

Adopt Proposed Amendments to District Rule 4702 (Internal Combustion Engines)

San Joaquin Valley Air Pollution Control District
Governing Board Meeting
August 19, 2021

Rule 4702 Overview

- District Rule 4702 applies to internal combustion (IC) engines rated at 25 bhp or greater
 - Spark-ignited (SI) engines
 - Compression-ignited engines
- Engines in Valley used to power pumps, compressors, or electrical generators at public and private facilities
- Many permitted compression-ignited engines used as emergency engines to provide backup power
- Rule limits emissions of NO_x, CO, VOCs, and SO_x

Internal Combustion Engine

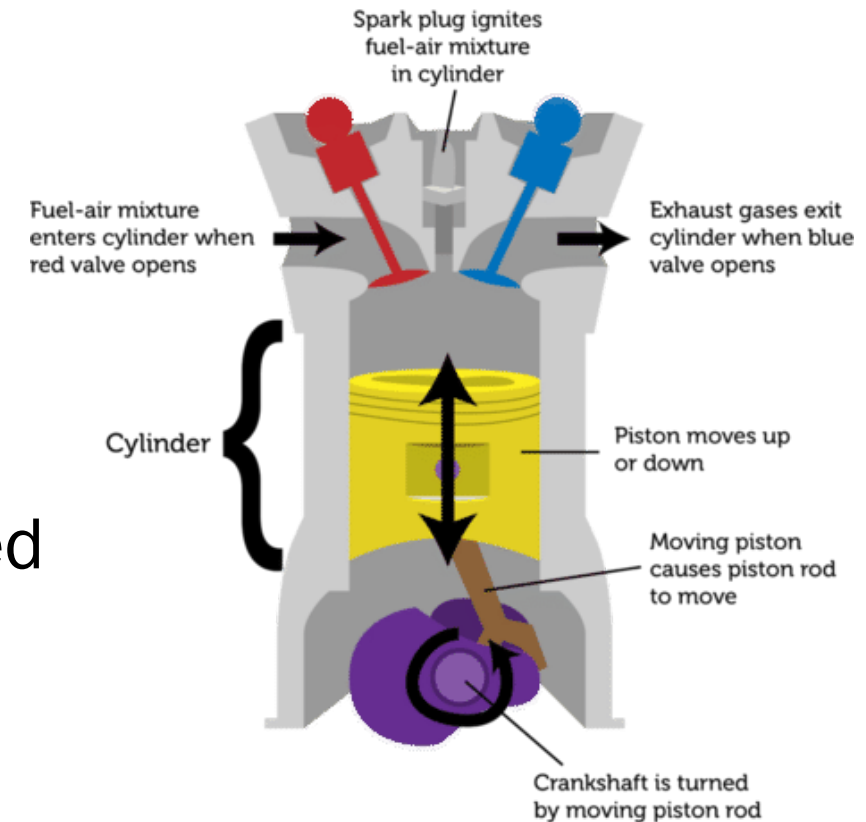


Image credit: C.Auyeung, 2019

Where do Internal Combustion Engines Operate?

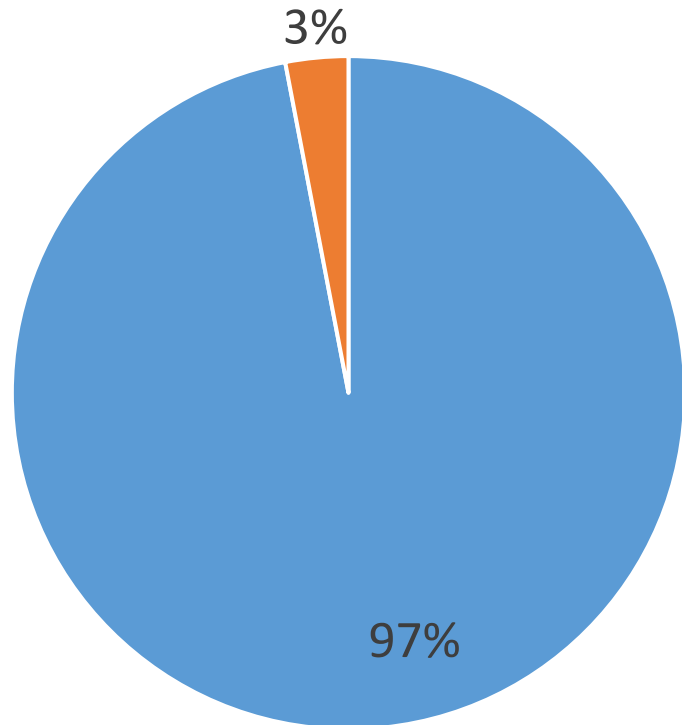
- IC engines are used at the following facility types in the Valley:
 - Oil and gas production facilities
 - Petroleum refineries
 - Landfills and waste wastewater treatment plants
 - Water districts
 - Schools, universities
 - Electrical power generation facilities
 - Food processing operations
 - Agricultural operations



Image credit: EPA, 2013

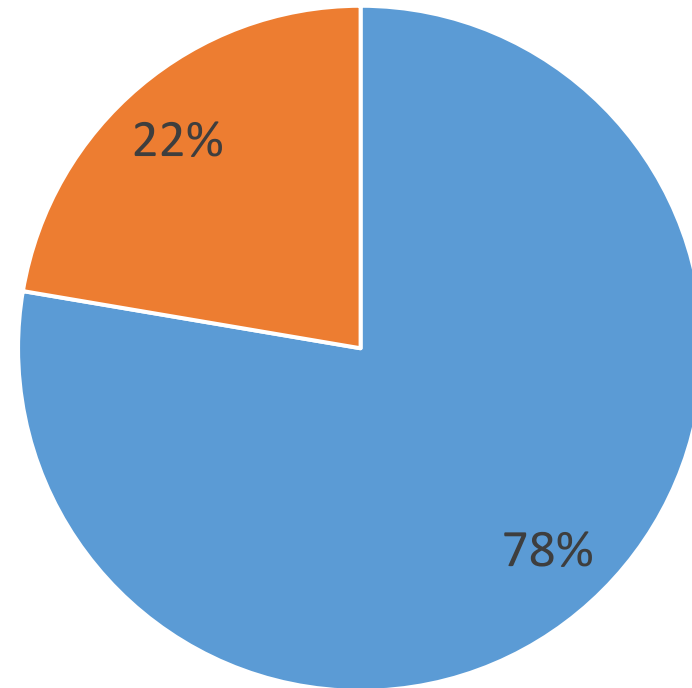
NOx Emissions from Internal Combustion Engines in the Valley

All NOx Emissions in the Valley
(Mobile, Stationary, & Area Sources)



■ Other NOx Sources ■ IC Engines

NOx Emissions from Stationary Sources



■ Other Stationary Sources ■ IC Engines

Current Rule 4702 Requirements

- District Rule 4702 adopted August 2003, sixth generation rule
 - Rule limits emissions of NO_x, CO, VOCs, and SO_x
 - Past amendments established lower NO_x limits for non-agricultural engines between 25-50 ppmv (rich-burn) and 65-75 ppmv (lean-burn)
 - 2011 amendment further strengthened rule by requiring NO_x limits as low as 11 ppmv for non-agricultural spark-ignited engines
 - Rule achieved significant reductions in NO_x and PM emissions from ag engines - past amendments have established limits between 90 – 150 ppmv for ag engines
- NO_x emissions from IC engines already reduced significantly
 - Achieved 90-96% NO_x emissions control for non-agricultural rich burn engines, 85-90% emissions control for non-agricultural lean burn engines
 - NO_x emissions from agricultural engines reduced by 84%

Further Emission Reductions Needed

- Valley's challenges in meeting federal air quality standards unmatched due to unique geography, meteorology, and topography
- Substantial reductions needed to achieve federal PM2.5 standards – need to go beyond already strict limits
- Proposed amendments address:
 - Commitment in *2018 PM2.5 Plan* to further reduce emissions from IC engines
 - State AB 617 Best Available Retrofit Control Technology (BARCT) requirements
- District staff have conducted comprehensive review of requirements in other air districts, lowest emission limits being achieved in installations statewide, and costs and feasibility of most effective emission control technologies available

Health Benefits of Emissions Reductions

- Exposure to PM_{2.5} and ozone linked to a variety of health issues, including asthma, chronic bronchitis, irregular heartbeat, respiratory/cardiovascular hospitalizations, and other issues
- District implements control measures to lower direct and precursor emissions throughout the Valley
 - NO_x emissions key precursor to ammonium nitrate, which is large portion of total PM_{2.5} during peak winter season
 - SO_x emissions precursor to ammonium sulfate, key component of PM_{2.5} concentrations in the Valley
 - NO_x and VOCs are chemical precursors to formation of ozone
- Proposed rule amendment will support goal of attaining health-based federal ambient air quality standards for both PM_{2.5} and ozone, and help to protect public health

Available Ag Pump Replacement Incentive Program

- District operates robust incentive program to provide funding for replacement of older ag engines with Tier 4 engines or electric motors
- Total program funding of over \$120,780,000
- Funding amounts based on dollar per horsepower from \$90/hp - \$150/hp (additional funding for line extension)
- Incentives have replaced over 7,140 engines, with over 3,060 replaced with electric motors (more info: <http://www.valleyair.org/grants/agpump.htm>)
- District will continue to provide incentives to transition engines to latest TIER or electric motors



Proposed Rule 4702 Requirements

- Lower NO_x limits for various categories based on technological feasibility and cost-effectiveness
- Lower VOC limits to 90 ppmv for all categories
- Rule compliance schedule
 - Non-ag Rich-Burn and Lean-Burn Engines: December 31, 2023
 - Ag Rich-Burn Engines: December 31, 2023
 - Ag Lean-Burn Engines: December 31, 2029, or 12 years after engine installation
- Removal of emissions fee compliance option for all categories
- Proposed limits and calculated cost-effectiveness shown in following slides for each affected engine category

Proposed Rule 4702 Requirements (cont'd)

- Sulfur Oxides (SO_x) Emission Control Requirements for Agricultural-Use IC Engines established to be consistent with requirements for non-AO engines (Section 5.7 of Rule 4702)
 - AO IC digester gas engines installed before 12/31/2021:
 - Limit fuel sulfur content to no more than 250 ppmv
 - AO IC digester gas engines installed on/after 12/31/2021:
 - Limit gaseous fuel sulfur content to no more than five (5) grains of total sulfur per one hundred (100) standard cubic feet; or install and properly operate an emission control system that reduces SO₂ emissions by at least 95% by weight
- Particulate Matter (PM) Emission Control Requirements:
 - Spark-ignited engines to comply with SO_x requirements to limit PM emissions
 - Compression-ignited engines to comply with applicable Tier certification standards at time of installation

Engine Add-On Control Technologies

- **Rich-Burn Engines**

- Costs and emissions range based on size of engine, age of engine, current controls, type of use
 - Total Capital Cost \$6,100 - \$95,000
 - Additional operating and maintenance costs for controls: nominal

- **Lean-Burn Engines**

- Costs and emissions range based on size of engine, age of engine, current controls, type of use
 - Total Capital Cost \$22,000 - \$191,000
 - Additional operating and maintenance costs for controls: \$720 - \$7,190/yr

Proposed Limits and Cost Effectiveness (CE) for Non-AO Rich-Burn Spark-Ignited Engines

Non-AO Rich Burn Spark-Ignited Engines	Affected Units	Current NOx Limit (ppmv)	Proposed NOx Limit (ppmv)	Current VOC Limit (ppmv)	Proposed VOC Limit (ppmv)	CE per ton NOx
Waste Gas	0	50	11	250	90	-
Cyclic Loaded, Field Gas Fueled	7	50	11	250	90	\$1,100-\$1,500
Limited Use	18	25	11	250	90	\$1,800-\$12,700
Not Listed Above	198	11	11	250	90	\$2,000

Proposed Limits and CE for Non-AO Lean-Burn Spark-Ignited Engines

Non-AO Lean Burn Spark-Ignited Engines	Affected Units	Current NOx Limit (ppmv)	Proposed NOx Limit (ppmv)	Current VOC Limit (ppmv)	Proposed VOC Limit (ppmv)	CE per ton NOx
Two-Stroke, Gaseous Fueled, >50 bhp and <100 bhp	0	75	11	750	90	-
Limited Use	0	65	11	750	90	-
Gas Compression	37	65	40	750	90	\$690-\$2,400
Waste Gas	13	65	40	750	90	\$2,656-\$11,300
Not Listed Above	19	11	11	750	90	-

Proposed Limits and CE for AO Spark-Ignited Engines

AO Engines	Affected Units	Current NOx Limit (ppmv)	Proposed NOx Limit (ppmv)	Current VOC Limit (ppmv)	Proposed VOC Limit (ppmv)	CE per ton NOx
Rich-Burn Spark-Ignited	364	90	11	250	90	\$2,030 – \$37,500
Lean-Burn Spark-Ignited	150	150	43	750	90	\$2,150- \$25,700

Estimated NOx and VOC Emission Reductions

Pollutant	2024 Emission Reductions (tpd)	2030 Emission Reductions (tpd)
NOx	0.62 (43%)	0.70 (49%)
VOC	0.31 (72%)	0.32 (75%)

Socioeconomic Impact Analysis

- Socioeconomic Impact Analysis conducted by third-party consultant, Eastern Research Group (Staff Report, Appendix D)
 - Units affected in multiple industries (including agriculture, oil and gas, water treatment, and wastewater supply/storage)
 - COVID-19 adjusted baselines and multiple recovery scenarios used in modeling
 - Impact projected to be less than significant using Board and CARB-approved methodology



Public Process to Amend Rule 4702

- *2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards*
 - Adopted: November 15, 2018
- Public scoping meeting held December 5, 2019
- Public workshops held on September 24, 2020, November 19, 2020, and June 28, 2021
- Draft rule published December 29, 2020, and proposed rule posted for public review and comment on July 20, 2021
- Discussed with interested stakeholders
- Discussed regularly at variety of meetings:
 - Citizens Advisory Committee (CAC)
 - Environmental Justice Advisory Group (EJAG)
 - AB 617 Community Steering Committee
 - District Governing Board
- Ongoing opportunities for public input throughout process

Recommendations

1. Adopt proposed amendments to Rule 4702 (Internal Combustion Engines)
2. Authorize the Chair to sign the attached Resolution