

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Socioeconomic Impact Assessment For: Proposed Amended Rule 1148.1 – Oil and Gas Production Wells

July 2024

Deputy Executive Officer

Planning, Rule Development, and Implementation
Sarah L. Rees, Ph.D.

Assistant Deputy Executive Officer

Planning, Rule Development, and Implementation
Michael Krause

Planning and Rules Manager

Planning, Rule Development, and Implementation
Barbara Radlein

Authors:

Chris Yu – Assistant Air Quality Specialist
Daniel Penoyer – Air Quality Specialist

Technical Assistance:

Jose Enriquez – Air Quality Specialist
Rodolfo Chacon – Program Supervisor

Reviewed By:

Xian-Liang (Tony) Tian, Ph.D. – Program Supervisor
Shah Dabirian, Ph.D. – Consultant
Erika Chavez – Senior Deputy District Counsel

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
GOVERNING BOARD**

Chair: VANESSA DELGADO
Senator (Ret.)
Senate Rules Committee Appointee

Vice Chair: MICHAEL A. CACCIOTTI
Councilmember, South Pasadena
Cities of Los Angeles County/Eastern Region

MEMBERS:

ANDREW DO
Supervisor, First District
County of Orange

CURT HAGMAN
Supervisor, Fourth District
County of San Bernardino

GIDEON KRACOV
Governor's Appointee

PATRICIA LOCK DAWSON
Mayor, Riverside
Cities of Riverside County Representative

LARRY MCCALLON
Mayor Pro Tem, Highland
Cities of San Bernardino County

HOLLY J. MITCHELL
Supervisor, Second District
County of Los Angeles

VERONICA PADILLA-CAMPOS
Speaker of the Assembly Appointee

V. MANUEL PEREZ
Supervisor, Fourth District
County of Riverside

NITHYA RAMAN
Councilmember, Fourth District
City of Los Angeles Representative

CARLOS RODRIGUEZ
Councilmember, Yorba Linda
Cities of Orange County

JOSE LUIS SOLACHE
Mayor, Lynwood
Cities of Los Angeles County/Western Region

EXECUTIVE OFFICER:

WAYNE NASTRI

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION.....	1
LEGISLATIVE MANDATES	1
AFFECTED FACILITIES.....	2
SMALL BUSINESS.....	2
COMPLIANCE COST.....	4
Capital/One-Time Costs	4
Recurring Costs.....	5
Total Compliance Cost	6
MACROECONOMIC IMPACTS ON THE REGIONAL ECONOMY	8
Impact of PAR 1148.1	9
Price Impact and Competitiveness	13
REFERENCES.....	14

EXECUTIVE SUMMARY

On March 17, 1989, the South Coast Air Quality Management District (South Coast AQMD) Governing Board adopted a resolution which requires an analysis of the economic impacts associated with adopting and amending rules and regulations. In addition, Health and Safety Code Section 40440.8 requires a socioeconomic impact assessment for any proposed rule, rule amendment, or rule repeal which “will significantly affect air quality or emissions limitations.” Lastly, Health and Safety Code Section 40920.6 requires an incremental cost-effectiveness analysis for a proposed rule or amendment which imposes Best Available Retrofit Control Technology (BARCT) or “all feasible measures” requirements relating to emissions of ozone, carbon monoxide (CO), sulfur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds (VOC), and their precursors.

Proposed Amended Rule 1148.1 (PAR 1148.1) has been developed to reduce the emissions of volatile organic compounds (VOC), toxic air contaminants (TAC), and total organic compounds (TOC) from wellheads and well cellars located at oil and gas production facilities. A socioeconomic impact assessment has been conducted accordingly, and the following presents a summary of the analysis and findings of the socioeconomic impact assessment conducted for PAR 1148.1.

Key Elements of PAR 1148.1

PAR 1148.1 would require oil and gas production facilities to take measures to reduce VOC, TAC, and TOC emissions from the operation of wellheads and well cellars and improve the handling of produced gas. These emission reductions would be achieved by requiring enhanced leak detection, establishing emission limits for internal combustion engines (ICEs) and microturbines powered by produced gas, and requiring cleaner engines on workover rigs.

Affected Facilities and Industries

PAR 1148.1 affects approximately 323 facilities, with 240 located in Los Angeles County, 81 located in Orange County, and two located in San Bernardino County. All the affected facilities are classified under the Oil and Gas Extraction industry according to the North American Industry Classification System (NAICS) code 211.

A small business analysis was also conducted for the facilities affected by PAR 1148.1. The following table presents the number of affected facilities that qualify as a small business under each definition used in the analysis.

Definition	Number of Facilities
South Coast AQMD Rule 102	59
South Coast AQMD's Small Business Assistance Office	241
U.S. Small Business Administration	255

Assumptions for the Analysis

The key requirements of PAR 1148.1 that have cost impacts include: 1) Optical Gas Imaging (OGI) cameras and inspection for leak detection; 2) NOx emission limits for engines and microturbines that are powered by produced gas; 3) source testing of engine and microturbine emissions; and 4) more stringent engine standards for workover rigs.

Specifically, PAR 1148.1 would likely cause the purchase and maintenance of OGI cameras, as well as training and labor costs to use these cameras for leak detection. Compliance with new emission limits for engines powered by produced gas would likely be achieved by the installation of 3-way catalysts and associated air pollution control equipment which requires annual maintenance and would be verified periodically by source tests. Finally, workover rigs would be retrofitted with Tier 4 Final engines which also require incremental annual maintenance expenditures.

This analysis projects the costs of implementing the control measures from 2025 to 2046. This analysis assumes that affected facilities purchase OGI cameras, 3-way catalysts, and Tier 4 Final engines in 2025, 2026, and 2027, respectively, which are the most cost-effective control strategies to comply with the requirements of PAR 1148.1.

Compliance Costs

The total present value of the compliance cost for PAR 1148.1 is estimated at \$92.0 million and \$66.4 million for a 1% and 4% discount rate, respectively. The average annual compliance cost of PAR 1148.1 is estimated to range from \$4.1 million to \$4.7 million for a 1% to 4% real interest rate, respectively. When using a 4% real interest rate, this analysis indicates roughly 53% of the annual average compliance cost would be incurred by Tier 4 Final engine expenses, followed by OGI expenses (43%), 3-way catalyst expenses (3%), and source testing expenses (1%).

The following table presents a summary of the average annual cost of PAR 1148.1 by cost category.

Cost Categories	Annual Average Cost of PAR 1148.1 (2025-2046)	
	1% Real Interest Rate	4% Real Interest Rate
Capital Costs		
OGI Camera	\$1,254,441	\$1,422,588
3-Way Catalyst & Air/Fuel Controller	\$48,203	\$49,611
3-Way Catalyst Installation	\$40,169	\$41,342
Workover Rig with Tier 4 Final Engine	\$1,496,363	\$1,929,591
Recurring Costs		
OGI Inspection Labor	\$480,000	\$480,000
OGI Camera Maintenance	\$100,000	\$100,000
OGI Camera Training	\$50,000	\$50,000
3-Way Catalyst & Air/Fuel Controller Maintenance	\$23,864	\$23,864
Tier 4 Final Engine Maintenance	\$545,455	\$545,455
Source Testing	\$64,773	\$64,773
Total	\$4,103,267	\$4,707,223

Job Impacts

Direct costs and corresponding spending of PAR 1148.1 are used as inputs to the Regional Economic Models, Inc (REMI PI+) model to assess job impacts and secondary/induced impacts for all the industries in the four-county economy on an annual basis from 2025-2046.

When the compliance cost is annualized using a 4% real interest rate, the REMI analysis forecasted 28 net jobs foregone annually in the four-county region on average over the forecast period, relative to the baseline forecast. Note that the jobs foregone mainly implies less job growth compared to the baseline scenario, not necessarily indicating the loss of current jobs. The jobs foregone are mainly attributable to the necessary equipment that facilities would have to install and purchase due to the implementation of PAR 1148.1. The largest job impacts occur in year 2033 when the REMI model forecasts 44 jobs foregone relative to the baseline scenario. However, the model also predicts 35 and 16 jobs gained in 2025 and 2027, respectively, due to the benefits from capital expenditures of affected facilities.

**Competitiveness
and Price
Impacts**

The overall impacts of PAR 1148.1 on production cost and delivered prices in the region are expected to be minimal. The REMI model indicates PAR 1148.1 will lead to a maximum increase of 0.44% and 0.02% on production cost and delivered price, respectively, in the year 2027.

INTRODUCTION

In 2004, the South Coast AQMD Governing Board adopted Rule 1148.1, which sought to reduce VOC emissions from wellheads and well cellars at oil and gas production facilities through increased inspection and maintenance, and controls for produced gas emissions. Rule 1148.1 applies to facilities engaged in activities like drilling, well completion, well rework, and well injection.

Rule 1148.1 was amended in 2015 after South Coast AQMD took enforcement action at an urban oil and gas production facility due to odor nuisance, in addition to increased concerns in local communities about potential environmental impacts from oil extraction techniques such as hydraulic fracturing. The objectives of these amendments were to: 1) minimize impacts on residents and sensitive receptors; 2) improve work practices; and 3) establish odor mitigation procedures.

PAR 1148.1 was developed to further reduce emissions of volatile organic compound (VOC), toxic air contaminants (TAC), and total organic compounds (TOC) from the operation of wellheads, well cellars, and handling of produced gas at oil and gas production facilities.

LEGISLATIVE MANDATES

The legal mandates directly related to the socioeconomic impact assessment of PAR 1148.1 include South Coast AQMD Governing Board resolutions and various sections of the Health and Safety Code.

South Coast AQMD Governing Board Resolution

On March 17, 1989, the South Coast AQMD Governing Board adopted a resolution that requires an analysis of the economic impacts associated with adopting and amending rules and regulations that considers all of the following elements:

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

Health and Safety Code Requirements

The state legislature adopted legislation which reinforces and expands the South Coast AQMD Governing Board resolution requiring socioeconomic impact assessments for rule development projects. Health and Safety Code Section 40440.8, which went into effect on January 1, 1991, requires a socioeconomic impact assessment for any proposed rule, rule amendment, or rule repeal which "will significantly affect air quality or emissions limitations."

To satisfy the requirements in Health and Safety Code Section 40440.8, the scope of the socioeconomic impact assessment should include all of the following information:

- 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; and
- 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 went into effect on January 1, 1992, requires the South Coast AQMD Governing Board to: 1) actively consider the socioeconomic impacts of regulations; 2) make a good faith effort to minimize adverse socioeconomic impacts; and 3) include small business impacts. To satisfy the requirements in Health and Safety Code Section 40728.5, the socioeconomic impact assessment should include the following information:

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

Finally, Health and Safety Code Section 40920.6, which went into effect on January 1, 1996, requires an incremental cost-effectiveness analysis for a proposed rule or amendment which imposes Best Available Retrofit Control Technology (BARCT) or “all feasible measures” requirements relating to emissions of ozone, carbon monoxide (CO), sulfur oxides (SO_x), nitrogen oxides (NO_x), VOC, and their precursors. A BARCT assessment has been conducted and can be found in chapter 2 of the Draft Staff Report.¹

AFFECTED FACILITIES

PAR 1148.1 would affect an estimated 323 onshore oil and/or gas well facilities. Out of these 323 affected facilities, 240 (74%) are located in Los Angeles County, 81 (25%) are located in Orange County, and two (1%) are located in San Bernardino County. All the affected facilities are classified under the Oil and Gas Extraction industry according to the North American Industry Classification System (NAICS) code 211 and either belong to the industries of Crude Petroleum Extraction (NAICS 211120) or Natural Gas Extraction (NAICS 211130). Staff estimated that the 323 affected facilities are owned by approximately 100 parent companies.

SMALL BUSINESS

The South Coast AQMD defines a “small business” in Rule 102 for purposes of fees as one which employs 10 or fewer persons and which earns less than \$500,000 in gross annual receipts. The 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 (SBAO) as a business with an annual receipt of \$5 million or less, or with 100 or fewer employees. In addition to the South Coast AQMD’s definition of a small business, the federal Small Business Administration (SBA) and the federal 1990 Clean Air Act Amendments (1990 CAAA) each have their own definition of a small business.

The 1990 CAAA classifies a business as a “small business stationary source” if it: 1) employs 100 or fewer employees; 2) does not emit more than 10 tons per year of either VOC or NO_x; and 3) is a small business as defined by the SBA. Based on firm revenue and employee count, the SBA

¹ South Coast AQMD, Preliminary Draft Staff Report for Proposed Amended Rule 1148.1 – Oil and Gas Production Wells, https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1148_2/par-1148-1-preliminary-draft-staff-report-final.pdf, accessed May 28, 2024.

definition of a small business varies by six-digit NAICS codes.² For example, facilities in the Crude Petroleum Extraction (NAICS 211120) and Natural Gas Extraction (NAICS 211130) sectors will be considered a small business if they employ 1,250 or fewer people.

South Coast AQMD mostly relies on Dun & Bradstreet data to conduct a small business analysis on privately owned companies. In cases where the Dun & Bradstreet data are unavailable or unreliable, other external data sources such as Manta, Hoover, and LinkedIn data will be used. The determination of data reliability is based on data quality confidence codes in the Dun & Bradstreet data as well as staff's discretion. Revenue and employee data for publicly owned companies is gathered from Securities and Exchange Commission (SEC) filings. Since subsidiaries under the same parent company are interest-dependent, the revenue and employee data of a facility's parent company will be used for the determination of its small business status. Employment and revenue data from 2023 Dun & Bradstreet as well as other external sources are available for only 291 facilities. Note that although the employment and revenue data for some facilities are unknown or missing, the current data used for this small business analysis represent the most thorough and accurate information obtainable as of the date of the draft report. However, staff was unable to determine small business classification for the affected facilities using the 1990 CAAA definition because most of these facilities are not required to submit annual emission reports under South Coast AQMD Rule 222 – Filing Requirements for Specific Emission Sources Not Requiring a Written Permit Pursuant to Regulation II and thus, their emissions data are not available.³ Table 1 presents the number of small businesses based on each definition.

Table 1
Number of Affected Small Business Facilities Based on Various Definitions

Definition	Number of Facilities
South Coast AQMD Rule 102	59
South Coast AQMD's Small Business Assistance Office	241
U.S. Small Business Administration	255

² U.S. Small Business Administration, 2023 Small Business Size Standards, <https://www.sba.gov/document/support-table-size-standards>, accessed May 28, 2024.

³ South Coast AQMD, Rule 222 – Filing Requirements for Specific Emission Sources Not Requiring a Written Permit Pursuant to Regulation II, <https://www.aqmd.gov/docs/default-source/rule-book/reg-ii/Rule-222.pdf>, accessed May 28, 2024.

COMPLIANCE COST

The elements of PAR 1148.1 which have potential cost impacts include: 1) enhanced leak detection requirements involving OGI inspections, 2) NOx emission limits for equipment using produced gas and compliance verification through source testing, and 3) Tier 4 Final engine standards for workover rigs.

This analysis assumes equipment purchases and services for control measures required by PAR 1148.1 are paid directly to equipment suppliers and service providers, and that OGI inspections are administered by the facilities using their own staff. Overall, this socioeconomic impact assessment takes a conservative approach to cost estimation, and some of the cost estimates may be slightly higher than the estimates discussed in the Draft Staff Report in order to account for uncertainty in certain costs. Capital and other one-time costs include OGI cameras, 3-way catalysts and air/fuel controllers for ICEs powered by produced gas, and Tier 4 Final Engines for workover rigs. Recurring costs include maintenance for OGI cameras, 3-way catalysts, and Tier 4 Final engines, OGI camera inspection labor, OGI camera training, and source testing for ICE engines and microturbines. Manufacturer-provided specifications for microturbines indicate that this equipment can achieve the NOx emission limit of 9 parts per million by volume (ppmv), and this analysis assumes that no additional emissions control technology will be required for these units.

While there are alternative air pollution control technologies discussed in the Draft Staff Report which affected facilities could use to comply with the requirements of PAR 1148.1, this analysis assumes that facilities will choose the lowest cost technologies and will purchase equipment in the year the compliance deadline goes into effect. The compliance cost for PAR 1148.1 is forecasted for a 22-year period from 2025 to 2046, reflecting the expected purchase of OGI cameras in 2025 and a 20-year useful life of Tier 4 Final engines, which are expected to be purchased in 2027. The expected purchase dates are based on the proposed compliance deadlines of PAR 1148.1. All estimates of the compliance cost are presented in 2023 dollars.

Many of the costs estimated in this analysis are dependent on site-specific factors and on business decisions made by facilities subject to PAR 1178.⁴ Staff strove to represent costs as realistically as possible, given that many factors would ultimately dictate what price a business will pay to implement a control. The estimated cost for each item was either estimated based on quotes from equipment manufacturers or service providers, data provided by affected facilities, or internal South Coast AQMD data. The procedure and assumptions for each cost estimate are discussed in the next section and the costs are presented in 2023 dollars.

Capital/One-Time Costs

OGI Cameras

PAR 1148.1 requires monthly Optical Gas Imaging (OGI) inspection to detect leaks from equipment more promptly than current inspection techniques and frequency allow. OGI cameras can detect vapors from leaking equipment by visualizing a variety of gas wavelengths. Staff identified roughly 100 parent companies for the 323 affected facilities. Each parent company is

⁴ South Coast AQMD Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities was amended in September 2023 to include OGI inspections, <https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-1178>, Accessed June 28, 2024.

assumed to purchase an OGI camera in 2025, the first year of rule compliance, and that OGI cameras will be used to perform leak inspections at all the affected facilities owned by the parent company. According to vendors and affected facilities, each camera will cost approximately \$120,000 and have an anticipated 10-year useful life. Since costs are forecasted until 2046, each parent company is expected to purchase an OGI camera three times within the forecast horizon, with a total cost of \$36 million.

3-way Catalyst and Air/Fuel Controller

For the affected facilities that utilize produced gas to power stationary ICEs onsite, PAR 1148.1 would require those engines to comply with a NO_x emission standard of 11 ppmv, corrected to 15% oxygen (O₂) on a dry basis, which is the same as what is required in Rule 1110.2 for stationary engines. Based on the BARCT analysis discussed in the Draft Staff Report, this analysis assumes that 3-way catalysts paired with air/fuel controllers will be installed on the affected equipment to meet this NO_x emission standard. Staff obtained cost estimates both from equipment manufacturers and existing cost information on exhaust emission controls collected during the November 2019 amendment to Rule 1110.2. The cost of a 3-way catalyst, air/fuel ratio controller, and installation of these components is estimated to be \$5,000, \$1,000, and \$5,000, respectively. Based on site visits to the affected facilities, an estimated 25 ICEs fueled by produced gas will each need to be retrofitted with a 3-way catalyst and an air/fuel ratio controller. The estimated useful life for this equipment is three years. The 3-way catalysts and air/fuel controllers are assumed to be installed in 2026, with a total of seven replacements over the forecast period, yielding an estimated total cost of \$1.9 million.

Tier 4 Final Workover Rigs

PAR 1148.1 would require workover rigs be equipped with an engine that meets the emissions standards of a Tier 4 Final engine. Staff estimated that there are currently 40 workover rigs utilized at the affected facilities to conduct maintenance activities on oil producing wells or water injection wells. Staff was able to obtain costs from several operators that have already retrofitted their workover rigs with Tier 4 Final engines, which is approximately \$1,000,000 per workover rig, with an expected useful life of 20 years. On site visits, staff observed that 10 workover rigs have already been retrofitted with Tier 4 Final engines, with 30 remaining workover rigs requiring a retrofit. This analysis assumes the 30 workover rigs will be retrofitted in 2027, with an estimated total cost of \$30 million.

Recurring Costs

OGI Camera Training

Training by OGI camera manufacturers is required to ensure proper operation of this equipment. Training is expected to occur every two years and cost approximately \$1,000 per trainee. Staff assumed one existing employee at each of the 100 parent companies will receive OGI training, resulting in a total cost of \$100,000 every two years. The first training is anticipated to occur in 2025, with 11 total training sessions over the forecast period, yielding a total cost of \$1.1 million.

Labor for OGI Inspection

PAR 1148.1 requires monthly OGI inspections at each facility to detect potential leaks. This analysis assumes that the inspections will be conducted by employees of facilities' parent companies and that the monthly inspection will take one day on average to inspect all the facilities

under the same parent company. With an assumed wage rate of \$50 per hour, the total annual labor cost associated with the inspection is estimated at \$4,800 for each parent company (1 person x 8 hrs/day x \$50/hr x 12 inspections/yr). For all 100 parent companies, the total yearly cost will be \$480,000. Since inspections will occur once a month over the 22-year forecast period, the total labor cost for OGI inspections is estimated to be \$10.6 million.

OGI Camera Maintenance

Annual maintenance is necessary for OGI cameras to ensure that equipment is calibrated and working properly. Each camera has an expected annual maintenance cost of \$1,000, yielding a total annual cost of \$100,000 for the 100 cameras. Maintenance will begin in 2025, the first year when OGI cameras are purchased, and will occur annually throughout the forecast period, bringing the total cost of OGI camera maintenance to roughly \$2.2 million.

3-Way Catalyst and Air/Fuel Controller Maintenance

Annual maintenance and calibration are necessary for 3-way catalysts and air/fuel controllers to ensure the equipment is operating at maximum efficiency. Each 3-way catalyst has an annual maintenance cost of approximately \$1,000 and all of the 25 ICEs fueled by produced gas will need to be retrofitted with a 3-way catalyst. As such, maintenance expenses are projected to begin in 2026 with an average annual maintenance cost of \$25,000, resulting in a total estimated maintenance cost of \$525,000 over the forecast period.

Tier 4 Final Workover Rig Maintenance

Starting in 2027, annual maintenance will be necessary for workover rigs equipped with Tier 4 Final engines to ensure that they continue to meet the more stringent emission standards in PAR 1148.1. Each workover rig has an estimated annual maintenance cost of \$20,000, yielding a total annual maintenance cost of \$600,000 for all 30 rigs and a total cost of \$12 million over the forecast period.

Source Testing

Periodic source testing of ICEs and microturbines powered by produced gas will be required within two years after PAR 1148.1 is adopted and every five years thereafter. According to discussions with vendors and affected facilities, each source test is estimated to cost between \$3,000 and \$5,000. As a conservative approach, this analysis assumes a cost of \$5,000 per source test. Source tests are required on an estimated universe of 32 existing microturbines and 25 ICEs, for a cost of \$285,000 in the years when source testing is required, and a total cost of \$1.4 million over the forecast period.

Total Compliance Cost

The average annual cost of implementing PAR 1148.1 includes the estimated amortized capital and recurring compliance costs averaged over the period from 2025 to 2046. For the calculation of the present value of total compliance costs, all the annual compliance costs will be discounted to 2024, the anticipated first year PAR 1148.1 is adopted.⁵

⁵ To find the present value of a stream of future payments, a discount rate will be used to reflect the idea that costs borne in the future are worth less than the costs incurred in the present period.

The present value of estimated compliance cost is estimated at \$92.0 million and \$66.4 million for a 1% and 4% discount rate, respectively. The average annual compliance cost of PAR 1148.1 is estimated to range from \$4.1 million to \$4.7 million for a 1% to 4% real interest rate, respectively.⁶ Table 2 presents the present value of estimated compliance costs and the average annual compliance cost of PAR 1148.1 by cost categories.

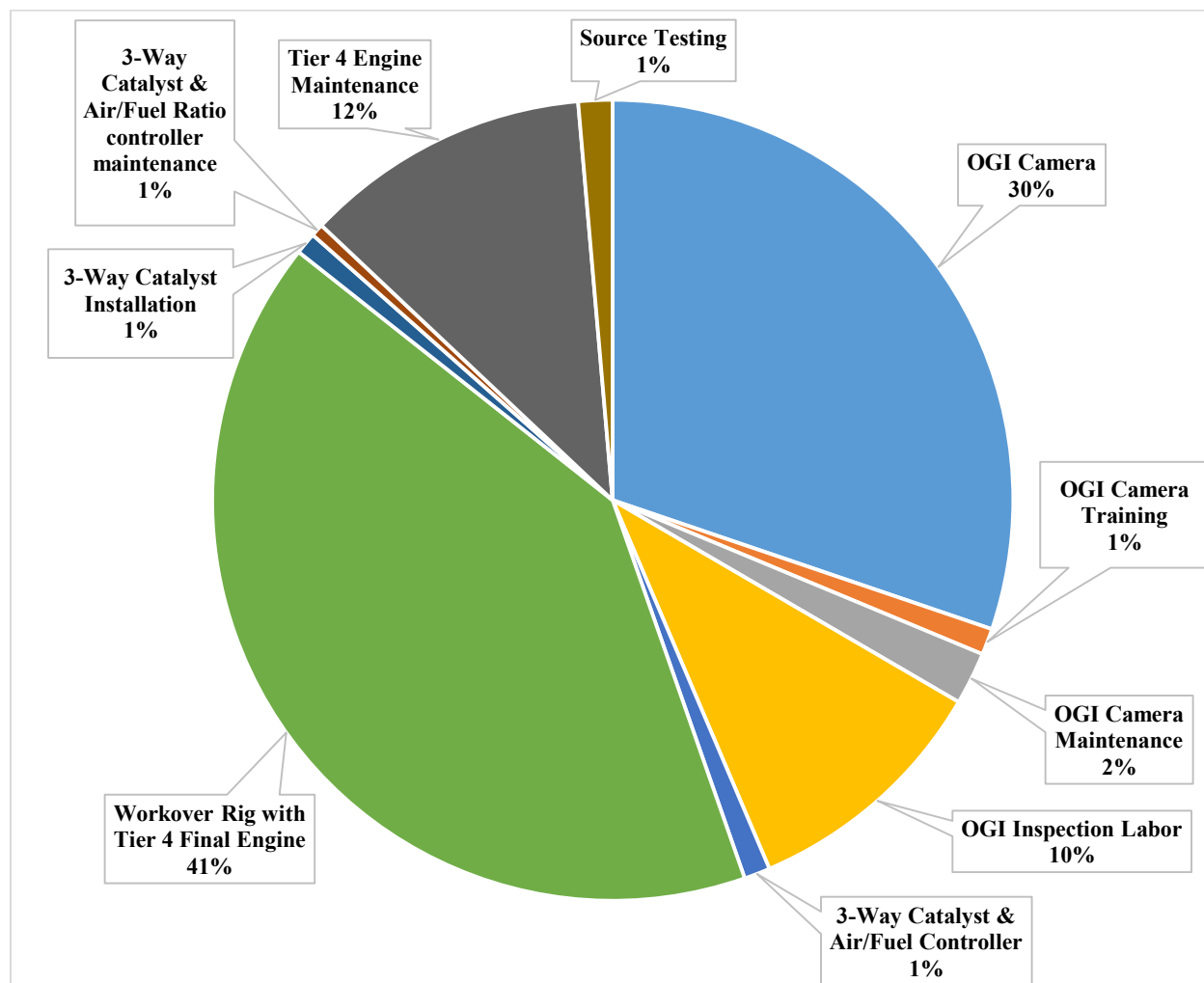
Table 2
Total Present Value and Annual Average Estimated Costs of PAR 1148.1

Cost Categories	Present Value (2024)		Annual Average (2025 – 2046)	
	1% Discount Rate	4% Discount Rate	1% Real Interest Rate	4% Real Interest Rate
Capital Costs				
OGI Camera	\$27,968,616	\$20,557,981	\$1,254,441	\$1,422,588
3-Way Catalyst & Air/Fuel Controller	\$970,357	\$701,098	\$48,203	\$49,611
3-Way Catalyst Installation	\$808,631	\$584,249	\$40,169	\$41,342
Workover Rig with Tier 4 Final Engine	\$37,547,885	\$26,669,891	\$1,496,363	\$1,929,591
Recurring Costs				
OGI Inspection Labor	\$9,436,982	\$6,936,535	\$480,000	\$480,000
OGI Camera Maintenance	\$1,966,038	\$1,445,112	\$100,000	\$100,000
OGI Camera Training	\$987,910	\$736,724	\$50,000	\$50,000
3-Way Catalyst & Air/Fuel Controller Maintenance	\$466,757	\$337,239	\$23,864	\$23,864
Tier 4 Final Engine Maintenance	\$10,613,991	\$7,539,012	\$545,455	\$545,455
Source Testing	\$1,264,748	\$924,654	\$64,773	\$64,773
Total	\$92,034,913	\$66,432,495	\$4,103,267	\$4,707,223

Figure 1 presents the estimated average annual compliance costs of PAR 1148.1 by cost category. Maintenance of workover rigs, OGI cameras and Tier 4 Final engines account for the largest portions of the average annual compliance cost at 41%, 30% and 12%, respectively. All the estimated compliance costs will be incurred by the industry of Oil and Gas Extraction (NAICS 211).

⁶ Real interest rate is defined as the nominal interest rate adjusted for inflation, reflecting the true cost of borrowing.

Figure 1
Total Annual Estimated Costs of the PAR 1148.1 by Expense Category



MACROECONOMIC IMPACTS ON THE REGIONAL ECONOMY

The Regional Economic Models, Inc (REMI) 2024 PI+ v3 model was used to assess the socioeconomic impacts of PAR 1148.1.⁷ The model links the economic activities in the counties of Los Angeles, Orange, Riverside, and San Bernardino, and 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.⁸

⁷ Regional Economic Modeling Inc. (REMI). Policy Insight® for the South Coast Area (70-sector model). Version 3. 2023.

⁸ 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 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.>)

It should be noted that the REMI model is not designed to assess impacts on individual operations. The model was used to assess the impacts of the proposed amended rule on various industries that make up the local economy. Cost impacts on individual operations were assessed outside of the REMI model and were aggregated to the 70-sector NAICS code level to be used as inputs into the REMI model.

Impact of PAR 1148.1

This assessment is performed relative to a baseline (“business as usual”) forecast where PAR 1148.1 would not be implemented. The analysis assumed that the 323 affected facilities would finance the capital and installation costs of equipment at a 4% real interest rate, and that these one-time costs are amortized and incurred over the useful life of the equipment.

Direct costs of PAR 1148.1 are used as inputs to the REMI model which relies on this information to assess secondary and induced impacts for all the industries in the four-county economy on an annual basis over the 2025-2046 period. Direct effects of PAR 1148.1 include equipment, labor, training, and other costs discussed in the previous compliance cost section.

While the compliance expenditures that are expected to be incurred by the affected facilities would increase their cost of doing business, the purchase of the required equipment and services would increase the sales and subsequent spending of businesses in various sectors, some of which may be located in South Coast AQMD’s jurisdiction. Table 3 lists the 70-sector NAICS codes modeled in REMI that would incur either as a direct cost or direct benefit from this anticipated compliance costs/spending.

Table 3
Industries Incurring and Benefitting from Compliance Costs/Spending

Source of Compliance Cost	REMI Industries Incurring Compliance Costs (NAICS)	REMI Industries Benefitting from Compliance Spending (NAICS)
OGI Camera	Oil and Gas Extraction (211)	<i>Capital & Recurring:</i> Computer and Electronic Product Manufacturing (334)
OGI Camera Maintenance		
OGI Camera Training		
OGI Inspections		N/A*
3-Way Catalyst & Air/Fuel Controller		<i>Capital:</i> Machinery Manufacturing (333)
3-Way Catalyst Installation		
3-Way Catalyst & Air/Fuel Controller Maintenance		<i>Recurring:</i> Repair and Maintenance (811)
Tier 4 Final Engine Maintenance		
Workover Rig with Tier 4 Final Engine		<i>Capital:</i> Transportation Equipment Manufacturing (336)
Source Testing		<i>Recurring:</i> Professional, Scientific, and Technical Services (541)

*The wage income earned by employees conducting OGI inspections is modeled as an increase in compensation for employees in the Oil and Gas Extraction industry and thus does not directly benefit a single industry.

Regional Job Impacts

In the REMI model, costs were distributed to each county based on the share of affected facilities in that county. Table 4 presents the forecasted jobs foregone and gained in the four-county economy for selected industries and years. When the compliance cost is annualized using a 4% real interest rate, the REMI model projects that there will be 28 jobs foregone on average over the 2025-2046 period relative to the baseline forecast. However, the jobs foregone can be considered minimal as they only represent 0.002% of the average forecasted baseline number of jobs in the regional economy. The largest forecasted jobs foregone occur in 2032 with 42 jobs foregone relative to the baseline forecast. For specific industries, the sectors of Construction (NAICS 23), Professional, Scientific, and Technical Services (NAICS 54), Oil and Gas Extraction (NAICS 211), and State and Local Government are expected to lose seven, four, four and three jobs on average, respectively, relative to the baseline forecast. The anticipated jobs foregone can be attributed to the increased spending that affected facilities have to incur to comply with PAR

1148.1. However, the REMI analysis shows that the sectors of Repair and Maintenance (NAICS 811) and Computer and Electronic Product Manufacturing (NAICS 334) are expected to gain three and two jobs on average, respectively, relative to the baseline forecast. The anticipated job gains are the result of the purchase of capital equipment and maintenance expenditures. Note that in Table 4, the “All Industries” row includes the full set of 70 industrial sectors modeled in the REMI software, including the 10 selected industries.

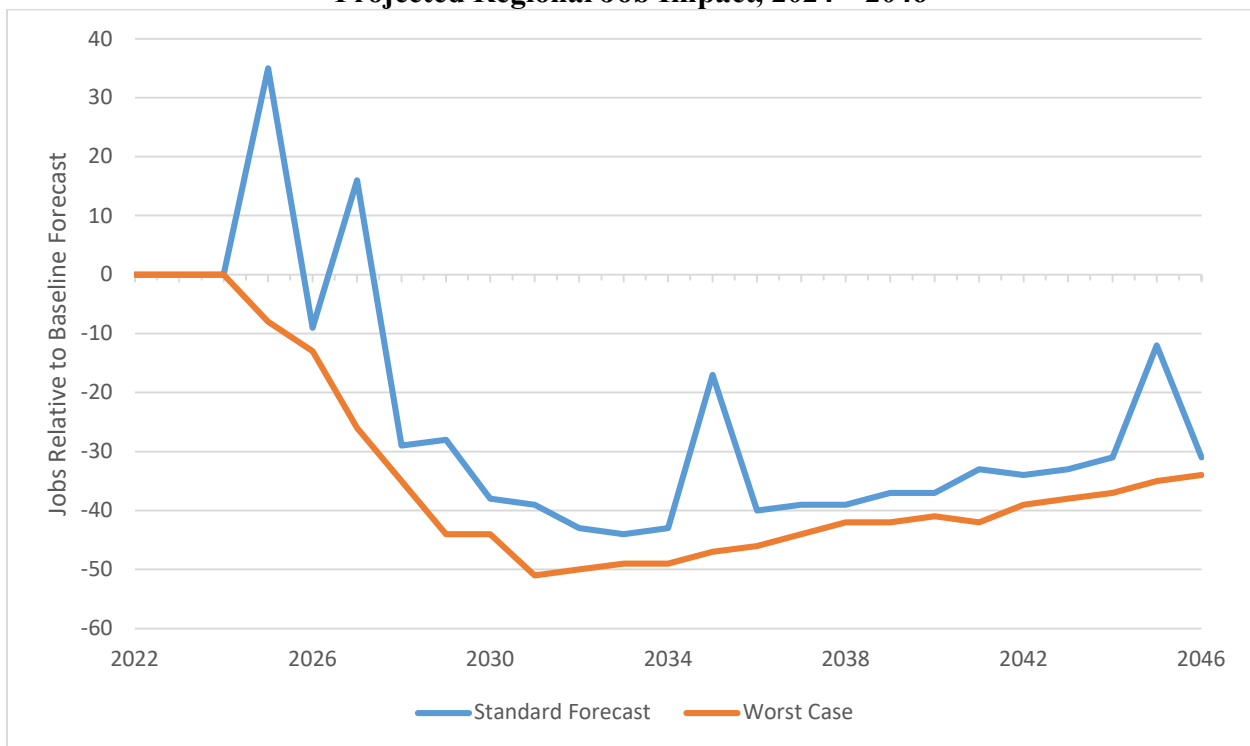
Table 4
Projected Job Impact of PAR 1148.1 for Selected Industries and Years

Industry (NAICS)	2025	2027	2033	2040	2046	Annual Average (2025-2046)	Baseline Number of Jobs (Average, 2024-2046)	Percent Relative to Baseline
Construction (23)	3	-3	-12	-6	-4	-7	514,757	0.0014%
Professional, Scientific and Technical Services (54)	2	0	-5	-6	-5	-4	967,340	0.0004%
Oil and Gas Extraction (211)	-1	-2	-5	-4	-3	-4	2,769	0.1445%
State and Local Government (92)	1	1	-5	-5	-4	-3	948,156	0.0003%
Retail Trade (44-45)	2	1	-3	-3	-3	-2	805,513	0.0002%
Administrative and Support Services (561)	2	1	-3	-3	-3	-2	816,654	0.0002%
Primary Metal Manufacturing (331)	0	1	0	0	0	0	13,132	0%
Motor Vehicles, Bodies and Trailers, and Parts Manufacturing (3361-3363)	0	5	0	0	0	0	9,034	0%
Computer and Product Manufacturing (334)	16	0	0	0	0	2	119,459	0.0017%
Repair and Maintenance (811)	0	5	3	2	2	3	120,046	0.0024%
Other Industries	10	8	-14	-12	-11	-9	7,130,286	0.0002%
All Industries	35	16	-44	-37	-31	-28	11,447,145	0.0002%

Note: Totals may not sum due to rounding.

In addition, in 2013, South Coast AQMD contracted with Abt Associates Inc. to review the South Coast AQMD socioeconomic assessments for Air Quality Management Plans and individual rules with the goal of providing recommendations that could enhance South Coast AQMD's socioeconomic analyses. In 2014, Abt Associates Inc. published a report which included a recommendation for South Coast AQMD to enhance socioeconomic analyses by testing major assumptions through conducting a scenario analysis. As such, South Coast AQMD generally includes an alternative worst-case scenario in Socioeconomic Impact Assessments which analyzes a scenario that assumes the affected facilities would purchase all feasible monitoring equipment and services from providers located outside of the South Coast AQMD's jurisdiction.⁹ In short, this alternative worst-case scenario only models the impacts of the costs of compliance with the proposed amended rule and excludes any market benefits associated with revenue realized by service providers in the four-county region. This also excludes benefits derived from the wages earned by employees performing OGI inspections. This hypothetical scenario is designed to test the sensitivity of the REMI analysis to the assumptions regarding how compliance costs and revenues would be distributed inside and outside of South Coast AQMD's jurisdiction. In practice, however, materials and labor for installation are more likely to be provided by local suppliers. As shown in Figure 2, this worst-case scenario would result in an annual average of approximately 39 jobs foregone relative to the baseline scenario. However, the job impact can be considered as minimal since the 39 jobs foregone only represent 0.0003% of the average forecasted baseline jobs in the regional economy.

Figure 2
Projected Regional Job Impact, 2024 – 2046



⁹ Abt Associates Inc., August 2014, Review of the SCAQMD Socioeconomic Impact Assessment Chapter 6, Section 3, <https://www.aqmd.gov/docs/default-source/Agendas/aqmp/scaqmd-report---review-socioeconomic-assessments.pdf>, accessed May 16, 2024.

Price Impact and Competitiveness

The impact of PAR 1148.1 on production costs and delivered prices in the South Coast AQMD region is not expected to be substantial. According to the REMI Model, PAR 1148.1 is projected to increase the relative delivered price of products in the industry of Oil and Gas Extraction (NAICS 211) by 0.02% in the year 2027 and will have even smaller increases in that industry over the remainder of the forecast period. Similarly, the relative cost of production in the industry of Oil and Gas Extraction is expected to increase by 0.44% in 2027 and will see even smaller increases in the industry throughout the remainder of the forecasted period. Given the minimal potential increase in delivered prices and cost of production, PAR 1148.1 is not expected to affect the ability of firms to compete with producers located outside of South Coast AQMD's jurisdiction.

REFERENCES

Abt Associates Inc., August 2014, Review of the SCAQMD Socioeconomic Assessments, Chapter 6, Section 3, <https://www.aqmd.gov/docs/default-source/Agendas/aqmp/scaqmd-report---review-socioeconomic-assessments.pdf>.

Regional Economic Modeling Inc. (REMI). Policy Insight® for the South Coast Area (70-sector model). Version 3, 2024.

South Coast AQMD, April 2023, Rule 222 – Filling Requirements for Specific Emission Sources Not Requiring a Written Permit Pursuant to Regulation II, <https://www.aqmd.gov/docs/default-source/rule-book/reg-ii/Rule-222.pdf>.

South Coast AQMD, August 2023, PAR 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities, <https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-1178>

South Coast AQMD, July 2024, Draft Staff Report for Proposed Amended Rule 1148.1 – Oil and Gas Production Wells, https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1148_2/par-1148-1-preliminary-draft-staff-report-final.pdf?sfvrsn=6

U.S. Small Business Administration, March 2023, Table of Small Business Size Standards, <https://www.sba.gov/document/support-table-size-standards>.