenario	Annual Cost As Percent of Net Profits: > 10 BTU\Hr Scenario
1 - 49	13	4,519,343	168,970	0.9908	$3,222	1.91%	$60	0.035%
50-99	95	31,113,463	1,028,783	7.1036	$23,101	2.25%	$427	0.042%
100-249	220	71,955,396	2,385,321	16.4684	$53,556	2.25%	$991	0.042%
250-499	477	149,961,076	4,749,300	35.6999	$116,097	2.44%	$2,148	0.045%
500-999	978	250,255,448	5,729,735	73.2145	$238,095	4.16%	$4,405	0.077%
1000+	2,413	484,279,960	4,807,688	57.0906	$185,660	3.86%	$3,435	0.071%

Source: ADE, Inc., based on California EDD and BAAQMD

TABLE 17
Socioeconomic Impact Analysis: Estimated Net Profits By Average Institutional Establishment By Size of Establishment Versus Share of Cost Attributable To Average Institutional Establishment

Institutional	AVG EMP	AVG REV	NET PROFITS	AVG Device Size-Share	Share of Annual Cost Per Device: < 10 BTU\Hr Scenario	Annual Cost As Percent of Net Profits: < 10 BTU\Hr Scenario	Sshare of Annual Cost Per Device: > 10 BTU\Hr Scenario	Annual Cost As Percent of Net Profits: > 10 BTU\Hr Scenario
1 - 49	13	898,184	34,281	0.1486	$483	1.41%	$9	0.026%
50-99	97	9,190,851	312,581	1.1078	$3,603	1.15%	$67	0.021%
100-249	227	21,527,563	732,153	2.5948	$8,438	1.15%	$156	0.021%
250-499	486	46,200,988	1,571,297	5.5689	$18,110	1.15%	$335	0.021%
500-999	973	92,463,659	3,144,693	11.1452	$36,244	1.15%	$671	0.021%
1000+	2,207	209,724,109	7,132,725	25.2792	$82,208	1.15%	$1,521	0.021%

Source: ADE, Inc., based on California EDD and BAAQMD

TABLE 18
Socioeconomic Impact Analysis: Estimated Net Profits By Average Public Sector Establishments By Type of Use Versus Share of Cost Attributable To Average Public Sector Establishment

Public Sector	AVG EMP	AVG REV	AVG Device Size-Share	Share of Annual Cost Per Device: < 10 BTU\Hr Scenario	Annual Cost As Percent of Net Profits: < 10 BTU\Hr Scenario	Sshare of Annual Cost Per Device: > 10 BTU\Hr Scenario	Annual Cost As Percent of Net Profits: > 10 BTU\Hr Scenario
Services\Office	91	$12,669,189	1.2154	$3,952	0.03%	$73	0.001%
Industrial	97	$13,632,945	7.2921	$23,714	0.17%	$439	0.003%
Institutional	76	$1,610,984	0.8718	$2,835	0.18%	$52	0.003%

Source: ADE, Inc., based on California EDD and BAAQMD

IMPACT ON SMALL BUSINESS

DEFINITION OF SMALL BUSINESS PER CALIFORNIA STATUTE

For purposes of qualifying small businesses for bid preferences on state contracts and other benefits, the State of California defines small businesses in the following manner:

- 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 an average gross receipts of $10 million or less over the previous tax years, or
  - A manufacturer with 100 or fewer employees

SMALL BUSINESS IMPACT ANALYSIS

The discussion above demonstrated that, across the board, impacts are below the significance threshold employed for purposes of socioeconomic analysis. In addition, the discussion above organized data by businesses in terms number of workers. Again, the analysis demonstrated no significant impacts. Thus, small businesses are not disproportionately impacted by the proposed amendments.