

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Final Socioeconomic Report For Proposed Rule 1157—PM 10 Emission Reductions from Aggregate and Related Operations

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EXECUTIVE SUMMARY

A socioeconomic analysis was conducted to assess the impacts of Proposed Rule 1157 (PR 1157)—PM10 Emission Reductions from Aggregate and Related Operations. A summary of the assessment and findings are presented below.

Elements of the Proposed Rule	Proposed Rule (PR) 1157 requires control of PM10 emissions from aggregate and related operations. PR 1157 will become effective July 1, 2005 for all requirements except for the installation of wheel washers which would become effective on December 1, 2005. PR 1157 is expected to reduce approximately 6,643 tons of PM10 per year.
Affected Facilities	PR 1157 would affect approximately 389 aggregate and related operations in the four-county area. These affected aggregate facilities belong to the sectors of construction sand and gravel [Standard Industrial Classification (SIC) 1442], crushed and broken limestone (SIC 1422), industrial sand (SIC 1446), ready mixed concrete (SIC 3273), concrete products (SICs 3271-72), lime and gypsum products (SICs 3274-75), asphalt paving mixtures and blocks (SIC 2951), and heavy construction, nec (SIC 1629). [*] Of the 389 affected facilities, 170 are located in Los Angeles, 50 in Orange County, 90 in Riverside, and 79 in San Bernardino County.
Assumptions of Analysis	It is assumed that the affected facilities would apply dust suppressants (water and chemical); sweep internal paved roads, use wheel washers, rumble grates, and misting systems; and pave roads to reduce PM10 emissions.
Compliance Costs	The total annualized cost of PR 1157 is estimated at \$9.26 million. The majority of the compliance costs are expected to incur in the sectors of construction (SICs 15-17) and stone, clay, and glass products (SIC 32).
Regional Economic Impacts	Based on the above assumptions, the compliance cost of PR 1157, and the application of the Regional Economic Models, Inc. (REMI) model, it is estimated that an average of 325 jobs could be forgone annually from the future projected growth between 2005 and 2020. It is projected that the price in the sector of construction (SICs 15-17) where most of the related operations belong would increase by 0.012 and 0.011 percent in the years 2010 and 2020, respectively, compared to the baseline prices in those years.

^{*} nec = not elsewhere classified.

PROPOSED RULE 1157

Proposed Rule (PR) 1157 requires control of PM10 emissions from aggregate and related operations. Aggregate operations produce sand, gravel, crushed stones, quarried rocks, slag, and/or rock dust. The related operations are defined as operations that use sand, gravel, cement, crushed stone, and/or quarried rocks in their products, or operations that crush recycled asphalt and concrete and inert landfills that handle construction or demolition debris. It is assumed that the affected facilities would apply dust suppressants (water and chemical) and sweep internal paved roads; use wheel washers, rumble grates, misting systems; and pave roads to reduce PM10 emissions. PR 1157 will become effective July 1, 2005 for all requirements except for the installation of wheel washers which would become effective on December 1, 2005.

LEGISLATIVE MANDATES

The socioeconomic assessments at the AQMD have evolved over time to reflect the benefits and costs of regulations. The legal mandates directly related to the assessment of the proposed rule include the AQMD Governing Board resolutions and various sections of the California Health & Safety Code (H&SC).

AQMD Governing Board Resolutions

On March 17, 1989 the AQMD Governing Board adopted a resolution that calls for preparing an economic analysis of each proposed rule for the following elements:

- Affected Industries
- Range of Control Costs
- Cost Effectiveness
- Public Health Benefits

On October 14, 1994, the Board passed a resolution which directed staff to address whether the rules or amendments brought to the Board for adoption are in the order of cost effectiveness as defined in the Air Quality Management Plan (AQMP). The intent was to bring forth those rules that are cost-effective first.

Health & Safety Code Requirements

The California state legislature adopted legislation that reinforces and expands the Governing Board resolutions for socioeconomic assessments. H&SC Sections 40440.8(a) and (b), which became effective on January 1, 1991, require that a socioeconomic analysis be prepared for any proposed rule or rule amendment that *"will significantly affect air quality or emissions limitations."* Specifically, the scope of the analysis should include:

- Type of Affected Industries
- Impact on Employment and the Economy of the Basin
- Range of Probable Costs, Including Those to Industries

- Emission Reduction Potential
- Necessity of Adopting, Amending or Repealing the Rule in Order to Attain State and Federal Ambient Air Quality Standards
- Availability and Cost Effectiveness of Alternatives to the Rule

Additionally, the AQMD is required to actively consider the socioeconomic impacts of regulations and make a good faith effort to minimize adverse socioeconomic impacts. H&SC Section 40728.5, which became effective on January 1, 1992, requires the AQMD to:

- Examine Small Business Impacts
- Consider Socioeconomic Impacts in Rule Adoption

Finally, H&SC 40440.5 require that social, economic, and public health analyses of proposed rule be available to the public by no fewer than 30 days prior to the hearing.

AFFECTED INDUSTRIES AND FACILITIES

PR 1157 would affect approximately 389 aggregate and related operations in the four-county area. The affected aggregate facilities belong to the sectors of construction sand and gravel [Standard Industrial Classification (SIC) 1442], crushed and broken limestone (SIC 1422), and industrial sand (SIC 1446).

The related operations include the industries of ready mixed concrete (SIC 3273), concrete block and brick (SIC 3271), concrete products, except block and brick (SIC 3272), lime and gypsum products (SICs 3274-75), asphalt paving mixtures and blocks (SIC 2951), construction sand and gravel (SIC 1442), and heavy construction, not elsewhere classified (nec) (SIC 1629).

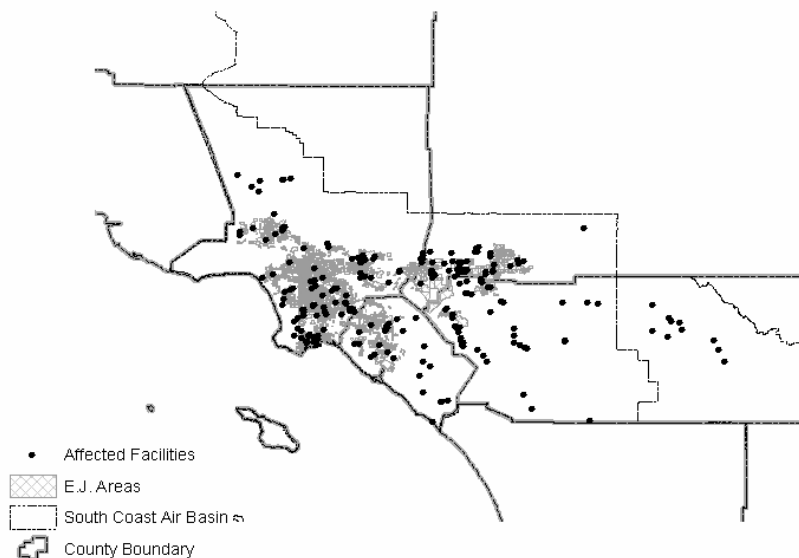
Table 1 shows the correspondence of affected facilities by SIC and North American Industrial Classification System (NAICS).¹ Figure 1 illustrates the geographical location of the affected facilities in the four-county area. Of the 389 affected facilities, 170 are located in Los Angeles, 50 in Orange County, 90 in Riverside, and 79 in San Bernardino County.

¹ The North American Industrial Classification System (NAICS) replaces obsolete Standard Industrial Classification (SIC).

Table 1
Affected Facilities by SIC and NAICS

SIC	SIC Title	NAICS	NAICS Title
1442	Construction Sand and Gravel	212321	Construction Sand and Gravel Mining
1422	Crushed and Broken Limestone	212319	Crushed and Broken Limestone Mining and Quarrying
1446	Industrial Sand	212322	Industrial Sand Mining
1629	Heavy Construction, nec	236210	Industrial Building Construction
3271-72	Concrete Block and Brick/Concrete Products	327331	Bricks, Concrete Manufacturing
3273	Ready-Mixed Concrete	327320	Central-Mixed Concrete Manufacturing
3274-75	Lime and Gypsum Products	327420	Board and Gypsum Manufacturing
2951	Asphalt Paving Mixtures and Blocks	324121	Asphalt Paving Mixture and Block Manufacturing

Figure 1
Location of Affected Facilities in the Four-County Area



The Environmental Justice (EJ) areas in Figure 1 are defined based on AB 1390 (Firebaugh), Point Ranking. Under AB 1390, an area is defined EJ if at least 10 percent of the population

falls below the federal poverty level based on the 2000 census, has an annual average PM concentration of 46 micrograms per cubic meter and above based on interpolated data from the AQMD's monitoring stations, and has a cancer risk of over 1,000 in a million.

Small Business Impacts

The AQMD defines a "small business" in Rule 102 as one which employs 10 or fewer persons and which earns less than \$500,000 in gross annual receipts. In addition to the AQMD's definition of a small business, the federal Small Business Administration (SBA), the federal Clean Air Act Amendments (CAAA) of 1990, and the California Department of Health Services (DHS) also provide their own definitions of a small business.

The SBA's definition of a small business uses the criterion of either gross annual receipts (ranging from \$0.5 million to \$17 million, depending on industry type) or number of employees (ranging from 100 to 1,500). The SBA definitions of small businesses vary by 6-digit NAICS code. The facilities affected by PR 1157 belongs to NAICS 212321—construction sand and gravel mining, NAICS 212322—industrial sand mining, NAICS 212319—crushed and broken limestone mining and quarrying, NAICS 236210—industrial building construction, NAICS 327420—board and gypsum manufacturing, NAICS 327320 and 327331—central mixed concrete manufacturing and bricks and concrete manufacturing, and NAICS 324121—asphalt paving mixture and block manufacturing. Fewer than 500 employees is the criterion below which a business is considered small for these industries.

The CAAA classifies a facility as a "small business stationary source" if it: (1) employs 100 or fewer employees, (2) does not emit more than ten tons per year of either VOC or NO_x, and (3) is a small business as defined by SBA. The DHS definition of a small business uses an annual gross receipt criterion (ranging from \$1 million to \$9.5 million, depending on industry type) for non-manufacturing industries and an employment criterion of fewer than 250 employees for manufacturing industries.

Out of 389 affected aggregate and related operations, 143 reported gross annual receipts and employee information in the 2002 Dun & Bradstreet database acquired by the AQMD. Based on the AQMD's Rule 102 definition, 21 of the 143 facilities would be considered a small business. With the SBA's definition, 123 facilities would be considered small businesses. With CAAA's, 95 could be considered small businesses.

COMPLIANCE COST

In order to comply with the PR 1157 requirements, the affected facilities are expected to apply dust suppressants (water and chemical); sweep paved roads; use wheel washers, rumble grates, and misting systems; and pave roads.

Capital Expenditure

AQMD staff conducted a survey of 395 potentially affected facilities in March 2004. The majority of the survey responses were from large and medium facilities as well as facilities with more than one location in the air basin. Based on the survey results, it is estimated that a total of 91 wheel washers and 320 rumble grates would be needed for the compliance of PR 1157. Staff assumed that each wheel washer would cost \$50,000. The installation cost, including soil preparation, is assumed to be an additional \$10,000 or 20 percent of the capital cost ($0.20 * \$50,000$). Furthermore, it is assumed that the cost of each set of rumble grate is \$5,000 with an additional \$500 (or 10 percent of \$5,000) for installation costs. Wheel washers and rumble grates are expected to last 10 years. The total annualized cost of wheel washers and rumble grates is estimated at \$902,820. Please see staff report for more detailed assumptions and discussions.

PR 1157 would also require the use of dust suppressants (water and/or chemical) during the loading, unloading, and transferring activity. Dust suppressants are usually delivered through a misting system. Based on the information obtained from NESCO (a vendor of the misting systems), it is assumed that each facility would need one misting system capable of delivering dust suppressants to various equipment and open storage piles. The cost for each misting system is estimated at \$40,000. Staff assumed that 311 affected facilities would need misting systems to comply with PR 1157 and the installation cost for each misting system would be an additional 15 percent of the capital cost or \$6,000 ($0.15 * \$40,000$). A misting system is expected to have a 10-year life. The total annualized cost of misting systems is estimated at \$1.76 million.

Finally, PR 1157 would require that the roads from the rumble grates and the wheel washers to the exits (leading to paved public roads) be paved. It is assumed that 655 tons of asphalt for all facilities would be needed for this purpose. According to All American Asphalt, each ton of asphalt would cost about \$50 and once applied it could last up to 10 years. The total capital cost of paving is estimated at \$32,750. The total annualized cost of road paving is estimated at \$4,028.

Operating and Maintenance Expenditure

The annual operating and maintenance costs of PR 1157 include water and chemical stabilizers, road sweeping, water truck rentals, and operating and maintenance costs associated with wheel washers and misting systems.

Based on the tonnage data from the AQMD survey, staff estimated that 431,561 gallons of water per day would be required for the storage piles. Based on the survey and water consumption factor (0.3 gallons of water per 1,000 tons of materials processed), staff estimated that 353,802 gallons of water per day would be needed for process equipment. Based on the PR 1157 survey results, a total of 10,035 trucks from 80 affected facilities would use wheel washers. Assuming 40 gallons of water per truck, approximately 401,400 gallons of water per day for the wheel washers would be required. The total water consumption for storage piles, wheel washers, and process equipment is thus 1,186,763 gallons per day. PR 1157 also requires less active facilities (154 facilities) to water 100 feet of their paved roads (from the facility's exit) on the days that sweeping is not conducted. The total water consumption for this category is estimated at 13,689

gallons per day. Based on a cost of \$4 per 1,000 gallons of water (U.S. Department of Energy, 2004), the total annual cost of water consumption is estimated at \$1.25 million per year.

PR 1157 would also require internal unpaved roads be stabilized with chemical stabilizer. Based on the AQMD survey, a total of 5,535,870 square feet of unpaved roads from 389 facilities would be stabilized with chemical stabilizers per year. Based on a cost of two cents per square foot of treated area and an application frequency of twice per year, the total annual cost of chemical stabilizers is estimated at \$221,435.

Chemical stabilizer is also assumed to be used by hot mixed asphalt plants in addition to other controls to minimize fugitive dust emissions from storage piles. Using the storage piles data from the AQMD survey, staff estimated that 263,853 square feet of storage piles would need to be treated 12 times a year. The total annual cost of chemical stabilizers for hot mixed asphalt plants is estimated at \$63,325.

Based on the survey responses, staff estimated that 94 facilities would need to sweep their paved roads at the end of each work shift and 252 facilities would need to sweep their paved roads every other day due to their truck trips. Currently, some of these affected facilities sweep their paved roads. It is assumed that an additional 38 facilities would need daily sweeping and 154 facilities would need sweeping every other day to comply with PR 1157. Staff assumed that each of the eight aggregate facilities would need two hours of daily sweeping (based on their two work shifts per day) and each of the remaining 30 facilities would need one hour of sweeping daily. It is further assumed that the 154 facilities would require 24,024 hours of sweeping annually. Based on the sweeping cost of \$80 per hour, the total annual cost for sweeping is estimated at \$2.88 million. Finally, staff assumed a facility that sweeps every other day, on the no sweep days, would need one hour of water trucking two times per week at a rental cost of \$70 per hour. The total annual cost of water truck rentals is estimated at \$1.12 million. This cost would be significantly less if facilities elect to rely on in-house watering techniques. The operating and maintenance costs associated with using wheel washers were assumed at \$455,000 (10 percent of capital cost) and those for misting systems were assumed at \$622,000 (5 percent of capital cost).

The grand total capital cost of wheel washers, rumble grates, misting systems, and road-paving is estimated at \$21.56 million. The grand total annual operating and maintenance cost of PR 1157 is estimated at \$6.61 million. Assuming an equipment life of 10 years and 4 percent real interest rate, the total annualized cost of PR 1157 is estimated at \$9.26 million. Table 3 provides a summary of the estimated costs to the four affected sectors. The majority of the compliance costs is expected to incur in the sector of construction (SICs 15-17) where most of the related operations such as crushed miscellaneous base, concrete and asphalt recycling, sand and cement blending and bagging, and inert landfills handling construction and demolition debris belong.

PR 1157 is expected to reduce approximately 6,643 tons of PM₁₀ per year. The overall cost-effectiveness of the PR 1157 is estimated at \$1,132 per ton of PM₁₀ reduced.

Table 3
Estimated Annual Cost of
Compliance (millions of 2004 dollars)

Sector (SIC)	Average Annual (2005-2020)
Construction Sand and Gravel, Crushed and Broken Limestone, Industrial Sand (SICs 1442, 1422, 1446)	\$1.33
Concrete Block and Brick, Concrete Products and Ready-Mixed Concrete (SICs 3271, 3272, 3273)	\$2.22
Asphalt Paving Mixtures and Blocks (SIC 2951)	\$1.11
Heavy Construction, nec (SIC 1629)	\$4.60
Total Cost	\$9.26

REGIONAL ECONOMIC IMPACT

The potential job and other socioeconomic impacts of implementing PR 1157 were analyzed through the REMI model. The REMI model is an economic and demographic forecasting and simulation model designed to examine the economic and demographic effects resulting from policy initiatives or external events in a local economy. The REMI model used in this analysis contains historical economic data of the four-county area from 1969 throughout 2001. A 16-year analysis period (from 2005 to 2020) was used.

Affected aggregate and related operations will face an additional cost of doing business from purchasing various control equipment and materials. Such purchases, on the other hand, would result in additional sales to the sectors of utility (SIC 49) for water consumption, trucking (SIC 42) for water truck rentals, chemicals (SIC 28) for chemical stabilizers, and industrial machinery (SIC 35) for wheel washers, rumble grates, and misting systems. The construction sector (SICs 15-17) would benefit from providing installation services of dust equipment. These additional sales to respective sectors were allocated to each county based on the output of these sectors in that county.

Employment Impact by Industry

The total employment impact of PR 1157 across industries in key years is shown in Table 4. It is estimated that an average of 325 jobs could be forgone annually from 2005 to 2020 in the local economy. This represents about 0.0033 percent of the average annual jobs forecasted in the four-county area from 2005 to 2020.

Compliance with PR 1157 will start in the year 2005. In 2005, additional jobs could be created in some sectors due primarily to increased expenditures made to suppliers of dust control equipment and dust suppressants used for PM10 reduction activities. The industries of industrial machinery (SIC 35), chemicals (SIC 28), and public utility (SIC 49), trucking (SIC 42), and construction (SICs 15-17) are the beneficiaries of these newly-created jobs. The additional cost

of doing business would translate to jobs forgone in the sectors of construction (SICs 15-17), stone, clay, etc (SIC 32), mining (SICs 10-14), and petroleum product (SIC 29) after the year 2005.

The reduction in income from jobs foregone would suppress demand for all goods and services in the local economy. Sectors that experience the greatest number of jobs forgone are the rest of retail trade sector (SICs 52-57, 59), followed by miscellaneous business services (SIC 73), eating and drinking (SIC 58), and wholesale (SICs 50-51).

Table 4
Job Impacts by Industry by Year

Industry (SIC)	Year				Average Annual (2005-2020)
	2005	2010	2015	2020	
Stone, Clay, etc. (32)	-3	-12	-13	-13	-11
Petroleum Product. (29)	0	-1	-1	-1	-1
Industrial Machinery & Equip. (35)	+17	-6	-5	-4	-3
Chemicals (28)	0	-1	-2	-1	-1
Mining (10, 12-14)	-1	-3	-3	-3	-3
Construction (15-17)	+3	-26	-19	-12	-18
Trucking(42)	+7	+2	+2	+2	+2
Public Utilities (49)	+6	+4	+4	+4	+4
Eating & Drinking (58)	-12	-24	-20	-17	-20
Rest of Retail (52-57,59)	-22	-46	-44	-39	-42
Wholesale (50-51)	-3	-18	-16	-12	-15
Real Estate (65)	-9	-21	-20	-18	-19
Personal Serv. and Repair (72,76)	-4	-9	-8	-6	-8
Misc. Busi. Serv. (73)	-14	-48	-45	-37	-41
Misc. Prof. Serv. (87)	-4	-21	-21	-18	-19
Non-Profit Org. (83)	-6	-12	-12	-11	-11
Government (91-97)	-2	-18	-26	-31	-21
Other Industries	-36	-110	-107	-100	-100
Total	-85	-368	-356	-319	-325

The job impacts include all the companies (affected and unaffected by PR 1157) in the respective industries.

Competitiveness

Affected industries can either pass on the additional cost of doing business to consumers or absorb this cost. Local industries that sell more than 50 percent of their products within the local area are assumed to pass the additional cost of doing business to their product buyers through increases in product prices. Based on the REMI forecast, the product price of stone, clay, and glass products (SIC 32) where most of the concrete batching and concrete product operations belong is expected to increase by 0.030 and 0.025 percent in the years 2010 and 2020, respectively. The product price of construction (SICs 15-17) where most of the aggregate operations belong is expected to increase by 0.012 and 0.011 percent in the years 2010 and 2020, respectively. The product price of the petroleum product sector (SIC 29) is expected to increase

by 0.009 percent and that in mining (SIC 14) are expected to increase by 0.005 percent in the years 2010 and 2020.

RULE ADOPTION RELATIVE TO THE COST-EFFECTIVENESS SCHEDULE

On October 14, 1994, the Governing Board adopted a resolution that requires staff to address whether rules being proposed for adoption are considered in the order of cost-effectiveness. The 2003 Air Quality Management Plan (AQMP) ranked, in the order of cost-effectiveness, all the control measures for which costs were quantified. It is generally recommended that the most cost-effective measures be taken first.

PR 1157 implements control measure BCM-08 (Further PM10 Reductions from Aggregate operations) in the 2003 AQMP. The cost-effectiveness of this measure was estimated at \$730 per ton of PM10 reduced. The cost effectiveness of PR 1157 is estimated at \$1,132 per ton of PM10 reduced. Control measure BCM-08 was ranked first (i.e., most cost-effective) amongst all the measures in terms of cost-effectiveness in the 2003 AQMP.

REFERENCES

California Manufacturers Register. 2001.

Dun & Bradstreet Information Services. 2001.

Regional Economic Models, Inc. (REMI). EDFS-214 Forecasting and Simulation Model for the Counties of Los Angeles, Orange, Riverside, and San Bernardino. Diamond Bar: South Coast Air Quality Management District, 2001.

South Coast Air Quality Management District (SCAQMD). Proposed Rule 1157. October 2004.

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, September 2004. www.eere.energy.gov.

U.S. Small Business Administration. "Small Business Size Standards." January 2004.