

**Socioeconomic Analysis
Proposed Amendments
Regulation 8
Rule 8
Wastewater (Oil-Water) Separators**

Prepared for

**Bay Area Air Quality Management District
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CONTENTS

1. Executive Summary	i
2. Introduction.....	1
3. Description Of Proposed Amendments	2
4. Methodology.....	3
5. Impacted Sources Subject To Proposed Amendments Regulation 8 Rule 8.....	5
6. Socioeconomic Impacts	11

TABLES

1. Population Growth: Nine-county San Francisco Bay Area Region 1992 – 2002.....	6
2. Employment Profile of the San Francisco Bay Area Region, 1997 – 2002.....	8
3. Employment Trends: Industries Affected by Proposed Amendments	9
4. Economic Characteristics of Impacted Sources Subject to Proposed Amendments to Regulation 8 Rule 8	10
5. Employment In Impacted Sources Subject to Proposed Amendments Relative to Region and California, 2002 (estimates)	10
6. Annual Compliance Cost.....	11
7. Socio-economic Impacts of Proposed Amendments to Regulation 8 Rule 8 on Affected Sources	13
8. Distribution of Oil Refineries in the San Francisco Bay Area by Size of Facility.....	15

1. EXECUTIVE SUMMARY

The purpose of Regulation 8 Rule 8 is to reduce the emission of volatile organic compounds (VOCs) from wastewater collection systems at five petroleum refineries in the nine-county San Francisco Bay Area. Rule 8-8 was first adopted in 1979 and was subsequently amended in 1982, 1989 and 1994. The regulation requires controls on small wastewater separators, junction boxes and sludge dewatering facilities, and it requires the retrofit of larger refinery wastewater oil-water separators.

The following are some of the key findings from the socioeconomic analysis of the proposed amendments.

- According to the Bay Area Air Quality Management District (BAAQMD), there are five (5) petroleum refineries in the region that are primarily affected by the amendments. These corporations are Chevron, Shell, Connoco Phillips, Valero-Valero Asphalt, and Tesoro.
- In 2003, these five refineries employed an estimated 2,807 workers, generated revenues of \$8.2 billion, and earned an estimated \$224 million in profits.
- The proposed amendments to will result in aggregate compliance costs ranging from \$1,457,000 to \$3,296,000—between 0.6 and 1.5 percent of aggregate profits for the 5 refineries directly affected by the proposed amendments to Regulation 8, Rule 8. Thus, the proposed amendments to Regulation 8, Rule 8 do not significantly impact in affected refineries.

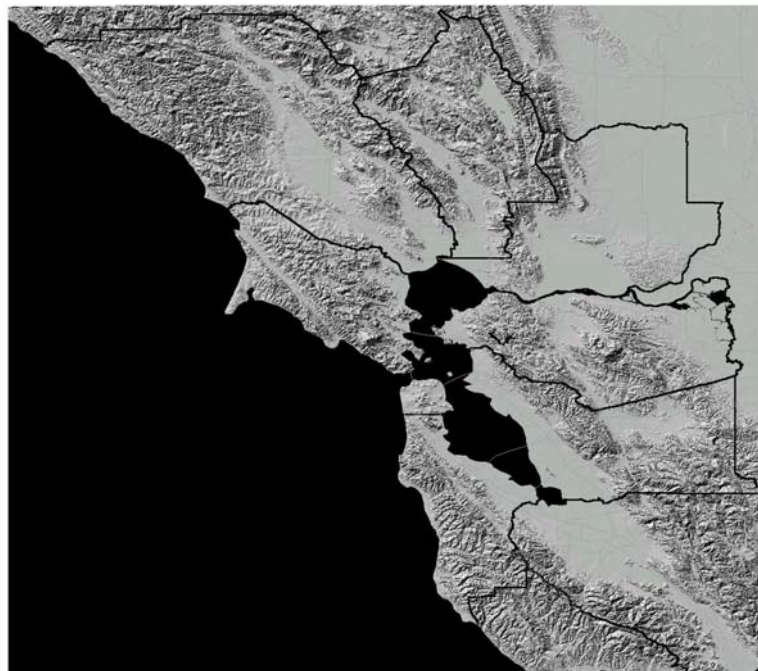
2. INTRODUCTION

This report describes the socioeconomic impacts of proposed amendments to Regulation 8, Rule 8. Following this introduction, the report summarizes proposed amendments to the rule and describes the methodology for the socioeconomic analysis. In Section 5, the report describes the economic characteristics of sites affected by the proposed amendment. The sixth section analyzes the socioeconomic impacts of proposed amendments to Regulation 8, Rule 8.

The proposed amendments to Regulation 8, Rule 8 will assist the BAAQMD in meeting its commitments to improving air quality in the region by limiting organic emissions from oil/water separators and dissolved air flotation units at refineries, chemical and other plants throughout the Bay Area. It also limits emissions from sludge dewatering and slop oil vessels.

Figure 1 below is a map of the Bay Area Air Quality Management District. The District consists of nine counties in the San Francisco Bay Area: Alameda, Contra Costa, Marin, Napa, San Mateo, San Francisco, Santa Clara, Solano, and Sonoma Counties.

Figure 1. Bay Area Air Quality Management District Air Basin



3. DESCRIPTION OF PROPOSED AMENDMENTS

Volatile Organic Compound (VOC) emissions from wastewater collection systems at oil refineries are generated when organic liquids are entrained in water used in refinery processes. These organic liquids are volatilized during transport to an onsite wastewater treatment system by exposure to high temperatures and turbulence in the transport structures (pipes, manholes, junction boxes, sumps and lift stations).

To reduce VOC emissions by at least 1.9 tons per day, as well as reduce toxic compounds such as benzene, toluene, and xylene, the Bay Area Air Quality Management District (BAAQMD) seeks to amend Regulation 8, Rule 8 (Wastewater [Oil-Water] Separators). In particular, the BAAQMD seeks to amend Regulation 8, Rule 8 to include a 500 ppm leak standard measured with an Organic Vapor Analyzer (OVA) for all wastewater collection components, control equipment mandates for leaking components, and an inspection and maintenance program for wastewater components.

4. METHODOLOGY

The socioeconomic analysis involves the use of information provided directly by the District, the corporations and sites directly affected by proposed amendments, as well as secondary data used to describe the industries affected by proposed amendments to Regulation 8, Rule 8. The approach is briefly described below.

ADE began the analysis by requesting from the District a list of all sites subject to the proposed amendments to Regulation 8, Rule 8. Based on conversations with District staff, we determined that the study would focus on oil refineries in the BAAQMD region and, of these, we further focused attention on Chevron, Shell, Connoco Phillips, Valero and Tesoro.

We then began to prepare a statistical description of the industry groups of which the affected sites are part, as well as to analyze data on the number of jobs, sales levels, the typical profit ratios and other economic indicators for each industry. ADE also reviewed and summarized documents available to the public such as annual reports for publicly traded companies.

With the annual reports and data from the US Economic Census, ADE was able to estimate revenues and profit ratios for many of the sites affected by the proposed amendments to Regulation 8, Rule 8. In calculating aggregate revenues generated by Bay Area refineries, ADE first estimated an average revenue figure for a refinery based on revenues generated over the four-year period between 2000 and 2003. Using the annual reports and data culled by Dun and Bradstreet, ADE calculated ratios of profit per dollar of sales for each refinery. To estimate employment, ADE used employment data from data vendors such as the US Economic Census and the Minnesota IMPLAN Group.

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 rule compliance or as a result of reducing

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

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5. IMPACTED SOURCES SUBJECT TO PROPOSED AMENDMENTS TO REGULATION 8, RULE 8

This section of the socioeconomic analysis describes demographic and economic trends in the San Francisco Bay Area region. The first part of this section compares the Bay Area against California as a whole and, in so doing, provides a context for understanding demographic and economic changes that occurred within the Bay Area between 1997 and 2002. Starting with sub-section 5.2, the second part of this section narrows the focus of the socioeconomic analysis to those industries identified by the District as subject to the proposed amendments. The five (5) sites that are affected by the proposed amendments to Regulation 8, Rule 8 are within SIC 2911 (petroleum refining). The second part of this section describes the economic characteristics of impacted sites subject to Regulation 8, Rule 8. 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.

5.1 REGIONAL DEMOGRAPHIC AND ECONOMIC TRENDS

Regional Demographic Trends

The San Francisco Bay Area experienced moderate population growth during the 1990s. Between 1992 and 2002, the nine-county region as a whole increased by 12 percent, from 6.2 million in 1992 to 6.9 million in 2002. The Bay Area grew almost at the same pace with the state, which increased by 13 percent. San Francisco, Marin, and San Mateo counties grew at significantly slower paces, perhaps because of the high cost of housing in these parts of the Bay Area, as Table 1 shows.

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TABLE 1
Population Growth: San Francisco Bay Area
1992 - 2002

	1992	1997	2002	92 - 97	97 - 02	92 - 02
California	30,844,728	32,670,019	34,999,827	6%	7%	13%
Bay Area	6,181,849	6,566,939	6,936,646	6%	6%	12%
Alameda County	1,310,478	1,381,705	1,484,698	5%	7%	13%
Contra Costa County	829,247	887,065	980,870	7%	11%	18%
Marin County	234,165	241,412	248,490	3%	3%	6%
Napa County	113,593	120,095	128,132	6%	7%	13%
San Francisco County	735,633	772,834	789,062	5%	2%	7%
San Mateo County	664,258	704,834	714,414	6%	1%	8%
Santa Clara County	1,534,704	1,654,833	1,716,755	8%	4%	12%
Solano County	358,916	375,512	405,642	5%	8%	13%
Sonoma County	400,855	428,649	468,583	7%	9%	17%

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

Regional Economic Trends

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

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

With notable companies such as Intel, Apple, NUMMI, to name a few, manufacturing continues to be the economic base of the San Francisco Bay Area, exporting goods and produce throughout the nation and globe. The industries affected by Regulation 8, Rule 8 are a prominent part of the region’s

economic base. Over the course of the late 1990s, local support industries gained somewhat within the region. Growth in local support industries, such as construction, retail and services, is in large part due to regional population growth, particularly in Alameda (Livermore Valley region), Contra Costa, Solano and Sonoma Counties.

As Table 2 shows, the service sector is the largest employment sector in the region, at 1.2 million or 34 percent of all private and public sector jobs. In 1997, services represented 32 percent of all jobs (1.0 million jobs). While the proportion of people employed in the services-based sector increased between 1997 and 2002, the proportion of people employed in the manufacturing economic base declined, from 16 to 13 percent of all private sector workers in the Bay Area. Between 1997 and 2002, manufacturing jobs decreased by 10 percent, from 495,500 to 445,400, as Table 2 shows.

Between 1997 and 2002, construction increased by 24 percent, from 142,400 to 176,300 jobs, as Table 2 shows. Other sectors with significant employment gains include services, which grew by 16 percent between 1997 and 2002, and government, which grew by 11 percent. Over the same five-year period, the number of retail jobs increased by 11 percent. In short, strong employment growth over the 1997-2002 five-year period and over the 1992-2002 ten-year period occurred in sectors that are local-support in nature, or, more precisely, those sectors whose respective fortunes ebb and flow with population. Export-oriented sectors such as manufacturing declined between 1997 and 2002, after having increased between 1992 and 1997.

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TABLE 2
Employment Profile of the San Francisco Bay Area, 1997 – 2002

	1992	1997	2002	2002	92 - 97	97 - 02	92 - 02
Agriculture	22,300	23,700	22,500	1%	6%	-5%	1%
Mining	6,875	4,003	3,300	0.1%	-42%	-18%	-52%
Construction	113,128	142,408	176,300	5%	26%	24%	56%
Manufacturing	453,875	495,584	445,400	13%	9%	-10%	-2%
Transportation and Public Utilities	164,747	179,333	171,700	5%	9%	-4%	4%
Wholesale Trade	162,570	176,870	166,700	5%	9%	-6%	3%
Retail Trade	473,044	513,214	570,700	17%	8%	11%	21%
Finance Insurance & Real Estate	207,347	202,944	214,300	6%	-2%	6%	3%
Services	828,269	1,017,933	1,179,900	34%	23%	16%	42%
Government	454,300	437,900	484,600	14%	-4%	11%	7%
TOTAL	2,886,455	3,193,889	3,435,400	100%	11%	8%	19%

Source: Applied Development Economics, based on data from MIG IMPLAN and California EDD LMID

5.2 DESCRIPTION OF AFFECTED INDUSTRIES

Regulation 8, Rule 8 affects industries in SIC 2911 (oil refineries). What follows is a description of this industry. Table 3 identifies economic trends for oil refineries in the Bay Area, and it provides a comparison between two points in time—1997 and 2002. Data in Table 3 are for all sources, not just the five (5) impacted sources subject to the proposed amendments. As Table 3 shows, employment in oil refineries increased by an estimated 4 percent for the five-year period from 1997 to 2002 — from 7,292 to 7,549 jobs. While Bay Area refinery jobs increased slightly between 1997 and 2002, manufacturing as a whole decreased by 10 percent in the Bay Area region, as Table 2 above noted.

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TABLE 3
Employment Trends: Industries Affected By Proposed Amendments to Regulation 8, Rule 8
1997 – 2002

	1997	2002	1997 - 2002	1997 - 2002
Manufacturing	495,584	445,400	-50,184	-10%
Oil Refineries (SIC 2911)	7,292	7,594	302	4%
<i>Major refineries (SIC 291100)</i>	<i>2,769</i>	<i>2,707</i>	<i>-62</i>	<i>-2%</i>
<i>Other refineries (SIC 2911xx)</i>	<i>4,523</i>	<i>4,887</i>	<i>364</i>	<i>8%</i>

Source: Applied Development Economics, based on data from MIG IMPLAN, California EDD LMID, Dun and Bradstreet, corporate annual reports, and East Bay Business Times (April 19, 2002)

Table 3 also distinguishes employment in the five refineries directly affected by amendments to Regulation 8, Rule 8. These refineries employ an estimated 2,707 workers. The five industries affected by the proposed amendments are classified under the SIC system as SIC 29110000. In addition to SIC 29110000, the SIC 2911 industry contains other sub-industries at the eight-digit SIC level. Refineries other than SIC 29110000 employ an estimated 4,887 workers, as Table 3 shows. Appendix A lists oil refineries businesses in the San Francisco Bay Area that have 8-digit SIC codes other than SIC 29110000.

5.3 ECONOMIC CHARACTERISTICS OF SOURCES AFFECTED BY THE PROPOSED AMENDMENTS TO REGULATION 8, RULE 8

Table 4 identifies the economic characteristics of the refineries affected by the proposed amendments. This table shows that the refineries are estimated to employ 2,707 workers. These sites have an estimated aggregate payroll of \$134 million, and estimated revenues of \$8.2 billion. In calculating aggregate revenues generated by Bay Area refineries, the consultant estimated an average revenue figure per refinery based on revenues generated by that refinery over a four-year period between 2000 and 2003. Then, the consultant summed the refineries' respective average revenue to arrive at the aggregate amount of \$8.2 billion. The consultant pursued this approach in order to control for the ebb and flow of refinery revenues, which fluctuate from one year to the next based on production

and the price of crude oil and gas, among other things.

TABLE 4
Economic Characteristics of Five Impacted Sources Subject To Proposed
Amendments to Regulation 8, Rule 8

SIC	Estimated Employment, 2002	Daily Throughput (bbls), 2002	Estimated Payroll	Revenues
SIC 2911 Oil Refineries	2,707	689,600	\$134,891,089	\$8,246,738,765

Sources: Applied Development Economics, based on data from the US Economic Census, Dun and Bradstreet, and various corporate annual reports

As Table 5 shows, the affected sources represent 35 percent of all employment within their respective industry (SIC 2911) in the Bay Area region. Overall, there are an estimated 7,594 petroleum refining employees in the Bay Area. Of the 7,594 workers, 2,707 work in the five affected refineries, or 35 percent. In California as a whole, there were 12,878 workers in SIC 2911– NAICS 32411. In other words, 21 percent of all workers in oil refining are employed in refineries impacted by proposed amendments to Regulation 8, Rule 8.

TABLE 5
Employment In Impacted Sites Subject To Proposed
Amendment to Regulation 8, Rule 8
Relative To the Bay Area and California

SIC	Estimated employment at Affected Refineries 2002	Affected Sites As percent of Bay Area 2911 Employment	Affected Sites As percent of California 2911 Employment
2911	2,707	35%	21%

Sources: Applied Development Economics, based on data from the Dun and Bradstreet and Count Business Patterns.

6. SOCIOECONOMIC IMPACTS

6.1 COMPLIANCE COST ESTIMATES

The District's cost of compliance analysis indicates that, overall, all sources affected by the amendments would experience an aggregate annual cost between \$1,457,000 and \$3,296,000. Table 6 provides a breakdown of the estimated costs.

TABLE 6
Annual Compliance Costs

Cost Item	Number of Items	Annualized Capital		Annual I&M Costs (\$000)	Total Annual Costs (\$000)
		Capital Cost Range (\$000)	Cost Range (\$000)		
Uncontrolled Drains	8,599	\$3,400 - \$8,600	\$490 - \$1,200	\$50 - \$290	\$540 - \$1,500
Manholes	5,776	\$2,300 - \$5,800	\$330 - \$820	\$30 - \$200	\$360 - \$1,000
Junction Boxes	1,926	\$3,900 - \$4,800	\$550 - \$690	\$12 - \$65	\$560 - \$750
					\$1,457 - \$3,296

Source: Bay Area Air Quality Management District

6.2 BUSINESS RESPONSE TO COMPLIANCE COSTS

Sites impacted by the proposed amendments to proposed Regulation 8, Rule 8 may respond in a variety of ways when faced with new regulatory costs. These responses may range from simply absorbing the costs and accepting a lower rate of return to shutting down the business operation altogether. Businesses may also seek to pass the costs on to their customers in the form of higher prices, or they may renew efforts to increase productivity and reduce costs elsewhere in their operation in order to recoup the regulatory costs and maintain profit levels.

6.3 IMPACT ANALYSIS

The businesses' responses to increased compliance costs hinge on the effect of the costs on the profits generated at the affected sites. An impact on estimated profits greater than 10

percent implies that the source would experience serious economic effects because of the compliance cost. When compliance costs are greater than 10 percent of estimated profits, companies typically respond to the impact by laying off some workers, closing parts of manufacturing facilities or, in the most drastic case, possibly closing the manufacturing facility.

Using the cost estimates developed by the BAAQMD, Applied Development Economics calculated the socioeconomic impacts of the proposed amendments. In calculating impacts of the proposed amendments on profits, ADE used return on sales ratios identified by Dun and Bradstreet for select industries and in annual reports of companies directly affected by the proposal. Base on data from the US Economic Census and from corporate annual report, we estimate that the 5 affected refineries generated a combined profit of \$224 million on \$8.2 billion in revenues.

Table 7 compares the estimated costs of the proposed amendments to this rule under both cost alternatives. Affected sources will incur an aggregate cost \$1,457,000 under the lower cost alternative. This cost represents an estimated .6 percent of profits for the five sources affected by the proposed amendments. Affected sources will incur an aggregate cost of \$3,296,000 in the higher cost alternative. This cost represents an estimated 1.5 percent of aggregate profits for the 5 sites affected by the proposed amendment. Thus, the five oil refineries affected by the proposed amendments to Regulation 8, Rule 8 will not experience any significant employment impacts as a result of the amendments.

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TABLE 7
Socioeconomic Impact Analysis of Proposed Amendments to Regulation 8, Rule 8 on Five Impacted Sources

Impacted Sources	Estimated SF region refinery returns	Distribution of Industry Costs: Lower Range	Distribution of Industry Costs: Upper Range	Cost as a Percent of Estimated Returns: Lower Range	Cost as a Percent of Estimated Returns: Upper Range	Lower Range Impacts	Upper Range Impacts	Lower Range Direct Employment Impacts	Upper Range Direct Employment Impacts
Five Refineries	\$224,644,199	\$1,457,000	\$3,296,000	0.6%	1.5%	-- no impacts --	-- no impacts --	-- no impacts --	-- no impacts --

Sources: Applied Development Economics, based on data from the US Economic Census, Dun and Bradstreet, various corporate annual reports and Bay Area Air Quality Management District

6.4 IMPACT ON SMALL BUSINESSES

In addition to analyzing the employment impacts of proposed amendments to Regulation 8, Rule 8, state legislation requires that the socioeconomic analysis assess whether small businesses are disproportionately affected by air quality rules such as the proposed amendments to the Regulation 8, Rule 8. First, this section profiles oil refineries in the San Francisco Bay Area region by employment size categories, and, in so doing, shows that most of these manufacturers are relatively large employers. Then, this section discusses the average size of the five refineries affected by the proposed amendments. Finally, this section shows how the five refineries affected by the proposed amendments to Regulation 8, Rule 8 fail to qualify as small businesses as defined by the State of California.

Oil Refineries By Employment Size Categories

More than 50 percent of all businesses in California and the United States employ less than four people, and almost 80 percent employ less than ten people. Data in Table 8 are for all sites in industries identified by the BAAQMD, and it includes data on sites affected by amendments to Regulation 8, Rule 8. The data in the table comes from a combination of vendors—Minnesota IMPLAN Group and the US County Business Patterns—and is current as of the year 2001. Table 8 distributes affected industries by number of employees per manufacturing site. As a group, establishments in the affected industries are significantly larger than state and national industries as a whole. Establishments with more than 100 workers represent 2.5 percent of all establishments in all industries in California and the United States. In contrast, 44 percent of affected sites employ at least 100 people. In fact, 55 percent of all sites employ at least 50 people versus the statewide and national average of 5.7 percent, as Table 8 shows. Consistent with data in Table 9, we estimate that the sites directly affected by the proposed amendment employ, on average 541 workers, placing these facilities as mid- to large-sized employers.

TABLE 8
Distribution Of Oil Refineries (SIC 2911) In The San Francisco Bay Area By Size of Facilities, 2001

	Employment Size Categories						
	1 thru 4	5 thru 9	10 thru 19	20-49	50-99	100-249	250 or more
Bay Area SIC 2911	11%	0%	11%	22%	11%	0%	44%
California (all industries)	54.0%	18.5%	12.6%	9.1%	3.2%	1.8%	0.7%
US (all industries)	53.9%	19.3%	12.7%	8.7%	3.0%	1.8%	0.7%

Source: United States Bureau of the Census, County Business Patterns 2000, IMPLAN MIG

Definition Of Small Business Per California Statute

The previous section showed oil refineries in the San Francisco Bay Area, including the five sources that are affected by the proposed amendments to Regulation 8, Rule 8, are significantly larger than most businesses in California and the nation, which, on average, employ less than 10 people. In contrast, the five refineries, on average, employ 541 workers. This section discusses how the State of California defines small business, and, in so doing, shows how the five sources affected by the proposed amendments to Regulation 8, Rule 8 fail to meet the State's definition of small business.

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 manner¹. To be eligible for small business certification, a business:

- 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:

¹ State of California. Department of General Services. "California Small Business Certification" (<http://www.pd.dgs.ca.gov/smbus/sbcert.htm>)

- 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

The five sources that are affected by the proposed amendments are not independently-owned and operated businesses. These refineries are owned by publicly-traded global corporations whose headquarters are outside of California (except for Chevron). In addition, each of the sources that are affected by the proposed amendments to Regulation 8, Rule 8 employ, on average, 541 workers, and their average revenue is approximately \$1.6 billion. Thus, by the standards established by the State of California, these sources are not small businesses. Based on this discussion, it is determined that proposed amendments to the Regulation 8, Rule 8 do not disproportionately affect small businesses because the sources impacted by the proposed amendments do not meet California's definition of small business.