SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Socioeconomic Impact Assessment for Proposed Amended Rule 1407 – Control of Emissions of Arsenic, Cadmium, and Nickel from Non-Chromium Metal Melting Operations

September 2019

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EXECUTIVE SUMMARY

A socioeconomic analysis was conducted to assess the potential impacts of Proposed Amended Rule (PAR) 1407 – Control of Emissions of Arsenic, Cadmium, and Nickel from Non-Chromium Metal Melting Operations on the four-county region of Los Angeles, Orange, Riverside, and San Bernardino. A summary of the analysis and findings is presented below.

Elements of Proposed Amendments	PAR 1407 - Control of Emissions of Arsenic, Cadmium, and Nickel from Non-Chromium Metal Melting Operations will implement, in part, the South Coast 2016 Air Quality Management Plant control measure TXM-06 – Control of Toxic Emissions from Metal Melting Facilities. The purpose of TXM-06 is to reduce arsenic, cadmium, nickel, other toxic metals, and particulate matter from foundries and other metal melting operations. PAR 1407 applies to all facilities melting metals containing less than 0.5% chromium content, for example aluminum, brass, bronze, carbon steel, zinc, etc. Such metal melting operations include foundries and other facilities performing smelting, tinning, galvanizing, etc. PAR 1407 establishes arsenic, cadmium, and nickel reduction efficiency requirements from metal melting operations, while allowing an option to meet arsenic, cadmium, and nickel mass emission limits in place of meeting reduction efficiency requirements. PAR 1407 requires non-chromium metal melting facilities to demonstrate compliance with the requirements of pollution reduction efficiency or mass emission limits through source testing. PAR 1407 requires non-chromium metal melting facilities to enclose their operations. PAR 1407 additionally requires closing openings in enclosures located at opposite ends of the building to reduce fugitive emissions of arsenic, cadmium, and nickel particulates outside their facilities. PAR 1407 establishes housekeeping, emissions control device maintenance, and recordkeeping requirements for metal melting facilities. PAR 1407 proposes to modify several exemptions, mainly the "metal or alloy purity" exemption and the "clean aluminum scrap" exemption. The "metal or alloy purity" exemption is modified to apply only to facilities processing smaller amounts of non-chromium metal, while the "clean aluminum scrap" exemption will end starting January 1, 2021.
Potentially Affected Facilities and Industries	PAR 1407 is expected to potentially affect 54 metal melting facilities classified under a variety of industry codes, mainly in the industries of steel product manufacturing from purchased steel (NAICS 3312), alumina and aluminum production and processing (NAICS 3313), and foundries (NAICS 3315). Of the 54 facilities potentially affected by PAR 1407, 35 are located in Los Angeles (LA) County, four in Orange (OR) County, three in Riverside (RV) County, and 12 in San Bernardino (SB) County.

Cost Assumptions	**Emission control devices (i.e. baghouses) and supporting equipment** To comply with PAR 1407, South Coast AQMD staff expects 10 baghouses at four facilities to be installed. Staff estimates these baghouses to cost $256,000 each for purchase, installation, and permitting along with $275,000 annually for baghouse operation and maintenance. In total, PAR 1407 is expected to result in $2.56 million in one-time costs for baghouses in 2021, along with an additional $2.75 million annual cost starting in 2021. **Bag leak detection systems and pressure gauges with data acquisition systems** To comply with PAR 1407, South Coast AQMD staff expects 28 baghouses (10 new and 18 existing) at 10 facilities to need bag leak detection systems and pressure gauges with data acquisition systems. Staff estimates purchase and installation of these systems to cost $3,100 each. In total, PAR 1407 is expected to result in $86,800 in one-time costs for bag leak detection systems and pressure gauges with data acquisition systems in 2021. **Building enclosures (e.g. walls, plastic strip curtains, and roll-up doors)** To comply with PAR 1407, South Coast AQMD staff expects four facilities to install major building enclosures (adding one or two walls to a building), and fourteen facilities to install minor building enclosures, 10 of which are expected to be plastic strip curtains, and the remaining four are expected to be roll-up doors. Staff estimates major building enclosures to cost $151,500 each, plastic-strip curtains to cost $9,000 each, and roll-up doors to cost $44,000 each. In total, PAR 1407 is expected to result in $872,000 in one-time costs for building enclosures in 2020. **Source tests** To comply with PAR 1407, South Coast AQMD staff expects all new and existing baghouses due to PAR 1407, i.e. 28 baghouses, to require source testing, along with an additional seven furnaces, for a total of 35 source tests. Staff estimates each source test will cost around $21,000. Staff estimates the total cost of source testing to be $735,000 in 2021 and every subsequent 60 months. **Smoke tests, anemometers, and slot velocity testing** To comply with PAR 1407, South Coast AQMD staff expects 28 baghouses (10 new and 18 existing) at 10 facilities to require smoke tests, slot velocity tests, and anemometer purchase. Staff estimates a one-time cost for anemometer purchase of $1,000 each, and a combined annual smoke and slot velocity testing cost of $1,160 for each baghouse. In total, PAR 1407 is expected to result in $13,000 in one-time costs for anemometers in 2021, along with an additional $32,480 annual cost for smoke and slot velocity tests starting in 2021.

Housekeeping

To comply with PAR 1407, South Coast AQMD staff expects all 54 potentially affected facilities to perform annual housekeeping, expected to cost at most $1,000 annually. Moreover, 41 of the 54 facilities are expected to purchase and operate 41 backpack HEPA vacuums due to being smaller facilities, while the remaining 13 facilities are expected to purchase and operate riding HEPA vacuums due to being larger facilities. Staff estimates backpack HEPA vacuums to cost $600 each, and riding HEPA vacuums to cost $11,500 each. In total, PAR 1407 is expected to result in $174,100 in one-time costs for HEPA vacuums in 2019, along with an additional $54,000 annual cost for housekeeping starting in 2019.

Monitoring, reporting, and recordkeeping

South Coast AQMD staff believes additional costs of monitoring, reporting, and recordkeeping required to comply with PAR 1407 to be negligible (e.g. labor cost to record anemometer readings, maintaining pressure gauge data, maintaining source test, smoke test, and slot velocity test records, etc.).

Compliance Costs

PAR 1407 Industry-Wide Expected Compliance Costs (2019-2040)

Real interest rate scenario	Total cost if all expenses made in 2019	Annualized cost
High-rate scenario (4% interest rate)	$43,095,000	$3,102,000
Low-rate scenario (1% interest rate)	$59,257,000	$3,041,000

Note: A higher assumed real interest rate means future expenses have lower current value. The real interest rate corrects for inflation, and is closely approximated by the nominal interest rate minus inflation.

PAR 1407's overall compliance cost is expected to be incurred almost entirely by the industries of steel product manufacturing from purchased steel (NAICS 3312), alumina and aluminum production and processing (NAICS 3313), and foundries (NAICS 3315). PAR 1407's total annualized compliance cost from 2019 - 2040 is expected to range from $3.0 - $3.1 million for the low- (1% real interest rate) and high- (4% real interest rate) rate scenarios respectively.

Based on the high-rate scenario, about 90% of the costs of PAR 1407 stem from purchasing, engineering, installing, and annual maintenance of new pollution control devices (baghouses), with about 81% of the PAR 1407 costs due to annual baghouse maintenance. The remaining costs of PAR 1407 stem from building enclosures, HEPA vacuums, source testing, smoke testing, housekeeping, etc. Additional costs of monitoring, reporting, and recordkeeping and permit modifications are expected to be negligible.

PAR 1407 is expected to have larger compliance costs for a few larger facilities expected to install emission control devices, as indicated in the table

below. Most PAR 1407 potentially affected facilities, 39 of 54, are smaller and expected to not have emissions control devices and not need new emissions control device. On average, each of these smaller facilities is expected to spend around $50,000 over 2019-2040 due to PAR 1407, or around $3,000 per year. A few larger facilities, four of 54, are larger facilities expecting to need one or more new emission control devices. On average, each of these larger facilities is expected to spend around $11,200,000 over 2019-2040 due to PAR 1407, or around $575,000 per year.

PAR 1407 Average Expected Compliance Cost Per Facility by Facility Size (2019-2040)

Facility size	Number potentially affected facilities	Total cost if all PAR 1407 expenses made in 2019	Annualized cost
Small; no existing emissions control device.	39	$50,000	$3,000
Small; with existing emissions control device.	2	$158,000	$8,000
Large; processing low arsenic and low cadmium metals.	9	$1,352,000	$69,000
Large; PAR 1407 requires new emissions control device installation.	4	$11,189,000	$575,000

Note: A small facility is defined to process less than 8,400 tons of metal per year, while a large facility is defined to process 8,400 tons of metal or more per year. Total cost includes all one-time and recurring costs expected due to PAR 1407 from 2019-2040 for an average facility in each facility-size category.

Jobs and Other Socioeconomic Impacts

PAR 1407 Expected Annual Foregone Jobs (2019-2040)

Cost scenario	Annual foregone jobs (% of total jobs in LA, OR, RV, and SB counties)
High-rate scenario (4% interest rate)	92 (0.001%)
Low-rate scenario (1% interest rate)	90 (0.001%)

Based on the above assumptions, the compliance cost of PAR 1407, and the application of the Regional Economic Models, Inc. (REMI) model, it is projected 90 - 92 jobs will be forgone on average annually from 2019 - 2040 in total across all South Coast AQMD industries. The projected job forgone impacts represent about 0.001% of total employment in the four-county

	region for both the low- and high-rate scenarios. Jobs foregone can come from current jobs lost, or potential future created jobs no longer being created. The steel product manufacturing from purchased steel (NAICS 3312), alumina and aluminum production and processing (NAICS 3313), and foundries (NAICS 3315) industries are expected to forego a total of 18 jobs annually from 2019 - 2040 as a result of PAR 1407 being adopted. Due to most expenditures from PAR 1407 expected to be made outside the South Coast AQMD jurisdiction, PAR 1407 is expected to reduce disposable income in the local economy, dampening the demand for local goods and services. Lower demand for local goods and services is expected to result in jobs forgone across the local economy, with 33 of the 92 foregone jobs (in the high-rate scenario) projected to be from construction (NAICS 23), retail trade (NAICS 44-45), food services and drinking places (NAICS 722), and state and local government (NAICS 92).
Competitiveness	As a result of PAR 1407 being implemented, steel product manufacturing from purchased steel (NAICS 3312), alumina and aluminum production and processing (NAICS 3313), and foundries (NAICS 3315) industries are respectively anticipated to experience a rise in their relative costs of production in any given year from 2019-2040 of at most 0.094% - 0.095%, 0.387% - 0.390%, and 0.523% - 0.531% for the low- and high-rate scenarios respectively relative to their predicted baseline costs of production. Moreover, these industries are anticipated to respectively experience an increase in their delivered prices in any given year from 2019-2040 of at most 0.056% - 0.057%, 0.242% - 0.243%, and 0.190% - 0.193% for the low- and high-rate scenarios respectively relative to their predicted baseline delivered prices. These price and cost increases are small relative to average inflation of industrial equipment costs, which was 2.3% from 1999-2018.

INTRODUCTION

Proposed Amended Rule 1407 (PAR 1407) – Control of Emissions of Arsenic, Cadmium, and Nickel from Non-Chromium Metal Melting Operations will implement, in part, the South Coast Air Quality Management District (South Coast AQMD) 2016 Air Quality Management Plan (AQMP) control measure TXM-06 – Control of Toxic Emissions from Metal Melting Facilities. The purpose of TXM-06 is to reduce arsenic, cadmium, nickel, other toxic metals, and particulate matter from foundries and other metal melting operations, as the California Office of Environmental Health Hazard Assessment has classified arsenic, cadmium, and nickel to be either likely carcinogenic or carcinogenic to humans (see staff report).

PAR 1407 applies to non-chromium metal melting operations including smelting, tinning, galvanizing, and other miscellaneous processes where metals are processed in molten form, as these operations can emit toxic air contaminants and particulate matter. PAR 1407 applies only to facilities melting metals containing less than 0.5% chromium content, for example aluminum, brass, bronze, carbon steel, zinc, etc.

PAR 1407 proposes to establish or modify the following requirements for metal melting facilities to meet:

1. Pollution control efficiency and pollution mass emission limits (facilities only required to meet one);
2. Emission control device monitoring requirements (e.g. bag leak detection systems, pressure gauges, smoke tests, etc.);
3. Building enclosures (e.g. walls, overlapping plastic strip curtains, roll-up doors);
4. Housekeeping (e.g. covered containers for metal-containing material storage, additional cleaning around furnace and casting operations, etc.);
5. Source testing to verify facility meets pollution control efficiency requirement or mass emission limits; and
6. Recordkeeping.

PAR 1407 proposes to modify several exemptions, mainly the "metal or alloy purity" exemption and the "clean aluminum scrap" exemption. The "metal or alloy purity" exemption modification would apply only to facilities processing smaller amounts of non-chromium metal, while the "clean aluminum scrap" exemption would end starting January 1, 2021.

LEGISLATIVE MANDATES

The legal mandates directly related to the assessment of the proposed amended rule include South Coast AQMD Governing Board resolutions and various sections of the California Health & Safety Code.

South Coast AQMD Governing Board Resolutions

On March 17, 1989 the South Coast AQMD Governing Board adopted a resolution that calls for an economic analysis of regulatory impacts that includes the following elements:

- Affected industries
- Range of probable costs
- Cost-effectiveness of control alternatives
- Public health benefits

Health & Safety Code Requirements

The state legislature adopted legislation that reinforces and expands the Governing Board resolutions for socioeconomic impact assessments. Health and Safety Code sections 40440.8(a) and (b), which became effective on January 1, 1991, require 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 regional economy
- Range of probable costs, including those to industry
- Availability and cost-effectiveness of alternatives to the rule
- Emission reduction potential
- Necessity of adopting, amending or repealing the rule in order to attain state and federal ambient air quality standards

Health and Safety Code section 40728.5, which became effective on January 1, 1992, requires the South Coast AQMD Governing Board to actively consider the socioeconomic impacts of regulations and make a good faith effort to minimize adverse socioeconomic impacts. It also expands socioeconomic impact assessments to include small business impacts, specifically:

- Type of industries or business affected, including small businesses
- Range of probable costs, including costs to industry or business, including small business

Finally, Health and Safety Code section 40920.6, which became effective on January 1, 1996, requires incremental cost-effectiveness be performed for a proposed rule or amendment that imposes Best Available Retrofit Control Technology or "all feasible measures" requirements relating to ozone, carbon monoxide (CO), oxides of sulfur (SOx), oxides of nitrogen (NOx), and their precursors.

This statute does not apply to PAR 1407 as it addresses toxic pollutants, not criteria pollutants listed in the statute. Moreover, cost effectiveness in terms of dollars per ton is not meaningful for risk-based regulations, since many other factors besides the amount of pollution affect the risk such as the toxic potency and the location of receptors.

AFFECTED INDUSTRIES/FACILITIES

Affected Industries and Industry Profile

PAR 1407 covers non-chromium metal melting operations which emit arsenic, cadmium, and nickel. Examples of these operations are smelting, tinning, galvanizing, and other miscellaneous processes where non-chromium metals, such as aluminum, brass, bronze, carbon steel, and zinc, are processed in molten form.

Approximately 54 facilities are expected to be potentially affected by PAR 1407. All but one of the potentially affected facilities are classified as being in the primary metal manufacturing industry (NAICS 331). Table 1 lists the industries which contain facilities potentially affected by PAR 1407, each industry's expected number of facilities potentially subject to PAR 1407, and total number of facilities in each industry.[1] Approximately 34% of all facilities in the potentially affected industries are expected to be affected by PAR 1407.

Table 1: PAR 1407 Potentially Affected Facilities and Regional Industry Comparison

NAICS	Industry description	Potentially affected facilities	Total facilities	Percent of facilities potentially affected by PAR 1407
331221	Rolled Steel Shape Manufacturing	1	14	7%
331222	Steel Wire Drawing	3	13	24%
331314	Secondary Smelting and Alloying of Aluminum	5	8	61%
331511	Iron Foundries	5	16	31%
331513	Steel Foundries (except Investment)	1	22	5%
331523	Nonferrous Metal Die-Casting Foundries	12	21	59%
331524	Aluminum Foundries (except Die-Casting)	24	30	81%
331529	Other Nonferrous Metal Foundries (except Die-Casting)	2	15	13%
332111	Iron and Steel Forging	1	24	4%
	TOTAL	**54**	**161**	**34%**

Note: Data on total facilities estimated and provided by Economic Modeling Specialists International.

Of the 54 PAR 1407 facilities potentially affected by PAR 1407, 35 are located in Los Angeles (LA) County, four in Orange (OR) County, three in Riverside (RV) County, and 12 in San Bernardino (SB) County.

Although economic information about specific PAR 1407 potentially affected facilities is unavailable, economic information about the broader industries which include these facilities is available. Table 2 presents a 2018 economic profile of the industries potentially affected by PAR 1407 located in LA, OR, RV, and SB counties. These industries consist of about 160 facilities; facilities which earn an average annual revenue of about $2.8

[1] Payrolled facilities is estimated and provided by Economic Modeling Specialists International (EMSI), accessed June 27th, 2019, https://www.economicmodeling.com/. This data presented here relies on payroll information provided by facilities for the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages.

million. These industries employ about 5,550 employees; employees which earn an average annual salary of about $80,000.

Table 2: PAR 1407 Potentially Affected Industries Industry Profile

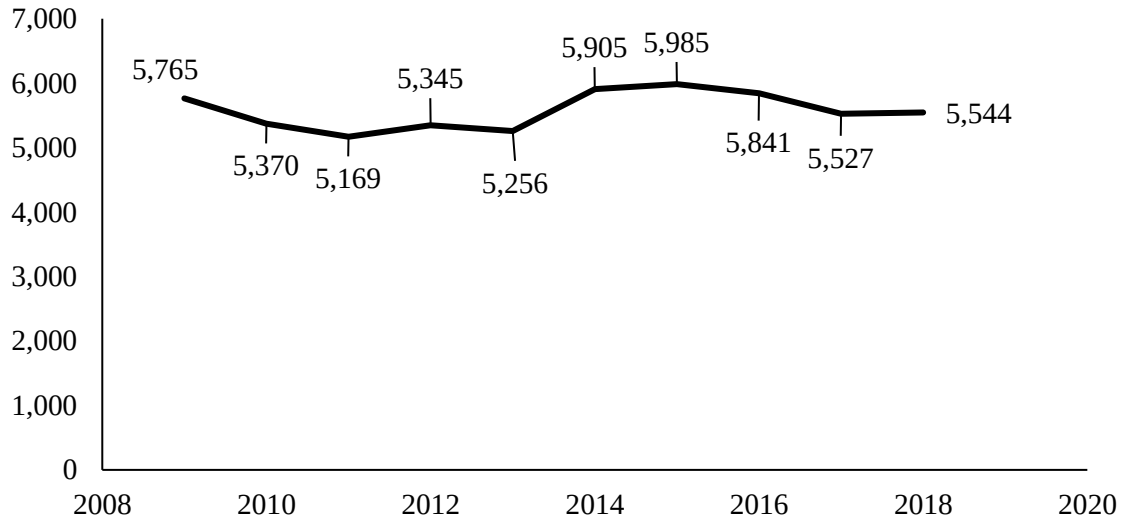
Key statistics of PAR 1407 potentially affected industries in 2018 in LA, OR, RV, and SB counties	
Approximate Number of Facilities	161
Approximate Number of Employees	5,544
Approximate Average Number of Employees per Facility	34
Approximate Annual Average Salary per Employee	$79,468
Approximate Annual Average Revenue per Facility	$2,765,822

Note: Data estimated and provided by Economic Modeling Specialists International for all industries with facilities expected to be affected by PAR 1407, specifically NAICS 331221, 331222, 331314, 331511, 331513, 331523, 331524, 331529, and 332111.

Having an understanding of whether an industry is growing or declining can provide additional information about the extent to which an industry can bear additional costs of regulation without substantial negative consequences. Determining financial success of an industry requires information on industry profit. Industry profit is unknown to South Coast AQMD staff, however information is available about historical employment of PAR 1407 potentially affected industries.

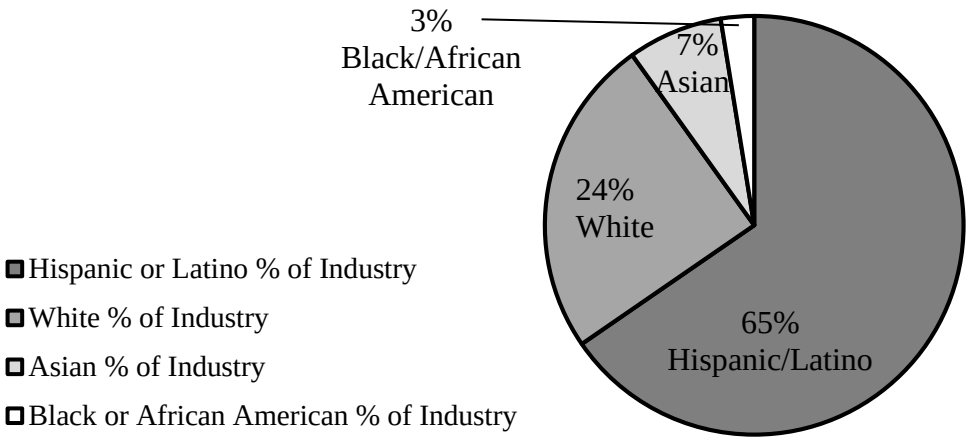
As illustrated by Figure 1, total employment in LA, OR, RV, and SB counties in the industries potentially affected by PAR 1407 was around 5,750 in 2009, and was around 5,550 in 2018. This indicates about a four percent reduction in employment in the industries potentially affected by PAR 1407 from 2009-2018, while there has been a 13 percent reduction for the same industries throughout all of California.

Figure 1: PAR 1407 Potentially Affected Industries Employment 2009-2018



Industries potentially affected by PAR 1407 on average employ more men; men account for approximately 80 percent and women 20 percent of their workforce. As illustrated by Figure 2, these industries on average employ more Hispanic/Latino individuals, with 65 percent of the workforce Hispanic/Latino, 24 percent White, seven percent Asian, and three percent Black/African American.

Figure 2: PAR 1407 Potentially Affected Industries Employment Ethnicity Distribution



Small Businesses

South Coast 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. South Coast AQMD also defines “small business” for the purpose of qualifying for access to services from the South Coast AQMD’s Small Business Assistance Office as a business with an annual receipt of $5 million or less, or with 100 or fewer employees.

U.S. Small Business Administration (SBA) definitions of small businesses vary by six-digit North American Industrial Classification System (NAICS) code. For PAR 1407 potentially affected industries, a firm is considered a “small business” by SBA if it has under a certain number of employees, which is listed in Table 3.[2]

Table 3: PAR 1407 Potentially Affected Industries U.S. Small Business Administration (SBA) Small Business Classification

Employee Range	NAICS (Industry Description)
≤ 500	331513 (Steel Foundries (except Investment)), 331523 (Nonferrous Metal Die-Casting Foundries), 331524 (Aluminum Foundries (except Die-Casting)), 331529 (Other Nonferrous Metal Foundries (except Die-Casting))
≤ 750	331314 (Secondary Smelting and Alloying of Aluminum), 332111 (Iron and Steel Forging)
≤ 1,000	331221 (Rolled Steel Shape Manufacturing), 331222 (Steel Wire Drawing), 331511 (Iron Foundries)

[2] The latest SBA definition of small businesses by industry can be found at the following website: http://www.sba.gov/content/table-small-business-size-standards.

In addition to South Coast AQMD and SBA's definitions of a small business, the federal Clean Air Act Amendments (CAAA) of 1990 also provides a definition of a small business. The CAAA classifies a business as a "small business stationary source" if it: (1) employs 100 or fewer employees, (2) emits less than 10 tons per year of any single pollutant and less than 20 tons per year of all pollutants, and (3) is a small business as defined under the federal Small Business Act (15 U.S.C. Sec. 631, et seq.).

Revenue and employee data from the Dun and Bradstreet Enterprise Database was available for all PAR 1407 potentially affected facilities. The number of facilities potentially affected by PAR 1407 that are classified as small businesses and classification definition are listed in Table 4 below:

Table 4: PAR 1407 Potentially Affected Facilities Small Business Tabulation

Small Business Definition	# Small Businesses
South Coast AQMD (Rule 102)	7 out of 54
South Coast AQMD (Small Business Assistance Office)	43 out of 54
U.S. Small Business Administration (SBA)	54 out of 54
1990 Clean Air Act Amendments (CAAA)	49 out of 54

COMPLIANCE COSTS

Methods and Sources of Data

Analysis Timeframe

To estimate meaningful costs associated with any rule, one must decide on a relevant time horizon over which to estimate the rule's costs. This analysis considers the cost of this rule, PAR 1407, from 2019-2040. This timeframe is considered as some facilities are expected to install building enclosures due to PAR 1407 by July 1st, 2020, and those enclosures are expected to have a 20-year life expectancy.[3]

One-Time and Recurring Costs

The main requirements of PAR 1407 which have cost impacts for potentially affected facilities can be split into two categories: "one-time costs," which are larger expenses seldom occurring (e.g. once every 10 years), and "recurring costs," which are smaller expenses frequently occurring (e.g. annually, twice a year, once every five years).[4] The one-time costs of PAR 1407 include capital and installation costs for baghouses, building enclosures, and continuous pressure monitoring systems. Annual recurring costs of PAR 1407 include housekeeping (e.g. cleaning operation areas of furnaces and casting),

[3] Analysis timeframe chosen to ensure cost and job estimates are easily comparable. Jobs are estimated to be added due to installation of control equipment. Ending the analysis timeframe before installation of rule-induced control equipment occurs a second time would underestimate forgone regional jobs due to rule adoption.

[4] A rule's "one-time costs" are expected to have direct costs (e.g. equipment, installation, engineering, etc.), as well as indirect costs from not using the resources devoted to direct costs for other investments. By dividing up costs into "one-time" and "recurring" costs, the opportunity cost of lost investment value is estimated and included into the total cost of this rule for costs classified as "one-time" costs.

baghouse operating cost (e.g. electricity), monitoring (e.g. calibrating continuous pressure monitors and testing of emissions collection systems), and reporting (e.g. additional source and smoke tests).

Cost Estimate Sources
Staff used the following sources to estimate costs of PAR 1407:

1) U.S. EPA Control Cost Manual to estimate one-time and recurring costs associated with baghouses.[5]
2) Dwyer Instruments for emissions control device bag leak detection systems.
3) Omega Engineering for emissions control device pressure gauges with data acquisition systems.
4) South Coast AQMD Rule 301 for permitting costs for baghouses.
5) South Coast AQMD Rule 1420 and Rule 1420.2 for major building enclosures.
6) W.W. Grainger, Inc. for plastic strip curtains, roll-up doors, and anemometers.
7) Almega Environmental for source testing.
8) Accurate Environmental Services, Inc. for smoke tests.
9) Nassco Inc. for housekeeping (furnace and casting operation area cleaning and slag/waste transport).

Cost Estimate Year
All costs presented in this report are estimated 2019 costs. The per-unit costs used for any expense required from PAR 1407 passing are either 2019 reported costs, or costs from earlier years inflated to 2019 values using the all-industry producer price index reported by the CoreLogic® Marshall & Swift® Equipment Cost Index (M&S index).

Toxins Emissions Point Source Controls (Baghouses)

PAR 1407 requires all arsenic, cadmium, and nickel emissions from metal melting operations to be reduced by a minimum of 99 percent or have mass emissions below the following limits by January 1, 2021: 0.000066 pounds per hour for arsenic, 0.000514 pounds per hour for cadmium, and 0.00848 pounds per hour for nickel.

Many facilities are expected to already meet the above pollution efficiency or mass emission limits and prove this through a source test. Facilities which do not already meet the above pollution efficiency or mass emission limits are expected to install point-source emission controls, namely baghouses.

Of the 54 potentially affected facilities, staff expects four facilities to install a total of 10 new baghouses to comply with PAR 1407. Given a lack of vendor quotes and facility specific information, staff estimates average baghouse one-time and recurring costs for all new baghouses using the U.S. EPA's Control Cost Manual.[6]

[5] U.S. EPA Air Pollution Control Cost Manual, Sixth Edition (https://www3.epa.gov/ttncatc1/dir1/c_allchs.pdf).
[6] Cost per square foot estimates come from the U.S. EPA Air Pollution Control Cost Manual, with costs inflated to 2019 values using the CoreLogic® Marshall & Swift® Equipment Cost Index (M&S index).

Staff estimates baghouses installed to comply with PAR 1407 to cost $256,000 each for purchase and installation,[7] along with $275,000 annually for operation and maintenance of each baghouse.[8] In total, PAR 1407 is expected to result in $2.56 million in one-time costs in 2021, along with an additional $2.75 million annually starting in 2021.

Bag Leak Detection Systems and Pressure Gauges with Data Acquisition Systems

PAR 1407 requires all emission control devices at facilities subject to PAR 1407 to operate, calibrate, and maintain a bag leak detection system (BLDS). Moreover, each emission control device is required to use a gauge to continuously monitor the pressure drop across the emission control device. Each gauge is required by PAR 1407 to be equipped with a continuous data acquisition system (DAS) which will record gauge output data at least every 60 minutes. The gauge reading provides an indication of whether the filters are operating within the proper range of pressure differential recommended by the manufacturer or whether they may be clogged or have leaks.

To provide a conservative estimate of this cost of PAR 1407, each new and existing baghouse is assumed to need a new BLDS and pressure gauge with a DAS. In addition to the 10 new baghouses staff estimates to be installed due to PAR 1407, staff also estimates facilities potentially affected by PAR 1407 have 18 existing baghouses. Therefore, staff expects 28 new bag leak detection systems and gauges with data acquisition systems to be purchased and installed.

Each BLDS is assumed to be purchased in addition to the baghouse itself on January 1, 2021, with a one-time cost of $1,500.[9] Staff also assumes installation of a bag leak detection system to take up to 5 hours, that the installation will be performed by a facility's own staff, and that the wage rate received by a facility's own staff is $40 per hour.[10] Thus the

[7] Assumptions made to derive this estimate are the following: Baghouse purchased and installed has pulse-jet filters using a common housing; bags have a maximum gross cloth area of 4,000 square feet; bags have diameter of 4.875 inches and is made of nomex – resulting in a bag cost of $9.89/square foot; bags use pulse jet cartridge cleaning (discussion with Donaldson Torid and South Coast AQMD source-testing staff verified this is the most common type of baghouse used by metal melting facilities); sales tax assumed to be 9%, as most cities in South Coast AQMD jurisdiction have sales tax rates around this value (range from 7.75% to 10.25%, https://www.cdtfa.ca.gov/taxes-and-fees/ArchiveRates-04-01-19-06-30-19.pdf). This estimates additionally assumes a South Coast AQMD baghouse permit fee of $5,900, which is the highest cost permit fee for baghouses which operate at temperatures below 350 degrees Fahrenheit.

[8] Assumptions made to derive this estimate, on top of those made for the purchase and installation cost estimate, are the following: Staff average wage rate of $40/hour; complete bag replacement every two years; a discount/real interest rate of 4%; complete baghouse replacement every 20 years (recommended by U.S. EPA Air Pollution Control Cost Manual, Chapter 6, subsection 1.5.2) and an industrial electricity price of $0.11/kilowatt-hour (U.S. Energy Information Administration's Electric Power Monthly 04/2019, https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a). This estimation leaves out additional operating materials cost, fuel, water, and dust disposal, all of which are expected to either not occur or be relatively small.

[9] http://www.dwyer-inst.com/Product/ProcessControl/Particulate-DustorBrokenBag-Transmitters/SeriesPMT2 (accessed 7/23/19).

[10] According to EMSI data, average annual salary at PAR 1407 potentially affected facilities is $79,468. Assuming 2,000 hours of work in a year (40 hours per week for 50 weeks) results in an average hourly wage of $40 per hour.

total one-time cost of purchasing and installing bag leak detection systems due to PAR 1407 is expected to be $47,600 in 2021.

Pressure gauges with the ability to log output data in line with PAR 1407's DAS requirement are assumed to be around $1,200 on the high-range.[11] Staff again assumes installation to take up to 5 hours, that installation will be performed by a facility's own staff, and that the wage rate received by a facility's own staff is $40 per hour. Thus each facility is expected to pay $1,400 to purchase and install each pressure gauge with a DAS, resulting in a total cost one-time cost of purchasing and installing pressure gauges and data acquisition systems due to PAR 1407 to be expected to be $39,200 in 2021.

Building Enclosures

PAR 1407 requires no later than July 1, 2020, an owner or operator of a non-chromium metal melting operation conduct all metal melting, metal grinding, and metal cutting operations in a building enclosure.

Major Building Enclosures
Staff expects four of the 54 facilities potentially affected by PAR 1407 to construct major building enclosures due to PAR 1407 upon passage. Major building enclosures entail a facility constructing one or two walls to fully enclose the building.

Historically South Coast AQMD staff has used a figure of $110 per square foot for construction of new total enclosures, e.g. PAR 1469 (amended 2018) and PAR 1420 (amended 2017). However, no facilities affected by PAR 1407 are expected to construct a new total enclosure. Based on discussions with facilities potentially requiring building improvements which provided cost estimates for constructing one wall due to South Coast AQMD Rule 1420.2 – Emission Standards for Lead from Metal Melting Facilities, staff estimates a cost of $19,500, $86,500, and $151,500 for small, medium, and large enclosures respectively.[12]

South Coast AQMD staff expects PAR 1407 facilities to fall in the large size range when compared to Rule 1420.2 facilities. Thus staff estimates each major building enclosure due to PAR 1407 passage to cost $151,500, which would result in a one-time total cost of major building enclosures due to PAR 1407 passage of $606,000 by July 1, 2020.

[11] Some models are closer to $600 (https://www.instrumart.com/products/43974/monarch-track-it-pressure-transmitter-data-logger, https://www.instrumart.com/products/42075/monarch-track-it-pressure-data-logger, https://www.instrumart.com/products/43295/wika-cpg1500-pressure-gauge, accessed 7/19/2019), while some are closer to $1,200 (https://www.transcat.com/fluke-700g30-fluke-700g30, https://www.omega.com/en-us/sensors-and-sensing-equipment/pressure-and-strain/pressure-gauges/p/DPG4000, accessed 7/19/2019).
[12] Values inflated to 2019 dollars using the RSMeans Construction Cost Index (https://www.rsmeansonline.com/references/unit/refpdf/hci.pdf; https://www.rsmeans.com/landing-pages/2019-rsmeans-cost-index.aspx, accessed 7/24/2019).

Minor Building Enclosures
Staff expects 14 of the 54 facilities potentially affected by PAR 1407 to construct minor building enclosures due to PAR 1407 upon passage. Ten facilities are expected to install plastic strip curtains, while four facilities are expected to install roll-up doors.[13]

Staff expects purchase and installation costs associated with plastic strip curtains to be $9 per square foot,[14] with a maximum area covered by plastic strip curtains of 1,000 square feet. Thus any facility expected by staff to install plastic strip curtains due to PAR 1407 is expected to pay $9,000 by January 1, 2021, for a total cost of plastic strip curtains due to PAR 1407 of $90,000 by January 1, 2021.

Staff expects purchase and installation costs associated with roll-up doors to be $44 per square foot,[15] with a maximum area covered by roll-up doors of 1,000 square feet. Thus any facility expected by staff to install roll-up doors due to PAR 1407 is expected to pay $44,000 by January 1, 2021, for a total cost of roll-up doors due to PAR 1407 of $176,000 by January 1, 2021.

Source Tests

PAR 1407 requires all non-chromium metal melting facilities to perform source testing on all furnaces or their respective emissions control devices to meet either the pollution reduction efficiency requirement (d)(3) or the mass emission limits of (d)(4) by January 1, 2021. PAR 1407 requires these source tests to be repeated every 60 months.

[13] Staff performed extensive site visits of the facilities potentially affected by PAR 1407. Staff visited 37 of the 54 facilities potentially affected by PAR 1407, and determined 7 facilities would require installing plastic strip curtains and 3 facilities would require installing roll-up doors due to PAR 1407. The remaining 17 facilities tend to be smaller and South Coast AQMD staff did not find time with those sites to complete a site visit in PAR 1407's rule development process. These facilities are expected to incur no additional costs besides housekeeping and possibly minor building enclosures. Staff estimated three of these non-visited facilities would require plastic strip curtains and one facility would require roll-up doors, based on the distribution of PAR 1407 facilities by county and the distribution of confirmed minor building enclosures.

[14] Search for plastic curtains from Grainger Industrial Supply provided a range of costs for plastic strip curtains (https://www.grainger.com/search/material-handling/dock-equipment/strip-doors-replacement-strips-and-hardware?sst=1&ts_optout=true&searchQuery=curtains, accessed 7/24/2019). The lowest cost was $1,437.88 for 14 feet by 14 feet smooth strip doors from TMI Incorporated. The highest cost was $1,850.91 for 14 feet by 14 feet ribbed strip doors from TMI Incorporated. South Coast AQMD staff expects PAR 1407 to not require the most expensive equipment, but also recognizes associated with installation are not included in these costs. Therefore South Coast AQMD staff assumes a per square foot strip curtain cost equal to the average of the lowest and highest cost curtains, i.e. $9 per square foot (rounded up).

[15] Search for roll-up doors from Grainger Industrial Supply provided a range of costs for manual chain hoist roll-up doors (https://www.grainger.com/search/material-handling/dock-equipment/garage-and-dock-doors?sst=1&ts_optout=true&searchQuery=roll-up+doors, accessed 7/24/2019). The lowest cost was $3,679.16 for 14 feet by 14 feet galvanized steel sheet doors from American Garage Door Supply. The highest cost was $13,505.36 for 14 feet by 14 feet galvanized steel rolling slat doors from American Garage Door Supply. South Coast AQMD staff expects PAR 1407 to not require the most expensive equipment, but also recognizes costs associated with installation are not included in these costs. Therefore South Coast AQMD staff assumes a per square foot roll-up door cost equal to the average of the lowest and highest cost doors, i.e. $44 per square foot (rounded up).

Staff is unsure which method any facility will use to comply with PAR 1407. To ensure conservative cost estimation, all facilities are assumed to meet the pollution reduction efficiency requirement, which results in costlier source testing (inlet and outlet source tests instead of only outlet source tests).

Staff expects all new and existing baghouses due to PAR 1407, i.e. 28 baghouses, to require source testing, along with an additional seven furnaces, for a total of 35 source tests. Staff estimates each source test will cost around $21,000.[16] Staff estimates the total cost of source testing to be $735,000 in 2021 and every subsequent 60 months.

Smoke Tests

PAR 1407 requires a smoke test be performed on every emission collection system leading to emissions control devices (e.g. baghouses) by January 1, 2021, and every six months thereafter. Staff estimates 10 new baghouses will be installed due to PAR 1407, along with a pre-existing 18 baghouses installed in the PAR 1407 potentially affected facilities. Therefore, staff estimates 28 smoke tests to be performed on January 1, 2021, and every six months thereafter.

South Coast AQMD staff expects most facilities potentially affected by PAR 1407 to use contractors to perform smoke tests for them to ensure all rule requirements for smoke tests are verifiably completed. Staff estimates each smoke test to cost around $500 per emissions control device,[17] for a total cost of $14,000 on January 1, 2021, and every six months thereafter, for an annual cost of $28,000 starting in 2021.

Anemometers

PAR 1407 requires using a calibrated anemometer to measure the slot velocity at each slot and pressure at each push air manifold of every emission collection system by January 1, 2021, and every six months thereafter. Staff estimates 10 new baghouses at four facilities will be installed due to PAR 1407, along with a pre-existing 18 baghouses installed at 10 facilities in the PAR 1407 potentially affected facilities. Therefore, staff estimates 28 sets of slot velocity tests being performed on January 1, 2021, and every six months thereafter, along with 13 anemometers purchased by January 1, 2021.[18]

[16] Source test cost estimates were provided by Morgan Nguyen of Almega Environmental for baghouses. The cost estimates range from $17,000 to $21,000 depending on if additional labor is needed for manlift access to an inlet or outlet. The cost assumes submittal of a source-test protocol, three hour source test runs with three runs for each piece of equipment being source tested, inlet and outlet source testing, and laboratory analysis being handled by the source-test company. Morgan Nguyen indicated source-test costs for furnaces could be one-half to two-thirds the cost of baghouse source tests. Nonetheless, the baghouse source-test cost was applied to furnaces to provide a conservative cost estimate.

[17] Smoke test cost estimates for a single furnace were provided by Wally Moe of Accurate Environmental Services, Inc. Staff assumes each emission control device (baghouse) to be controlling pollution from a single furnace.

[18] One facility already has baghouses and is expected to get more due to PAR 1407, lowering the expected anemometer count by one facility to 13.

Staff expects each anemometer to cost at most $1,000, as many hot-wire and rotating-vane digital anemometers are sold for less than $1,000.[19] Thus staff estimates total anemometer cost of PAR 1407 to be $13,000 in January 1, 2021. Staff expects each set of slot velocity tests for each emission control device to require at most two hours to perform by facility staff, for a total of $80 per set of slot velocity tests per emission control device. Therefore, staff estimates total slot velocity tests using anemometers cost of PAR 1407 to be $2,240 on January 1, 2021, and every six months thereafter.

Housekeeping and Recordkeeping

Each of the 54 PAR 1407 potentially affected facilities is expected to perform the following types of housekeeping:

- Weekly cleaning for areas where furnace and casting operations occur and waste generated from housekeeping activities is stored, disposed of, recovered, or recycled;
- Weekly cleaning of locations where cutting and grinding occur;
- Quarterly cleaning and inspection of equipment will be required at all facilities with emission control devices;
- Within an hour of an event that results in the deposition of fugitive metal dust emissions, the area where the activity occurred will be required to be cleaned using an approved cleaning method;
- Removal of weather caps that restrict the flow of exhaust air from stacks that are sources of emissions from non-chromium metal melting; and
- Slag and waste generated from housekeeping and construction or maintenance of building enclosures shall be transported within closed conveyor systems or covered containers (for materials below 500 degrees Fahrenheit and not located within a building enclosure or enclosed storage area).

Additionally, each of the 54 PAR 1407 potentially affected facilities is expected to maintain records of the following for three years, with at least the two most recent years kept onsite:

- Monthly quantities of raw materials processed along with purchase records;
- Material testing data;
- Source test data;
- Housekeeping activities;
- Data files, inspection, calibration documentation, and maintenance of emission control devices;
- Anemometer data; and
- Smoke test documentation.

Staff assumes all 54 PAR 1407 facilities to require HEPA vacuums, with 13 facilities being larger likely choosing to purchase riding vacuum cleaners, and the remaining 41 facilities choosing to purchase smaller vacuum cleaners, e.g. backpack vacuums. Staff estimates the

[19] https://www.grainger.com/category/test-instruments/air-movement/air-velocity-meters-and-anemometers?sortKey=price&sortOrder=desc (accessed 7/27/19).

incremental cost from riding vacuum cleaners due to PAR 1407 to be $11,500.[20] Staff estimates the incremental cost from backpack vacuums to be $600.[21] Therefore, staff estimates the total one-time cost of housekeeping due to PAR 1407 to be $174,100 30 days after rule adoption.

Staff expects the combination of annual housekeeping and recordkeeping costs to be at most $1,000. Thus the total annual cost from housekeeping and recordkeeping due to PAR 1407 passage is an annually recurring cost of $54,000 starting 30 days after rule adoption.

Cost Summary

Table 6 presents the distribution of overall predicted costs of PAR 1407 by select cost categories. Table 6 indicates the present worth value and annualized cost of each cost category. The present worth value in 2019 dollars presents the estimated total PAR 1407 cost from 2019-2040 by cost category if all costs paid over this timeframe due to PAR 1407 were paid in 2019. The annualized cost presents the estimated total PAR 1407 annual cost from 2019-2040 by cost category, where one-time costs are spread over an equipment's lifetime while including lost investment value to facilities where the investments are assumed to have either a 4% or 1% real rate of return (nominal interest rate net inflation).

The majority of predicted costs, about $2.5 million annually, is attributed to annual operation and maintenance of baghouses installed due to PAR 1407, or about 81% of the PAR 1407 total cost. The one-time cost associated with baghouses, e.g. purchase, engineering, installation, etc., is estimated to be $245,000 - $287,000 annually for the low- and high-rate scenarios respectively. The low-rate scenario assumes a real interest rate of 1%, while the high-rate scenario assumes a 4% real interest rate.[22] The average annual cost of PAR 1407 is estimated to be $3.0 - $3.1 million between 2019 and 2040, for the low- and high-rate scenarios respectively.

Table 7 presents total and average annual compliance costs of PAR 1407 by industry. Most of the cost due to PAR 1407 is expected to be incurred by facilities processing or producing alumina or aluminum ($28.7 - $39.5 million or 67% - 69% of the total cost for the low- and high-rate scenarios respectively). The industry which incurs the second-highest expected cost due to PAR 1407 is foundries ($10.2 - $14.0 million of the total cost or 24% for both the low- and high-rate scenarios). The remaining expected cost due to PAR 1407

[20] Riding vacuum price from Nassco for the Chariot 2 iVacuum ATV 24" HEPA Rider Vacuum (https://www.nasscoinc.com/janitorial/floorcleaningequipment/commercialgradevacuumcleanersandaccessories/ridingvacuums/windsorchariot2ivacuumatv24ridervacuum/?, accessed 7/25/2019). This search provided prices ranging from $10,410 to $11,450. A rounded up value of $11,500 is assumed to provide a conservative estimate of the incremental rider vacuum cost for each larger facility due to PAR 1407.

[21] Backpack vacuum price from Nassco for the Proteam Super CoachVac HEPA backpack vacuum (https://www.nasscoinc.com/janitorial/floorcleaningequipment/commercialgradevacuumcleanersandaccessories/backpackvacuums/proteamsupercoachvacbackpackvaccumhepa/?, accessed 7/25/2019). This search provided a price of $571.76, resulting in a rounded up value of $600 to provide a conservative estimate of the incremental backpack vacuum cost for each smaller facility due to PAR 1407.

[22] The real interest rate can be viewed as the percentage return on an investment net inflation. A higher real interest rate entails a higher cost of using facility funds to meet regulatory requirements.

is expected to be incurred almost entirely by facilities producing steel ($4.2 million - $5.8 million of the total cost or about 10% for both low- and high-rate scenarios).[23]

Table 6: PAR 1407 Projected Total and Average Annual Cost by Cost Category for Potentially Affected Facilities (2019 Dollars)

	Present Worth Value (2019)		Annual Average (2019-2040)	
Cost Categories	**1% Discount Rate**	**4% Discount Rate**	**1% Real Interest Rate**	**4% Real Interest Rate**
One-Time Cost				
Baghouse**	$4,777,000	$3,962,000	$245,000	$287,000
Bag leak detection system**	$36,000	$30,000	$2,000	$2,000
Pressure gauge with DAS**	$34,000	$28,000	$2,000	$2,000
Anemometer**	$24,000	$20,000	$1,000	$1,000
Major enclosure***	$627,000	$602,000	$32,000	$43,000
Roll up doors***	$182,000	$175,000	$9,000	$12,000
Plastic curtains***	$102,000	$98,000	$5,000	$7,000
Rider HEPA vacuum*	$507,000	$412,000	$26,000	$29,000
Backpack HEPA vacuum*	$83,000	$68,000	$4,000	$5,000
Total one-time cost	**$6,372,000**	**$5,395,000**	**$326,000**	**$388,000**
Recurring Cost				
Baghouse annual maintenance	$48,635,000	$34,545,000	$2,499,000	$2,499,000
Smoke test	$495,000	$352,000	$25,000	$25,000
Source test	$2,652,000	$1,995,000	$134,000	$134,000
Slot velocity test	$40,000	$28,000	$2,000	$2,000
Housekeeping	$1,062,000	$780,000	$54,000	$54,000
Total recurring cost	**$52,884,000**	**$37,700,000**	**$2,714,000**	**$2,714,000**
Total	**$59,257,000**	**$43,095,000**	**$3,041,000**	**$3,102,000**

Note: Values rounded to nearest thousand dollars.
*Cost annualized over 6 years
**Cost annualized over 10 years
***Cost annualized over 20 years

PAR 1407 is expected to have larger compliance costs for a few larger facilities expected to install emission control devices, as indicated in the table below. Most of the PAR 1407 potentially affected facilities, 39 of 54, are smaller and expected to not have and not need a new emissions control device. On average, each of these smaller facilities is expected to spend around $50,000 over 2019-2040 due to PAR 1407, or around $3,000 per year. A few larger facilities, four of 54, are larger facilities expecting to need one or more new emission

[23] Percentages do not add to 100%. The remaining costs are borne by other industries listed in Table 1.

control devices. On average, each of these larger facilities is expected to spend around $11,200,000 over 2019-2040 due to PAR 1407, or around $575,000 per year.

Table 7: PAR 1407 Projected Total and Average Annual Compliance Cost by Industry for Potentially Affected Facilities (2019 Dollars)

Industry Description	Number Potentially Affected Facilities	Present Worth Value (2019)		Average Annual Costs (2019-2040)	
		1% Discount Rate	4% Discount Rate	1% Discount Rate	4% Discount Rate
Steel product manufacturing from purchased steel (3312)	4	$5,793,000	$4,196,000	$297,000	$302,000
Alumina and aluminum production and processing (3313)	5	$39,488,000	$28,665,000	$2,028,000	$2,068,000
Foundries (3315)	44	$13,954,000	$10,218,000	$715,000	$730,000
Forging and stamping (3321)	1	$22,000	$16,000	$1,000	$1,000
Total	**54**	**$59,257,000**	**$43,095,000**	**$3,041,000**	**$3,102,000**

Note: Values rounded to nearest thousand dollars.

PAR 1407 is expected to have larger compliance costs for a few larger facilities expected to install emission control devices, as indicated in Table 8. Most PAR 1407 potentially affected facilities, 39 of 54, are smaller and expected to not have emissions control devices and not need new emissions control device. On average, each of these smaller facilities is expected to spend around $50,000 over 2019-2040 due to PAR 1407, or around $3,000 per year. A few larger facilities, four of 54, are larger facilities expecting to need one or more new emission control devices. On average, each of these larger facilities is expected to spend around $11,200,000 over 2019-2040 due to PAR 1407, or around $575,000 per year.

JOBS AND OTHER SOCIOECONOMIC IMPACTS

The REMI model (PI+ v2.3.1) was used to assess the total socioeconomic impacts of the regulatory change from PAR 1407.[24] The model links the economic activities in the counties of Los Angeles, Orange, Riverside, and San Bernardino, and for each county, it is comprised of five interrelated blocks: (1) output and demand, (2) labor and capital, (3) population and labor force, (4) wages, prices and costs, and (5) market shares.[25]

[24] Regional Economic Modeling Inc. (REMI). Policy Insight® for the South Coast Area (160-sector model). Version 2.3.1, 2019.

[25] Within each county, producers are made up of 156 private non-farm industries and sectors, three government sectors, and a farm sector. Trade flows are captured between sectors as well as across the four counties and the rest of U.S. Market shares of industries are dependent upon their product prices, access to production inputs, and local infrastructure. The demographic/migration component has 160

Table 8: PAR 1407 Average Expected Compliance Cost Per Facility by Facility Size from 2019-2040

Facility size	Number potentially affected facilities	Total cost if all PAR 1407 expenses made in 2019	Annualized cost
Small; no existing emissions control device.	39	$50,000	$3,000
Small; with existing emissions control device.	2	$158,000	$8,000
Large; processing low arsenic and low cadmium metals.	9	$1,352,000	$69,000
Large; PAR 1407 requires new emissions control device installation.	4	$11,189,000	$575,000

Note: A small facility is defined to process less than 8,400 tons of metal per year, while a large facility is defined to process 8,400 tons of metal or more per year. Total cost includes all one-time and recurring costs expected due to PAR 1407 from 2019-2040 for an average facility in each facility-size category. Values rounded to nearest thousand dollars.

The assessment herein is performed relative to a baseline ("business as usual") where PAR 1407 would not be adopted. Adoption of PAR 1407 would create a regulatory scenario under which the potentially affected facilities would incur average annual compliance costs totaling $3.0 - $3.1 million for low- and high-rate scenarios respectively. Direct effects of proposed rules/amendments must be estimated and used as inputs into the REMI PI+ model in order for the model to assess secondary and induced impacts for all actors in the four-county economy on an annual basis and across a user-defined horizon (2019 - 2040). Direct effects of PAR 1407 include additional costs to the potentially affected facilities and additional sales by local vendors of equipment, devices, or services supplying the necessary goods/services to help the potentially affected facilities meet the proposed requirements of PAR 1407.

While compliance expenditures may increase the cost of doing business for affected facilities, the purchase and installation of additional equipment combined with spending on operating and maintenance may increase sales in other sectors. Table 9 lists the industry sectors modeled in REMI PI+ that would either incur a cost or benefit from the compliance expenditures.[26]

All compliance costs expected due to PAR 1407 are included fully into the REMI PI+ model as spending in the industry categories listed in Table 9. This could substantially mute negative regional effects on employment if the REMI PI+ model assumed all spending from any industry in the South Coast AQMD jurisdiction was spent within the

ages/gender/race/ethnicity cohorts and captures population changes in births, deaths, and migration. (For details, please refer to REMI online documentation at http://www.remi.com/products/pi.)

[26] Improved public health due to reduced air pollution may improve worker productivity and other economic factors. However, public health benefit assessment requires modeling air quality improvements. Current air-quality modeling employed by South Coast AQMD performs poorly with changes in air pollution less than 10 tons per day of criteria pollutants since such changes are hard to distinguish from random variation in the model. Toxic air pollutants present additional analytical challenges to estimate monetized public health benefit due to the localized nature of their air quality impact.

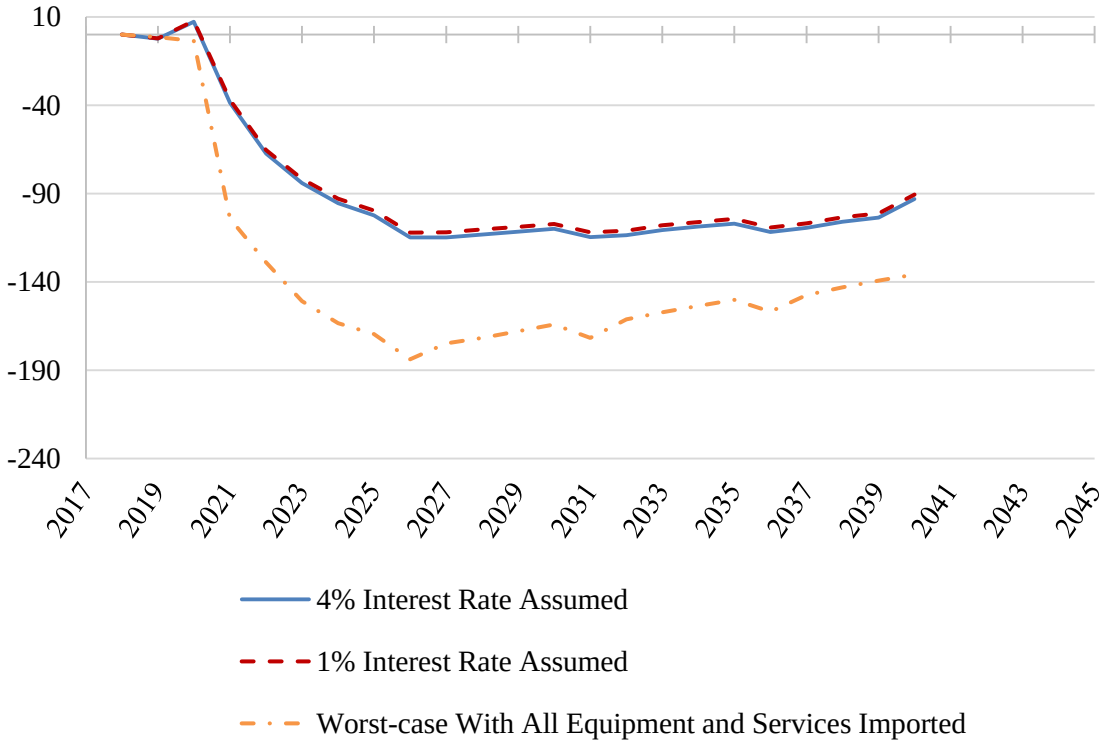
South Coast AQMD jurisdiction. However, each industry is provided a set of "regional purchase coefficients" within the REMI PI+ model, which accounts for industries within the South Coast AQMD jurisdiction spending often going to other facilities outside the South Coast AQMD jurisdiction.

Table 9: Industries Incurring Costs or Benefitting from PAR 1407 Compliance

Compliance Cost Source	REMI Industries Incurring Compliance Costs (NAICS)	REMI Industries Benefitting from Compliance Spending (NAICS)
Baghouse	Steel Product Manufacturing from Purchased Steel (NAICS 3312); Alumina and Aluminum Production and Processing (NAICS 3313); Foundries (NAICS 3315)	*One-time-Capital:* Industrial Machinery Manufacturing (NAICS 3332*)*
Bag leak detection system		
Pressure gauge with DAS		
Anemometer		
Major enclosure		*One-time-Capital:* Construction (NAICS 23)
Roll up doors		
Plastic curtains		
Baghouse annual maintenance		*Recurring Cost:* Management, scientific, and technical consulting services (NAICS 5416)
Smoke test		
Source test		
Slot velocity test		
Rider HEPA vacuum		*One-time-Capital:* Electric Equipment Manufacturing (3353)
Backpack HEPA vacuum	Steel Product Manufacturing from Purchased Steel (NAICS 3312); Alumina and Aluminum Production and Processing (NAICS 3313); Foundries (NAICS 3315); Forging and Stamping (NAICS 3321)	

As presented in Figure 3, PR 1407 is expected to result in an average of 90 - 92 jobs foregone annually from 2019 - 2040 for the low- and high-rate scenarios respectively. The projected job impacts represent about a 0.001% decrease of total employment in the four-county region for both low- and high-rate scenarios. A "worst-case" scenario, where all purchases made due to PR 1407 went to suppliers outside the four-county region, resulted in approximately 141 jobs on average expected to be foregone annually from 2019 - 2040.

Figure 3: PAR 1407 Projected Regional Foregone Jobs, 2019 - 2040

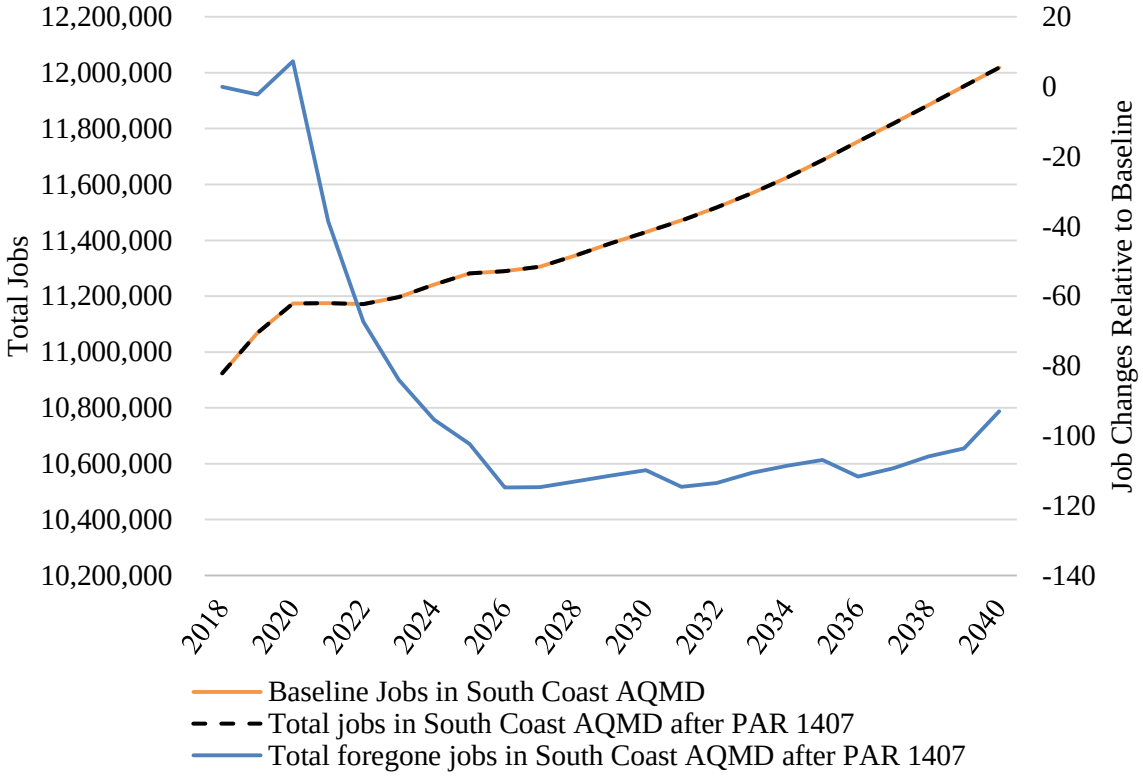


Jobs foregone can come from currently existing jobs or future new jobs. Figure 4 plots predicted foregone jobs, baseline jobs, and total jobs following adoption of PAR 1407 from 2019 – 2040 for the high-rate scenario. Figure 4 makes clear the predicted job impacts from PAR 1407 are small relative to the total predicted jobs, and that jobs can be foregone without someone currently employed losing their job.

Table 10 presents expected job impacts of PAR 1407 for the top 10 industries with negative job impacts, one industry with expected positive job impacts, and the remaining industries grouped together. Jobs are expected to be foregone in the overall economy throughout the time period considered (2019 - 2040). The alumina and aluminum production and processing industry (NAICS 3313) along with the foundry industry (NAICS 3315) is expected to bear most of the estimated total compliance cost of PAR 1407, with an expected total 18 jobs forgone annually between 2019 and 2040. The remainder of the projected reduction in employment due to PAR 1407 implementation is spread across many other

major sectors of the economy due to secondary and induced impacts of PAR 1407, occurring mainly in construction (NAICS 23) and retail trade (NAICS 44-45).[27]

Figure 4: PAR 1407 Projected Regional Job Impact, 2019 – 2040 (High-Rate Scenario)



Positive job impacts from adoption of PAR 1407 in the management, scientific, and technical consulting services sector (NAICS 5416) are due to PAR 1407 potentially affected facilities completing baghouse annual maintenance, smoke testing, source testing, and slot velocity testing.

Competitiveness

The additional cost brought on by PAR 1407 would increase the cost of services rendered by the affected industries in the region. The magnitude of the impact depends on the size, diversification, and infrastructure in a local economy as well as interactions among industries. A large, diversified, and resourceful economy, like that under the South Coast AQMD jurisdiction, would absorb the impact described above with relative ease.

[27] Secondary impacts on jobs are changes in jobs to supplying industries of the affected industries, while induced impacts on jobs are changes in jobs due to overall disposable income changes in the South Coast AQMD economy.

Changes in production/service costs would affect prices of goods produced locally. The relative delivered price of a good is based on its production cost and the transportation cost of delivering the good to where it is consumed or used. The average price of a good at the place of use reflects prices of the good produced locally and imported elsewhere.

Table 10: PAR 1407 Job Impacts (High-Rate Scenario)

Industries (NAICS)	2019	2024	2029	2035	2040	Average Annual Job Changes (2019 - 2040)	Average Annual Baseline (2019 - 2040)	% Change from Baseline Jobs
Alumina and aluminum production and processing (3313)	0	-14	-17	-18	-17	-14	3,000	-0.517%
Construction (23)	5	-19	-12	-8	-1	-11	489,000	-0.002%
Retail trade (44-45)	0	-11	-11	-12	-10	-10	1,001,000	-0.001%
State and local government (92)	0	-7	-9	-10	-9	-7	911,000	-0.001%
Food services and drinking places (722)	0	-5	-6	-7	-6	-5	779,000	-0.001%
Wholesale trade (42)	0	-4	-4	-5	-4	-4	454,000	-0.001%
Foundries (3315)	0	-4	-4	-4	-3	-4	3,000	-0.125%
Real estate (531)	0	-4	-4	-4	-3	-3	583,000	-0.001%
Offices of health practitioners (6211-6213)	0	-2	-3	-3	-3	-2	413,000	-0.001%
Business support services; investigation and security services; other support services (5614, 5616, 5619)	0	-2	-2	-2	-2	-2	256,000	-0.001%
Management, scientific, and technical consulting services (5416)	0	17	16	19	14	15	154,000	0.010%
Other industries	-8	-41	-55	-53	-50	-46	6,426,000	-0.001%
Total	**-2**	**-95**	**-111**	**-107**	**-93**	**-92**	**11,471,000**	**-0.001%**

Note: Adding all industry values may not add to total amount due to rounding.

Steel product manufacturing from purchased steel (NAICS 3312), alumina and aluminum production and processing (NAICS 3313), and foundries (NAICS 3315) industries are anticipated to respectively experience a rise in their relative costs of production of 0.094% - 0.095%, 0.387% - 0.390% , and 0.523% - 0.531% for the low- and high-rate scenarios respectively. Moreover, these industries are anticipated to respectively experience an

increase in their delivered prices by 0.056% - 0.057%, 0.242% - 0.243%, and 0.190% - 0.193% for the low- and high-rate scenarios respectively.

Delivered prices a facility may charge for specific goods or services may increase at a greater rate than predicted, allowing incurred costs to be passed through to downstream industries and end-users. Due to the increased costs imposed by PAR 1407, the remaining sectors are also likely to experience increases in the relative cost of production and relative delivered price with respect to their counterparts in the rest of the U.S.

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