SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Staff Report
Proposed Rule 1110.3 – Emissions from Linear Generators
Proposed Amended Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines

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EXECUTIVE SUMMARY

Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines is a source-specific rule which applies to non-RECLAIM facilities and RECLAIM facilities with engines greater than 50 rated brake horsepower. The rule was last amended in 2019 to implement Control Measure CMB-05 of the Final 2016 Air Quality Management Plan. During the rule development process, linear generators were introduced as an alternative technology to reduce emissions and stakeholders commented on the unique characteristics of linear generators. Unlike internal combustion engines (ICEs), linear generators produce electricity by driving magnets through copper coils in a linear motion. One unique feature of linear generators is that the thermochemical reaction takes place at lower temperatures than ICE, which results in lower emissions without add-on control devices (e.g., selective catalytic reduction). In addition, linear generators utilize a parametric monitoring system that monitors performance and controls emission levels. Linear generators are currently being used for prime power applications but can also be used for emergency backup power, and are considered a technology that can potentially assist in implementing Control Measure L-CMB-04 of the Final 2022 Air Quality Management Plan. In response to stakeholder comments, Proposed Rule 1110.3 – Emissions from Linear Generators (PR 1110.3), is being developed to allow for specific considerations of the technology and capabilities of linear generators.

Currently, a total of six units with Permits to Operate and 82 Permits to Construct will be affected by PR 1110.3. It is possible that the number of units subject to PR 1110.3 in the future might be considerably more as the technology matures. PR 1110.3 establishes emission limits for linear generators as well as source testing, reporting, and recordkeeping requirements. Proposed Amended Rule 1110.2 (PAR 1110.2) will remove provisions currently applicable to linear generators.

PR 1110.3 and PAR 1110.2 were developed through a public process. Staff held three Working Group Meetings on November 9, 2022, December 8, 2022, and February 23, 2023. In addition, a Public Workshop was held on January 25, 2023.

CHAPTER 1: BACKGROUND

INTRODUCTION

Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines (Rule 1110.2) is source-specific rule which applies to facilities with engines greater than 50 rated brake horsepower. Rule 1110.2 currently regulates linear generators and specifies emission limits and other requirements applicable to linear generators. In response to stakeholder comments, PR 1110.3 is being developed to allow for specific considerations of the technology and capabilities of linear generators. PR 1110.3 will establish emission limits for linear generators, as well as testing, monitoring and reporting, and recordkeeping requirements. In addition, Rule 1110.2 will be amended to remove provisions currently applicable to linear generators.

BACKGROUND

Rule 1110.2 applies to all stationary and portable engines greater than 50 rated brake horsepower. Rule 1110.2 was last amended in 2019 to implement Control Measure CMB-05 of the Final 2016 Air Quality Management Plan (2016 AQMP). During the rule development process, linear generator technology was introduced as an option to further reduce NOx emissions. At that time, it was estimated that emissions from linear generators would approach California Air Resources Board's (CARB) Distributed Generation (DG) levels.

Staff is aware of two manufacturers of linear generators. Unlike ICEs, linear generators produce electricity by driving magnets through copper coils in a linear motion (see Figures 1 and 2). In this process, a mixture of fuel and air are compressed, causing a chemical reaction that drives the linear motion. One of the features that makes linear generators unique is that this thermochemical reaction occurs at lower temperatures than internal combustion engines, resulting in lower NOx and CO emissions. Linear generators also do not need add-on control technologies such as selective catalytic reduction (SCR) to reduce NOx to near-zero emissions. Although some may be equipped with an oxidation catalyst, they are not dependent on this catalyst to reach a destruction temperature and thus, start-up emissions are low. For those linear generators that are equipped with an oxidation catalyst, due to the lower reaction temperatures, the oxidation catalyst's ability to control VOC emissions is limited and its main function is to reduce CO emissions. In addition, linear generators utilize a parametric monitoring system to maintain proper fuel and air injection to meet energy demands. The parametric monitoring system works by monitoring and adjusting air and fuel flow to ensure proper air-to-fuel ratio is achieved, which also ensures emissions are under control. Finally, linear generators have the ability to operate on different fuels without any hardware changes to the equipment. However, staff has only received source test data for natural gas fueled units; source test data was not provided for other fuel types.

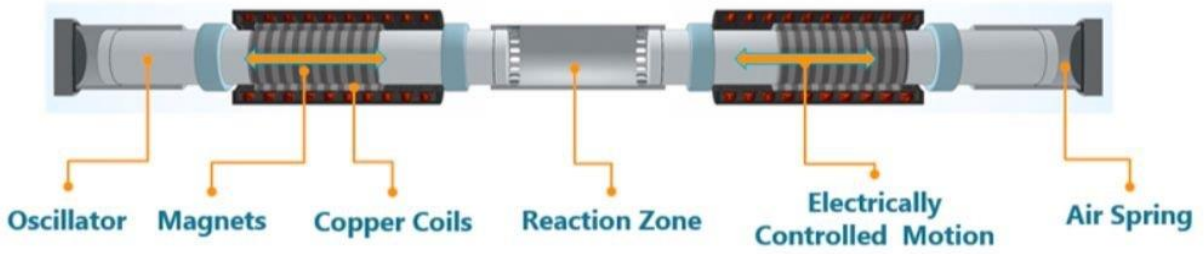


Figure 1. Mainspring Linear Generator Components[1]

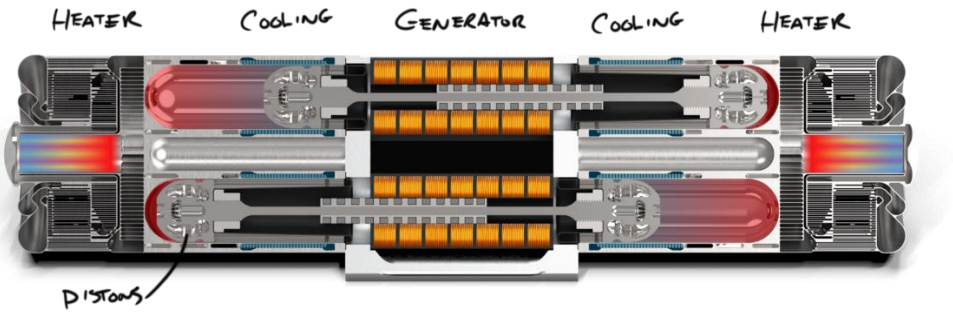


Figure 2. Hyliion Karno Linear Generator Components[2]

At the time of its introduction, linear generators were being used as a stationary prime power source at facilities, but it is anticipated that they can be configured as portable units and can also be used for emergency applications. In response to stakeholder comments highlighting the unique characteristics of linear generators, PR 1110.3 is being developed to allow for specific considerations of linear generator technology running solely on natural gas. PR 1110.3 establishes emission limits for linear generators as well as testing, reporting, and recordkeeping requirements. PAR 1110.2 will remove provisions currently applicable to linear generators.

REGULATORY HISTORY

Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines

South Coast AQMD Rule 1110.2 was adopted on August 3, 1990 and was last amended on November 1, 2019. Rule 1110.2 applies to stationary and portable engines greater than 50 rated brake horsepower. The 2019 amendment of Rule 1110.2 included concentration limits for new electrical generating devices in addition to the listed emission standards expressed as pounds of NOx per Megawatt-Hour. Additionally, the 2019 amendments added a provision which allowed new engines installed prior to January 1, 2024 that can achieve NOx concentration limits at all times with no ammonia emissions from add-on equipment to meet an interim VOC concentration

[1] https://www.greentechmedia.com/articles/read/mainspring-energys-linear-generators-to-roll-out-through-150m-deal-with-nextera
[2] https://www.hyliion.com/karno/

limit of 25 parts per million by volume, dry (ppmvd). This provision was added to Rule 1110.2 to account for the introduction of linear generator technology.

In addition to the emission limits, Rule 1110.2 included a cap on the number of units that can be installed while meeting the alternative VOC concentration limit of 25 ppmvd to ensure that the VOC emissions from such engines would not exceed South Coast AQMD's air quality significance threshold for operational VOCs (e.g., 55 pounds per day) under the California Environmental Quality Act (CEQA)[3]. Based on calculations, staff recommended a total VOC emission cap not to exceed 45 pounds per day of VOC which provided 10 pounds per day to allow for any differences in variables such as generator size and operational hours.

AFFECTED FACILITIES AND EQUIPMENT

PR 1110.3 applies to all linear generators and based on permitting data and South Coast AQMD databases, staff identified 88 applications submitted at 22 facilities that meet the applicability requirements of PR 1110.3. Table 1 contains the facility applications and permits affected by PR 1110.3.

TABLE 1
PR 1110.3 AFFECTED FACILITY APPLICATIONS & PERMITS

Application Status	
Permit to Construct Issued	82
Permit to Operate Granted	6
Applications Cancelled	6
Applications Rejected	2
Total	96

PUBLIC PROCESS

The development of PR 1110.3 and PAR 1110.2 was conducted through a public process. Working Group Meetings were held on November 9, 2022, December 8, 2022, and February 23, 2023. The Working Group Meetings included representatives from affected facilities, environmental and community groups, other agencies, consultants, and interested parties. The purpose of the Working Group Meetings was to discuss details of PR 1110.3 and PAR 1110.2 and to listen to concerns and issues with the objective to build consensus and resolve key issues.

In addition, one Public Workshop was held on January 25, 2023. The purpose of the Public Workshop was to present the proposed amended rule language to the public and to stakeholders and to solicit comments.

[3] South Coast AQMD Air Quality Significance Thresholds, March 2023, http://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf

CHAPTER 2: SUMMARY OF PROPOSAL

INTRODUCTION

PROPOSED RULE 1110.3

PROPOSED AMENDED RULE 1110.2

INTRODUCTION

Linear generators were first considered by South Coast AQMD during the 2019 amendment of Rule 1110.2. Based on staff's evaluation of the technology, and in response to a manufacturer's request, regulatory provisions for linear generators were included in Rule 1110.2 at that time. As such, emissions from linear generators are currently regulated by Rule 1110.2. However, due to the unique characteristics of linear generators, a separate rule, PR 1110.3, will specifically address linear generator technology and establish concentration-based emission limits, as well as other requirements. In addition, Rule 1110.2 will be amended to remove the provisions applicable to linear generators. The following provides a discussion of the various changes proposed in PR 1110.3 and PAR 1110.2.

PROPOSED RULE 1110.3

Subdivision (a) – Purpose

The purpose of PR 1110.3 is to reduce oxides of nitrogen (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO) from linear generators.

Subdivision (b) – Applicability

PR 1110.3 applies to all linear generators fueled solely by natural gas, both portable and stationary, regardless of size. Linear generators are currently being used as a stationary prime power source at facilities, but it is anticipated that they can be configured as portable units and can also be used for emergency applications.

PR 1110.3 only applies to linear generators fueled solely by natural gas because source test data has not been provided for other fuels. The narrowed applicability will allow the research and development of linear generator technology operating on other fuels like biogas, hydrogen, ammonia, or any other fuels. All existing linear generators in South Coast AQMD are operated solely on natural gas.

Subdivision (c) – Definitions

PR 1110.3 incorporates definitions from other South Coast AQMD rules to define types of facilities, equipment, and other rule terms. New or modified definitions added to PR 1110.3 include:

- IDENTICAL UNITS means any Units with the same manufacturer, model, and output rating.

  This definition provides clarification for the determination of units that can qualify for pooled source testing under paragraph (f)(10).

- LINEAR GENERATOR means any power generation technology that uses a thermochemical reaction to create linear motion that is directly converted into electricity.

  With input from stakeholders and South Coast AQMD engineering staff, this definition provides clarification and distinguishes linear generator technology from generators that utilize internal combustion engines to generate electricity.

- TUNING means adjusting, optimizing, rebalancing, or other similar action operations to an electric generating Unit or an associated control device or as otherwise defined in the Permit

to Operate. Tuning does not include automatic adjustments made by a unit's control system to meet load fluctuation.

This definition has been modified to provide clarification and address the specific operating conditions of linear generator technology due to the utilization of a parametric monitoring system to control and monitor its operation. For example, adjustments to meet load fluctuations or any adjustment made automatically by the control system would not be considered tuning.

- UNIT means any single linear generator core.

  To date, linear generators in operation within South Coast AQMD were installed as a single packaged product that contains two individual identical cores within each package. Each core within the package has thus far been issued a separate Permit to Operate. Despite the current packaged product consisting of two cores, this definition is included to provide clarification that the term Unit refers to a single linear generator core for the purposes of this rule. Based on this definition, a manufacturer expressed interest in obtaining Permits to Operate based on the packaged product instead of individual cores. They also expressed concerns about permitting costs for current and future packaged products that might contain 3 or more cores, resulting in the necessity to obtain separate Permits to Operate for each core. The definition does not preclude South Coast AQMD from permitting linear generators differently in the future (e.g. a single permit for a packaged product with multiple cores).

Subdivision (d) – Emission Limits

Subdivision (d) specifies emission limits in Table 1 of PR 1110.3 (Table 2 in Staff Report) and applies to all natural gas fueled linear generators, both portable and stationary, regardless of size. During the 2019 amendment of Rule 1110.2, staff and stakeholders had concerns about the performance of the equipped oxidation catalyst and its ability to impactfully reduce VOC emissions. As a result, a limited number of linear generators were allowed to comply with a VOC limit of 25 ppmvd for an interim period. However, beginning January 1, 2024, all new units are required to meet the emission limits in Table IV of Rule 1110.2. During this phase-in period, VOC emissions in excess of 10 ppmvd are tabulated by South Coast AQMD staff and the total VOC emissions are not to exceed 45 pounds per day.

During the PR 1110.3 rule making process, staff held meetings with stakeholders to discuss Rule 1110.2 emission limits. Source test data for natural gas fueled units were provided by a manufacturer showing that linear generators are able to comply with the emission limits in Table 2 of the Staff Report. A manufacturer also indicated that the oxidation catalyst contribution to achieving VOC emission reductions were negligible due to the lower reaction temperatures, and VOC emissions are primarily controlled through the parametric monitoring system. After further discussion, it was determined that the 25 ppmvd VOC limit was not necessary and thus, those provisions were not carried over from Rule 1110.2. The emission limits in Table 2 of the Staff Report will take effect upon adoption of PR 1110.3 and will apply to all units with Permits to Operate issued on or after the date of adoption.

TABLE 2
CONCENTRATION LIMITS FOR LINEAR GENERATORS

Units with a Permit to Operate Issued on or after *[Date of Adoption]*			
Fuel Type	**NO_x (ppmv)[1]**	**CO (ppmv)[1]**	**VOC (ppmv)[2]**
Natural Gas	2.5	12	10

[1] Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes.
[2] Parts per million by volume, measured as carbon, corrected to 15% oxygen on a dry basis, and averaged over the sampling time required by the test method.

In addition, emissions from various fuel types were also discussed and preliminary data provided by a manufacturer indicated that emissions from the different fuel types were compliant with the same emissions limits. However, staff has only received source test data for natural gas fueled units; source test data was not provided for other fuel types.

Subdivision (e) – Maintenance Requirements

Paragraphs (e)(1) and (e)(2) are intended to ensure that owners and operators of linear generators perform scheduled maintenance per manufacturer's recommendations. In addition, a copy of the manufacturer's operating and maintenance manual is required to be kept and made available for inspection to verify that maintenance is indeed being performed.

Subdivision (f) – Source Testing

Similar to Rule 1110.2, paragraph (f)(1) requires non-pooled units to be source tested periodically for NOx, VOC reported as carbon, and CO concentrations. Staff originally proposed a frequency of at least once every two years from the date of the previous test, or every 8,760 operating hours, whichever occurs first. Due to the low NOx and CO emissions from linear generators, the utilization of a parametric monitoring system to control emissions, and the cost of source testing, stakeholders questioned the necessity of the proposed frequency and requested a reduced source testing frequency of at least once every five years. Additionally, one manufacturer explained that the procedures for performing the emissions checks required them to override their safety protocol in order to access the testing ports. Source test data for natural gas fueled units was provided to substantiate their request. An initial source test will be required within six months of installation of a Unit or within six months of not meeting the eligibility requirements for pooled source testing. Subsequently, source testing shall be conducted once every five years from the date of the previous source test, no later than the last day of the calendar month that the test is due.

PR 1110.3 also references to a generic source test protocol in several rule provisions. A generic source testing protocol is one in which an owner or operator submits a protocol for review and once it has been reviewed and approved, can be used for subsequent source testing on identical units without the need to submit separate protocols for review.

Stakeholders also expressed concerns about the necessity, cost, and logistics of source testing multiple Units that are identical and located within the same facility. In response to these concerns, staff has proposed the allowance of pooled initial source testing for facilities with six or more identical units. The allowance for pooled testing reduces the source testing costs and logistical concerns.

Under the pooled testing schedule, specified in paragraph (f)(10), at least one-third of the units are required to be initially source tested. Subsequent source testing shall be conducted on a different one-third of the Units from the previous source test. Source testing for pooled units is required to be conducted at least once every three years from the date of the previous source test, no later than the last day of the calendar month that the test is due.

Subparagraph (f)(10)(B) specifies that units installed after the initial source test are subject to the subsequent pooled emission testing schedule. Units installed after the initial source test that are not identical to the units in the pool are required to be source tested separately as required in paragraph (f)(1). PR 1110.3 defines the term identical units. If additional identical units are installed, the required one-third of units to be source tested will be based on the new total number of units. For example, if a facility initially installed nine identical units, and later installed 15 more identical units, an owner or operator would be required to source test eight units out of 24 identical units total to comply with the requirement to source test at least one-third of pooled units. Furthermore, the source test schedule for additional identical units will be based on date of the last source test. For example, if a source test for pooled units was conducted in March 2023 and then new identical units were installed in 2024, then the next source test would be required by March 2026.

If any unit subject to the pooled source testing exceeds any of the emission limits, the owner or operator will be required to repair the unit and repeat the source test within 60 days of repair. In this event, additional source tests will also be required to be conducted on an additional one-third of the pooled units.

Based on the one-third testing schedule, staff expects all of the pooled units to be source tested within a period of nine years, at the latest. For example, a facility installing 10 identical units under this proposed testing schedule will be required to test four units during the initial source test in order to meet the one-third source testing criteria. The next pool of source tests is required to occur on four different units after three years. Then, after another three years, the remaining two units and two units that were source tested in the first pool are required to source test.

Subdivision (g) – Monitoring, Recordkeeping, and Reporting

Ensuring that the parametric monitoring system is functioning properly is of utmost importance, as its main function is to ensure that the unit is operating within specified parameters and that emissions are controlled. In order to ensure the performance and robustness of the parametric

monitoring system, staff is proposing diagnostic emissions checks by a portable NOx, CO, and oxygen analyzer at least once every two years from the date of the previous emissions test, no later than the last day of the calendar month that the test is due. A previous emissions test includes both source tests as well as diagnostic emission checks. The diagnostic emission testing would be conducted in accordance with South Coast AQMD's Combustion Gas Periodic Monitoring Protocol for the Periodic Monitoring of Nitrogen Oxides, Carbon Monoxide, and Oxygen from Combustion Sources Subject to Rules 1110.2, 1146, and 1146.1. This protocol for portable analyzer testing was first approved on February 1, 2008, and most recently updated on May 15, 2020. The portable analyzer testing shall also be conducted by a person who has completed an appropriate South Coast AQMD-approved training program and has received a certification issued by the South Coast AQMD.

Paragraph (g)(1) requires owners and operators of linear generators to maintain a revenue grade net output meter that meets ANSI C12.20 or an equivalent standard and a parametric monitoring system. It also requires the inspection and maintenance of the parametric monitoring system, as well as sensors and meters, per manufacturer's recommendations.

In response to comments from stakeholders, staff modified provisions in subparagraph (g)(1)(D), which requires the owner or operator to maintain a parametric monitoring system including the associated components necessary to maintain a proper air-to-fuel ratio. Lastly, owners or operators are required to monitor and record the parametric monitoring system at least daily. These provisions were added in lieu of requiring the submittal of a separate Inspection and Monitoring (I & M), as is required in Rule 1110.2.

Records play an important role in verifying compliance with PR 1110.3. Subparagraph (g)(2)(A) requires monthly records to be kept for various parameters. In addition, records to demonstrate compliance with other rule provisions are also required to be maintained for a period of five years and made available to the South Coast AQMD upon request for compliance verification.

Subparagraph (g)(3) requires owners and operators to submit source test results within 60 days of completion of the test.

In the normal course of operation, there is potential for complex equipment such as linear generators to experience malfunctions. Staffs' primary concern during these events are emissions that exceed rule limits or permit conditions. South Coast AQMD Rule 430 – Breakdown Provisions contains requirements during breakdowns that units subject to PR 1110.3 would be required to comply with.

Subdivision (h) – Exemptions

This subdivision was created to capture future considerations and applications for linear generators. Staff anticipates that there will be expansion and adoption of linear generator technologies into various industrial sectors and these provisions will provide allowances for the research and development of linear generators that could ensure durability and robustness of the technology.

Paragraph (h)(1) provides an exemption from subdivision (d) and subparagraph (g)(1)(A) for linear generators used in a laboratory for testing and research purposes and paragraph (h)(2) provides an

exemption from subdivision (f) and subparagraph (g)(1)(A) for emergency standby units, units used for fire-fighting and flood control, or any other emergency unit approved by the Executive Officer, which have permit conditions that limit operation to 200 hours or less per year as determined by an operational non-resettable totalizing time meter.

PROPOSED AMENDED RULE 1110.2

Subdivision (c) – Definitions

PAR 1110.2 incorporates definitions from other South Coast AQMD rules to define types of facilities, equipment, and other rule terms. One existing definition was amended and a single new definition was added to PAR 1110.2:

- ENGINE is any spark- or compression-ignited internal combustion engine, including engines used for control of VOCs, but not including Linear Generators or engines used for self-propulsion.

This definition was amended to include "linear generators" as to exclude them from any applicability when the term "engine" is referenced in this rule.

- LINEAR GENERATOR means any power generation technology that uses a thermochemical reaction to create linear motion that is directly converted into electricity.

This definition was created with input from stakeholders and South Coast AQMD engineering staff and provides clarification and distinguishes linear generator technology from internal combustion engines.

Subdivision (d) – Requirements

Clause (d)(1)(L)(i) subjects new non-emergency electrical generators to the NOx, CO, and VOC emission limits in Table IV. Table IV contains a column that reflects emission standards, in concentration limits, for new non-emergency electrical generators, which was specifically added for linear generators.

PAR 1110.2 will update Table IV to remove the concentration limit column, and applicable footnotes, as it was originally created for linear generators. The emission limits in Table 3 will take effect upon adoption of PAR 1110.2.

TABLE 3
UPDATED EMISSION STANDARDS

TABLE IV EMISSION STANDARDS FOR NEW ELECTRICAL GENERATION DEVICES	
Pollutant	**Emission Standard (lbs/MW-hr)[1]**
NOx	0.070
CO	0.20
VOC	0.10[2]

[1] The averaging time of the emission standard for VOC is the sampling time required by the test method.

[2] Mass emissions of VOC shall be calculated using a ratio of 16.04 pounds of VOC per lb-mole of carbon.

Clause (d)(1)(L)(vii) allows units installed prior to January 1, 2024 that can achieve NOx concentration limits at all times with no ammonia emissions from add-on control equipment to meet an interim VOC concentration limit of 25 ppmvd. Additionally, Rule 1110.2 includes a cap on the number of units that can be installed meeting the alternative VOC concentration limit of 25 ppmvd. The total VOC emission cap from these units are not to exceed 45 pounds per day of VOC. This provision was included to ensure that the emissions from such engines would not exceed South Coast AQMD's Air Quality Significance Threshold under CEQA for operational VOC emissions.

PAR 1110.2 will remove this clause, as it will be obsolete and no longer applicable.

Subdivision (f) – Monitoring, Testing, Recordkeeping and Reporting

Subparagraph (f)(1)(D) requires operators to submit an I & M Plan to the Executive Officer for approval. Since linear generators utilize a parametric monitoring system to control emissions, it was proposed by stakeholders that this system would be a substitute for periodic portable analyzer testing. As a result, there were concerns from stakeholders as to how linear generator operators can meet the specific requirements of this subparagraph. In response to this request, subclause (f)(1)(D)(i)(1) was added to provide operators with flexibility and allowed them to submit an alternative I&M Plan for the Executive Officer's consideration.

PAR 1110.2 will be updated to remove the provision allowing for I&M plan flexibility, as it was an allowance added specifically for linear generator operators.

Subclause (f)(1)(D)(ii)(V) requires that the portable analyzer be calibrated, maintained and operated in accordance with the manufacturer's specifications and recommendations and the Protocol for the Periodic Monitoring of Nitrogen Oxides, Carbon Monoxide, and Oxygen from Stationary Engines Subject to South Coast Air Quality Management District Rules 1110.2, 2, 1146, and 1146.1. Since the protocol was amended on May 15, 2020, the reference to the protocol was updated to reflect the current title.

Subdivision (i) – Exemptions

This subdivision in Rule 1110.2 does not currently contain any exemptions specifically for linear generators. PAR 1110.2 will amend paragraph (i)(3) to change "units" to "engines" to provide clarification that the provisions of Rule 1110.2 do not apply to linear generators located at landfills or Publicly Owned Treatment Works, as those units would be subject to Rule 1110.3. The use of the term "engine" is deliberate and is intended to differentiate and distinguish linear generator technology from internal combustion engines.

CHAPTER 3: IMPACT ASSESSMENTS

INTRODUCTION

Impact assessments were conducted during PR 1110.3 and PAR 1110.2 rule development to assess the environmental and socioeconomic implications of these rules. Health and Safety Code requirements for cost-effectiveness analysis and incremental cost-effectiveness analysis were evaluated during rule development of PR 1110.3 and PAR 1110.2. Draft findings and comparative analyses were prepared pursuant to Health and Safety Code Sections 40727 and 40727.2, respectively. Staff is currently reviewing PR 1110.3 and PAR 1110.2 to determine if it will result in any potential adverse environmental impacts. Appropriate CEQA documentation will be prepared based on this analysis.

COSTS

The provisions in PR 1110.3 and PAR 1110.2 are not expected to impose additional costs. In comparison to current Rule 1110.2 source testing requirements, PR 1110.3 includes a new emission testing schedule to help alleviate costs associated with source testing. Based on the new emission testing schedule, and an estimated cost of $10,000 per source test, staff calculates the cost of source testing each unit to be approximately $30,000 over a 15-year period. The new emission testing schedule translates to over 60% cost savings over the originally proposed source test frequency for units currently subject to Rule 1110.2. Facilities with three or more units may elect to conduct pooled source testing to further alleviate costs.

EMISSION REDUCTIONS

Any emission reductions from PR 1110.3 are expected to be negligible. Potentially, there could be a slight decrease in VOC emissions, as the interim VOC limit of 25 ppmvd for units installed prior to January 1, 2024 is proposed for removal from PAR 1110.2 and PR 1110.3 does not include an interim VOC limit for these units. All units with a Permit to Operate issued on and after *[Date of Adoption]* will be required to meet 10 ppmvd VOC under PR 1110.3.

COST-EFFECTIVENESS

The Health and Safety Code Section 40920.6 requires a cost-effectiveness analysis when establishing BARCT requirements. PR 1110.3 and PAR 1110.2 does not include new BARCT requirements nor is it expected to impose any additional costs. Therefore, this provision neither applies to PR 1110.3 nor PAR 1110.2.

INCREMENTAL COST-EFFECTIVENESS

Health and Safety Code Section 40920.6 requires an incremental cost-effectiveness analysis for BARCT rules or emission reduction strategies when there is more than one control option which would achieve the emission reduction objective of PR 1110.3 and PAR 1110.2, relative to ozone, CO, SOx, NOx, and their precursors. PR 1110.3 and PAR 1110.2 neither include new BARCT requirements nor include any requirements for additional control options. Thus, there is no more

stringent control option upon which an incremental cost-effectiveness would be calculated. Therefore, this provision neither applies to PR 1110.3 nor PAR 1110.2.

SOCIOECONOMIC ASSESSMENT

PR 1110.3 and PAR 1110.2 would result in a cost savings to affected facilities and are not expected to result in any adverse socioeconomic impacts. The "Costs" section on page 3-1 of this Staff Report includes a discussion about the net savings associated with PR 1110.3 and PAR 1110.2.

CALIFORNIA ENVIRONMENTAL QUALITY ACT ANALYSIS

Pursuant to the California Environmental Quality Act (CEQA) Guidelines Sections 15002(k) and 15061, the proposed project (PR 1110.3 and PAR 1110.2) is exempt from CEQA pursuant to CEQA Guidelines Section 15061(b)(3). A Notice of Exemption will be prepared pursuant to CEQA Guidelines Section 15062, and if the proposed project is approved, the Notice of Exemption will be filed with the county clerks of Los Angeles, Orange, Riverside, and San Bernardino counties, and with the State Clearinghouse of the Governor's Office of Planning and Research.

DRAFT FINDINGS UNDER HEALTH AND SAFETY CODE SECTION 40727

Requirements to Make Findings

Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the South Coast AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report. The draft findings are as follows:

Necessity

PR 1110.3 is needed to establish emission limits and other requirements for linear generators. PAR 1110.2 is needed provide non-duplication of South Coast AQMD requirements by exempting linear generators.

Authority

The South Coast AQMD obtains its authority to adopt, amend, or repeal rules and regulations pursuant to Health and Safety Code Sections 39002, 39616, 40000, 40001, 40440, 40702, 40725 through 40728, 40920.6, and 41508, as well as the federal Clean Air Act.

Clarity

PR 1110.3 and PAR 1110.2 are written or displayed so that its meaning can be easily understood by the persons directly affected by them.

Consistency

PR 1110.3 and PAR 1110.2 are in harmony with and not in conflict with or contradictory to, existing statutes, court decisions or state or federal regulations.

Non-Duplication

PR 1110.3 and PAR 1110.2 will not impose the same requirements as any existing state or federal regulations. PR 1110.3 and PAR 1110.3 are necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference

In adopting PR 1110.3 and PAR 1110.2, the following statutes which the South Coast AQMD hereby implements, interprets or makes specific are referenced: Health and Safety Code Sections 39002, 40001, 40702, 40440(a), and 40725 through 40728.5, and the federal Clean Air Act.

COMPARATIVE ANALYSIS

Under Health and Safety Code Section 40727.2, the South Coast AQMD is required to perform a comparative written analysis when adopting, amending, or repealing a rule or regulation. The comparative analysis is relative to existing federal air pollution control requirements, existing or proposed South Coast AQMD rules and regulations, and all air pollution control requirements and guidelines which are applicable to the same equipment or source type. A comparative analysis is presented in Table 3-1.

TABLE 3-1
PR 1110.3 & PAR 1110.2 COMPARATIVE ANALYSIS

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
Applicability	All linear generators fueled solely by natural gas are subject to this rule.	All stationary and portable engines over 50 rated brake horsepower (bhp) are subject to this rule.	Any DG Unit manufactured after January 1, 2003, for sale, lease, use, or operation in the State of California or any new DG Unit sold or leased, or offered for sale or lease, for use or operation in the State of California after January 1, 2003, shall be certified by the Air Resources Board unless the DG Unit: (a) does not emit an air contaminant when operated, (b) is portable, (c) is used only when electrical or natural gas service fails or for emergency pumping of water for fire protection or flood relief, (d) is not exempt from an air pollution control district or air quality management district's permitting requirements, (e) is part of a research operation that has been approved in writing by the Executive Officer prior to commencement of operations, or (f) is operated by the manufacturer at the manufacturing facility prior to sale or lease for the purpose of quality-assurance testing.
Requirements	An owner or operator of a Unit with a Permit to Operate issued on or after [Date of Adoption] shall not operate it in a manner that exceeds the NOx, CO, and VOC emission limits listed in Table 1: • NOx: 2.5 ppmvd corrected to 15% oxygen and averaged over 15 minutes • CO: 12 ppmvd corrected to 15% oxygen and averaged over 15 minutes • VOC: 10 ppmvd corrected to 15% oxygen and averaged over sampling time required by test method Maintenance Requirements (1) An owner or operator of a Unit shall perform maintenance per manufacturer's recommendations as specified in the operating and maintenance manual. (2) An owner or operator of a Unit shall keep a copy of the manufacturer's operating and maintenance manual and make it available to South Coast AQMD upon request. Source Testing (1) An owner or operator of a Unit that is not pooled pursuant to paragraph (f)(10) shall conduct source testing for NOx, VOC reported as carbon, and CO concentrations (concentrations in ppm by volume, corrected to 15 percent oxygen on dry basis):	(C) The operator of any stationary engine fired by landfill or digester gas (biogas) shall not operate the engine in a manner that exceeds the emission concentration limits of Table III-A, provided that the facility monthly average biogas usage by the biogas engine is 90% or more, based on the higher heating value of the fuels used. The calculation of the monthly facility biogas use percentage may exclude natural gas fired during: any electrical outage at the facility; a Stage 2 or higher electrical emergencies called by the California Independent System Operator Corporation; and when a sewage treatment plant activates an Emergency Operations Center or Incident Command System, as part of an emergency response plan, because of either high influent flows caused by precipitation or a disaster. Table IIIB- Concentration Limits for Landfill and Digester Gas (Biogas)-Fired Engines- Effective January 1, 2017 (Concentration limits @ 15% O2): • NOx: 11 ppmvd averaged over 15 minutes • VOC: 30 ppmvd averaged over sampling time required by test method • CO: 250 ppmvd averaged over 15 minutes (D) Notwithstanding the provisions of subparagraph (d)(1)(B), the operator of any stationary engine fired by landfill or digester gas (biogas) shall not operate the engine in a manner that exceeds the emission concentration limits of Table III.	(a) On or after January 1, 2003, any DG Unit subject to this regulation must be certified pursuant to section 94204 to one of the following sets of emission standards in Table 1. (1) DG Unit not integrated with combined heat and power, DG Unit not Integrated with Combined Heat and Power (1): • NOx: 0.5 lb/mW-hr • CO: 6.0 lb/MW-hr • VOC: 1.0 lb/MW-hr • PM: an emission limit corresponding to natural gas with fuel sulfur content of no more than 1 grain/100scf (b) On or after January 1, 2007, any DG Unit subject to this regulation fueled by a fossil fuel must be certified pursuant to section 94204 to the following set of emission standards in Table 2. • NOx: 0.07 lb/mW-hr • CO: 0.10 lb/MW-hr • VOC: 0.2 lb/MW-hr (c) Any DG Unit subject to this regulation and fueled by digester gas, landfill gas, or oil-field waste gas must be certified pursuant to section 94204 to the emission standards in Table 3. On or after January 1, 2008: • NOx: 0.5 lb/mW-hr • CO: 6.0 lb/MW-hr

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
	(A) Initially, within six months of installation of a Unit or within six months of not meeting the eligibility requirements for pooled source testing in paragraph (f)(10); and (B) Subsequently, at least once every five years from the date of the previous source test, no later than the last day of the calendar month that the test is due. (2) An owner or operator of a Unit shall conduct the source test by using a contractor that is approved under South Coast AQMD's Laboratory Approval Program (LAP) for the test methods specified in Table 2, or any test methods approved by CARB and U.S. EPA, and authorized by the Executive Officer. Table 2: Testing Methods Pollutant Method NOx South Coast AQMD Method 100.1 CO South Coast AQMD Method 100.1 VOC South Coast AQMD Method 25.1* or Method 25.3* *Excluding ethane and methane (3) An owner or operator of a Unit shall submit a source test protocol to the Executive Officer for written approval at least 60 days before the scheduled date of the test. The source test protocol shall include, but is not limited to the following: (A) Name, address, and phone number of the Unit operator and a South Coast AQMD-approved source testing contractor that will conduct the test; (B) Application number(s), permit number(s), and emission limits; (C) Description of the Unit(s) to be tested and the test methods and procedures to be used; (D) Number of tests to be conducted and under what loads; and (E) Required minimum sampling time for the VOC test, based on the analytical detection limit and expected VOC levels. (4) An owner or operator of a Unit with an approved generic source test protocol or other valid approved source test protocol shall conduct the source test within 90 days after a written approval of the source test protocol by the Executive Officer is electronically distributed. (5) An owner or operator of a Unit with an approved generic protocol, or with a previously approved source test protocol, shall submit a subsequent protocol if the Unit has been altered in a manner that requires a permit modification, if emission limits for the Unit have changed since the previous source test, or if requested by the Executive Officer.	(G) Once an engine complies with the concentration limits as specified in Table III-B, there shall be no limit on the percentage of natural gas burned. (L) New Non-Emergency Electrical Generators (i) All new non-emergency engines driving electrical-generators shall comply with the following emission standards in lbs/MW-hr: Table IV- Emissions Standards for New Electrical Generation Devices Concentration limits for low-use engines. (Concentration limits calculated using a 40% engine efficiency and no applied thermal credit, corrected to 15% O2): • NOx: 2.5 ppmvd • CO: 12 ppmvd • VOC: 10 ppmvd (vii) Owners and operators of new engines installed prior to January 1, 2024 with no ammonia emissions from add-on control equipment and where NOx emissions meet the concentration limit of Table IV at all times may elect to apply for and comply with the concentration limits of Table IV, expressed in ppmvd, except an alternative VOC concentration limit that is equal to or less than 25 ppmvd may be complied with. The Executive Officer shall accumulate daily VOC emissions in excess of the concentration limit of Table IV based on the permitted VOC limits from each such engine and shall not approve any additional permit for such engine that will cause the total accumulated daily VOC emissions to exceed 45 lbs per day. Any new installation on or after January 1, 2024 shall comply with the VOC concentration limit in Table IV in ppmvd. (e)(4) Stationary Engine Inspection and Monitoring (I&M) Plans: The operator of stationary engines subject to the I&M plan provisions of subparagraph (f)(1)(D) shall: (A) By August 1, 2008, submit an initial I&M plan application to the Executive Officer for approval; (B) By December 1, 2008, implement an approved I&M plan or the I&M plan as submitted if the plan is not yet approved. Any operator of 15 or more stationary engines subject to the I&M plan provisions shall comply with the above schedule for at least 50% of engines, and for the remaining engines shall: (C) By February 1, 2009, submit an initial I&M plan application to the Executive Officer for approval; (D) By June 1, 2009, implement an approved I&M plan or the I&M plan as submitted if the plan is not yet approved.	• VOC: 1.0 lb/MW-hr On or after January 1, 2013: • NOx: 0.07 lb/mW-hr • CO: 0.10 lb/MW-hr • VOC: 0.2 lb/MW-hr (e) By July 2005, the ARB staff must complete an electrical generation technology review to evaluate if the requirements in (b) and (d) above and section 94207 should be modified and report its findings to the Board.

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
	(6) An owner or operator of a Unit shall provide the Executive Officer at least 30 days prior notice of any source test to afford the Executive Officer the opportunity to have an observer present. If, after the 30 days prior notice is given, there is a delay (due to operational problems, etc.) in conducting the scheduled source test, the owner or operator of a Unit shall notify the Executive Officer as soon as possible of any delay in the original test date, either by providing notice of the rescheduled date of the source test at least seven days prior, or by arranging a rescheduled date mutually agreed upon with the Executive Officer. (7) An owner or operator of a Unit shall provide source testing facilities as follows: (A) Sampling ports adequate for the applicable test methods. This includes constructing the air pollution control system and stack or duct such that pollutant concentrations can be accurately determined by applicable test methods; (B) Safe sampling platform(s), scaffolding or mechanical lifts, including safe access, that comply with California General Safety Orders; and (C) Utilities for sampling and testing equipment. (8) The LAP contractor shall not conduct a source test within 1 week of any Unit servicing or Tuning. (9) The LAP contractor shall conduct source testing for at least 30 minutes during normal operation (actual duty cycle). This test shall not be conducted under a steady-state condition unless it is the normal operation. The LAP contractor shall not conduct any pre-tests for compliance. (10) In lieu of meeting the requirements in paragraph (f)(1), an owner or operator of six or more Identical Units located at the same facility may elect to conduct pooled initial source testing, for NOx, VOC reported as carbon, and CO concentrations (concentrations in ppm by volume, corrected to 15 percent oxygen on dry basis), pursuant to the following: (A) At least one-third of the Units hall be source tested during the initial source test and all subsequent source testing shall be conducted on a different one-third of the Units. Source testing of pooled Units shall be conducted at least once every three years from the date of the previous source test, no later than the last day of the calendar month that the test is due; (B) Identical Units installed after the initial source test has been performed shall be included with the Units subject to the	(6) New Stationary Engines The operator of any new stationary engine issued a permit to construct after February 1, 2008 shall comply with the applicable I&M or CEMS requirements of this rule when operation commences. If applicable, the operator shall provide the required information in subparagraph (f)(1)(D) to the Executive Officer prior to the issuance of the permit to construct so that the I&M procedures can be included in the permit. A separate I&M plan application is not required. (7) Biogas Engines For any biogas engine for which the operator applies to the Executive Officer by April 1, 2008 for a change of permit conditions for ECF-corrected emission limits, or the approval to burn more than 10 percent natural gas in accordance with subparagraph (d)(1)(C), the biogas engine shall not be subject to the initial concentration limits of Tables II or III until August 1, 2008, provided the operator continues to comply with all emission limits in effect prior to February 1, 2008.	

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
	pooled subsequent emissions testing pursuant to subparagraph (f)(10)(A); (C) If any Unit subject to the pooled source testing exceeds any emissions standards in Table 1, the owner or operator shall repair the Unit that failed, repeat the source test within 60 days of repair, and conduct source testing on an additional one-third Units; (D) All pooled Units at a facility shall be source tested at least once every nine years.		
Monitoring	(A) An owner or operator of a Unit shall conduct diagnostic emission checks by a portable NOx, CO, and oxygen analyzer at least once every two years from the date of the previous emissions test, no later than the last day of the calendar month that the test is due and comply with the following requirements: (i) No Unit or control system maintenance or tuning may be conducted within 1 week prior to the diagnostic emission check, unless it is an unscheduled, required repair, (ii) The portable analyzer shall be calibrated, maintained and operated in accordance with the manufacturer's specifications and recommendations and in accordance with South Coast AQMD's Combustion Gas Periodic Monitoring Protocol of Nitrogen Oxides, Carbon Monoxide, and Oxygen from Combustion Sources subject to South Coast Air Quality Management District Rules 1110.2, 1146, and 1146.1, or subsequent protocol approved by U.S. EPA and the Executive Officer, (iii) The portable analyzer tests required in subparagraph (g)(1)(A) shall only be conducted by a person who has completed an appropriate South Coast AQMD-approved training program in the operation of portable analyzers and has received a certification issued by South Coast AQMD, and (iv) A source test pursuant to paragraphs (f)(1) and (f)(10) shall be an acceptable substitute diagnostic emission check to satisfy subparagraph (g)(1)(A).. (B) If a diagnostic emission check results in finding emissions in excess of rule or permit limits, an owner or operator shall correct the exceedance as soon as possible and demonstrate compliance with another diagnostic emission check pursuant to (g)(1)(A). (C) An owner or operator of a Unit shall maintain a net output meter that is revenue grade compliant with ANSI C12.20 or equivalent.	(f) Monitoring, Testing, Recordkeeping and Reporting (1) Stationary engines: The operator of any engine subject to the provisions of paragraph (d)(1) of this rule shall meet the following requirements: (B) Elapsed Time Meter Maintain an operational non-resettable totalizing time meter to determine the engine elapsed operating time. (C) Source Testing (i) Effective August 1, 2008, conduct source testing for NOx, VOC reported as carbon, and CO concentrations (concentrations in ppm by volume, corrected to 15 percent oxygen on dry basis) at least once every two years from the date of the previous source test, no later than the last day of the calendar month that the test is due, or every 8,760 operating hours, whichever occurs first. Relative accuracy tests required by Rule 218.1 or 40 CFR Part 75 Subpart E shall satisfy this requirement for those pollutants monitored by a CEMS. The above source test frequency may be reduced to once every three years if the engine has operated less than 2,000 hours since the last source test. If the engine has not been operated before the date a source test is due, the source test shall be conducted by the end of seven consecutive days or 15 cumulative days of resumed operation. The operator of the engine shall keep sufficient operating records to demonstrate that it meets the requirements for extension of the source testing deadlines. (ii) Conduct source testing for at least 30 minutes during normal operation (actual duty cycle). This test shall not be conducted under a steady-state condition unless it is the normal operation. In addition, conduct source testing for NOx and CO emissions for at least 15 minutes at: an engine's actual peak load, or the maximum load that can be practically achieved during the test, and; at actual minimum load, excluding idle, or the minimum load that can be practically achieved during the test. These	(a) Sampling methodology used must conform to ARB testing procedures. Alternate or modified test methods may be used if approved in writing by the Executive Officer prior to use for certification. Testing shall be conducted in accordance with the following methods, which are incorporated by reference herein: NOx, CO, and Oxygen: ARB Test Method 100 (as adopted on July 28, 1997) VOC: South Coast AQMD Method 25.3 (as published in March 2000) Gas Velocity and Flow Rate: ARB Test Methods 1, 2, 3, and 4 (as adopted on July 1, 1999) (b) Only natural gas, LPG, digester gas, landfill gas, or oil-field waste gas, as defined in section 94202, meeting the requirements of section 94207(d)(7) shall be used for certification testing. Other fuels may be used upon the written approval of the Executive Officer. (c) The DG Unit shall be configured as it will be marketed, including any additional control equipment or other devices that affect emissions. (d) Testing parameters. (1) A minimum of three valid test runs must be conducted. Tests are to be run consecutively. Justification for invalid test runs or time gaps between runs must be included in the test report. (2) Testing commences after the DG Unit has reached stable operation. (3) Each run must be conducted at 100 percent of generator net output. (A) A load bank may be used to establish the load. (B) The DG Unit must be operated for a sufficient period of time to demonstrate stability in the emission readings at constant load and to ensure the collection of representative and quantifiable samples.

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
	(D) An owner or operator of a Unit shall maintain a parametric monitoring system and its associated components necessary to maintain a system that measures air-to-fuel ratio. (E) An owner or operator of a Unit shall inspect and maintain all sensors and meters used by the parametric monitoring system per manufacturer's recommendations as specified in the operating manual. (F) An owner or operator of a Unit shall develop and implement procedures for at least daily monitoring of the parametric monitoring system.	additional two tests are not required if the permit limits the engine to operating at one defined load, ± 10%. No pre-tests for compliance are permitted. The emission test shall be conducted at least 40 operating hours, or at least 1 week, after any engine servicing or tuning. If an emission exceedance is found during any of the three phases of the test, that phase shall be completed and reported. The operator shall correct the exceedance, and the source test may be immediately resumed. Relative accuracy tests required by Rule 218.1 or 40 CFR Part 75 Subpart E shall satisfy this requirement for those pollutants monitored by a CEMS for all applicable operating loads specified in this clause (f)(1)(C)(ii). (iii) Use a contractor to conduct the source testing that is approved by the Executive Officer under the Laboratory Approval Program for the necessary test methods. (iv) Submit a source test protocol to the Executive Officer for written approval at least 60 days before the scheduled date of the test. The source test protocol shall include the name, address and phone number of the engine operator and a South Coast AQMD-approved source testing contractor that will conduct the test, the application and permit number(s), emission limits, a description of the engine(s) to be tested, the test methods and procedures to be used, the number of tests to be conducted and under what loads, the required minimum sampling time for the VOC test, based on the analytical detection limit and expected VOC levels, and a description of the parameters to be measured in accordance with the I&M plan required by subparagraph (f)(1)(D). The source test protocol shall be approved by the Executive Officer prior to any testing. The operator is not required to submit a protocol for approval if: there is a previously approved protocol that meets these requirements; the engine has not been altered in a manner that requires a permit alteration; and emission limits have not changed since the previous test. If the operator submits the protocol by the required date, and the Executive Officer takes longer than 60 days to approve the protocol, the operator shall be allowed the additional time needed to conduct the test. (v) Provide the Executive Officer at least 30 days prior notice of any source test to afford the Executive Officer the opportunity to have an observer present. If after 30 days notice for an initially scheduled performance test, there is a delay (due to operational problems, etc.) in conducting the scheduled performance test, the engine operator shall notify the Executive Officer as soon as	(4) Generator output (MW-hr), based on net output, shall be measured during each valid test run. A calibrated electric meter shall be used for the measurements. The meter shall meet the American National Standards Institute's Code for Electricity Metering (ANSI C12.1-as of July 9, 2001). (5) Recovered heat shall be measured using a water loop device, measuring the water flow rate, inlet temperature, and outlet temperature. (6) The emission rate shall be expressed in lb/MW-hr. (7) Certification Fuels (A) Natural gas. (B) LPG that meets the standards of HD-5 propane. (C) Surrogate digester gas that is composed of 60 to 65 percent methane and 35 to 40 percent CO2, by volume. (D) Surrogate landfill gas that is composed of 42 to 46 percent methane, 34 to 38 percent CO2, and 18 to 22 percent N2, by volume. (E) Surrogate oil-field waste gas that is composed of 63 to 71 percent methane, 6 to 8 percent ethane, 9 to 11 percent propane, 7 to 9 percent CO2, and 7 to 8 percent carbon compounds with four or more carbon atoms per molecule, by volume. (e) Alternative testing procedures may be used upon written approval of the Executive Officer, if alternative procedures are deemed to be equivalent or more accurate than the prescribed procedures.

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
		possible of any delay in the original test date, either by providing at least seven days prior notice of the rescheduled date of the performance test, or by arranging a rescheduled date with the Executive Officer by mutual agreement. (vi) Submit all source test reports, including a description of the equipment tested, to the Executive Officer within 60 days of completion of the test. (vii) By February 1, 2009, provide, or cause to be provided, source testing facilities as follows: (I) Sampling ports adequate for the applicable test methods. This includes constructing the air pollution control system and stack or duct such that pollutant concentrations can be accurately determined by applicable test methods; (II) Safe sampling platform(s), scaffolding or mechanical lifts, including safe access, that comply with California General Safety Orders. Agricultural stationary engines are excused from this subclause if they are in remote locations without electrical power; (III) Utilities for sampling and testing equipment. Agricultural stationary engines are exempt from this subclause if they are on wheels and moved to storage during the off season. (D) Inspection and Monitoring (I&M) Requirements (i) I&M Plan. The operator shall: (I) Submit to the Executive Officer for written approval an I&M plan. One plan application is required for each facility that does not have a NOx and CO CEMS for each engine. The I&M plan shall include all items listed in Attachment 1. The owner or operator may request an alternative item(s) in Attachment 1 that is determined by the Executive Officer to be equivalent in meeting the same objectives. (II) Upon written approval by the Executive Officer, implement the I&M plan as approved. (III) Submit an I&M plan for approval to the Executive Officer for a plan revision before any change in I&M plan operations can be implemented. The operator shall apply for a plan revision prior to any change in emission limits or control equipment. (f)(F) New Non-Emergency Electrical Generating Engines Operators of engines subject to the requirements of subparagraph (d)(1)(L) shall also meet the following requirements. (i) The engine generator shall be monitored with a calibrated electric meter that measures the net electrical output of the engine generator system, which is the difference between the electrical output of the generator and the electricity consumed by	

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
		the auxiliary equipment necessary to operate the engine generator. (g) Test Methods Testing to verify compliance with the applicable requirements shall be conducted in accordance with the test methods specified in Table IX, or any test methods approved by CARB and EPA, and authorized by the Executive Officer. TABLE IX- TESTING METHODS NOx- South Coast Air Quality Management District Method 100.1 CO- South Coast Air Quality Management District Method 100.1 VOC- South Coast Air Quality Management District Method 25.1* or Method 25.3* * Excluding ethane and methane A violation of any standard of this rule established by any of the specified test methods, or any test methods approved by the CARB or EPA, and authorized by the Executive Officer, shall constitute a violation of this rule.	
Reporting	An owner or operator of a Unit shall submit all source test reports to the Executive Officer within 60 days of completion of the test..	(f)(D)(iii) Requirements for responding to, diagnosing and correcting breakdowns, faults, malfunctions, alarms, diagnostic emission checks finding emissions in excess of rule or permit limits, and parameters out-of-range. (I) For any diagnostic emission check or breakdown that results in emissions in excess of those allowed by this rule or a permit condition, the operator shall correct the problem as soon as possible and demonstrate compliance with another diagnostic emission check, or shut down an engine by the end of an operating cycle, or within 24 hours from the time the operator knew of the breakdown or excess emissions, or reasonably should have known, whichever is sooner. (H) Reporting Requirements (i) The operator shall report to the Executive Officer, by telephone (1-800-CUT-SMOG or 1-800-288-7664) or other South Coast AQMD-approved method, any breakdown resulting in emissions in excess of rule or permit emission limits within one hour of such noncompliance or within one hour of the time the operator knew or reasonably should have known of its occurrence. Such report shall identify the time, specific location, equipment involved, responsible party to contact for further information, and to the extent known, the causes of the	None

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
		noncompliance, and the estimated time for repairs. In the case of emergencies that prevent a person from reporting all required information within the one-hour limit, the Executive Officer may extend the time for the reporting of required information provided the operator has notified the Executive Officer of the noncompliance within the one-hour limit. (ii) Within seven calendar days after the reported breakdown has been corrected, but no later than thirty calendar days from the initial date of the breakdown, unless an extension has been approved in writing by the Executive Officer, the operator shall submit a written breakdown report to the Executive Officer which includes: (I) An identification of the equipment involved in causing, or suspected of having caused, or having been affected by the breakdown; (II) The duration of the breakdown; (III) The date of correction and information demonstrating that compliance is achieved; (IV) An identification of the types of excess emissions, if any, resulting from the breakdown; (V) A quantification of the excess emissions, if any, resulting from the breakdown and the basis used to quantify the emissions: (VI) Information substantiating whether the breakdown resulted from operator error, neglect or improper operation or maintenance procedures; (VII) Information substantiating that steps were immediately taken to correct the condition causing the breakdown, and to minimize the emissions, if any, resulting from the breakdown; (VIII) A description of the corrective measures undertaken and/or to be undertaken to avoid such a breakdown in the future; and (IX) Pictures of any equipment which failed, if available. (iii) Within 15 days of the end of each calendar quarter, the operator shall submit to the Executive Officer a report that lists each occurrence of a breakdown, fault, malfunction, alarm, engine or control system operating parameter out of the acceptable range established by an I&M plan or permit condition, or a diagnostic emission check that finds excess emissions. Such report shall be in a South Coast AQMD-approved format, and for each incident shall identify the time of the incident, the time the operator learned of the incident, specific location, equipment involved, responsible party to contact for further information, to the extent known the causes of	

Rule Element	PR 1110.3	PAR 1110.2	CCR, Title 17, Division 3, Chapter 1, Subchapter 8, Article 3
		the event, the time and description of corrective actions, including shutting an engine down, and the results of all portable analyzer NOx and CO emissions checks done before or after the corrective actions. The operator shall also report if no incidents occurred.	
Recordkeeping	An owner or an operator of a Unit shall retain all data logs, source test reports, and other records required by this rule for at least five years and be made available to the Executive Officer upon request. (A) The owner or operator of a Unit shall maintain records, on a monthly basis, for the following parameters(s) or item(s): (i) Quantity of fuel consumption (e.g., cubic feet of gas); (ii) Date of last emissions test required in subdivision (f) and subparagraph (g)(1)(A); (iii) Megawatt-hours of electricity produced; and (iv) Air-to-Fuel system faults, alarms, and any other related emission control malfunctions. (B) An owner or operator of a Unit shall keep records to demonstrate compliance with paragraphs (e)(1), (f)(1), (f)(8), (f)(10), and (g)(1).	(E) Operating Log Maintain a monthly engine operating log that includes: (i) Total hours of operation; (ii) Type of liquid and/or type of gaseous fuel; (iii) Fuel consumption (cubic feet of gas and gallons of liquid); and (iv) Cumulative hours of operation since the last source test required in subparagraph (f)(1)(C).	(a) The Applicant must retain all information used for the certification application. (b) Upon request of the Executive Officer, the Applicant will submit information to the ARB on the number and location of certified DG Units in California. (c) The Applicant shall maintain a log identifying the components listed pursuant to section 94204(a)(6) that are replaced, the date of replacement, and the hours of operation each replaced component was used. (d) All records maintained pursuant to this certification program must be retained for a period of five years after the certification has expired. (e) All records maintained pursuant to this certification program shall be submitted to the ARB upon request of the Executive Officer.

APPENDIX A: LIST OF AFFECTED FACILITIES

Table A-1: Facilities Affected by PR 1110.3

Facility ID	Facility Name
8582	Southern California Gas Company
189493	Mainspring Energy, Incorporated/Food 4 Less
193535	Mainspring Energy, Incorporated/Lineage Logistics
193650	Mainspring Energy, Incorporated/Ralphs
193671	Mainspring Energy, Incorporated/Ralphs
193675	Mainspring Energy, Incorporated/Food 4 Less
193716	Mainspring Energy, Incorporated/Ralphs
193748	Mainspring Energy, Incorporated/Ralphs
193871	Mainspring Energy, Incorporated/Ralphs
194969	Mainspring Energy, Incorporated/Ralphs
194970	Mainspring Energy, Incorporated/Ralphs
194986	Mainspring Energy, Incorporated/Food 4 Less
195671	Mainspring Energy, Incorporated/Ralphs
195672	Mainspring Energy, Incorporated/Food 4 Less
197093	Mainspring Energy, Incorporated/Ralphs
197094	Mainspring Energy, Incorporated/Food 4 Less
197144	Mainspring Energy, Incorporated/Food 4 Less
197710	Mainspring Energy, Incorporated/Lineage Logistics
197890	Mainspring Energy, Incorporated/Food 4 Less
197925	Mainspring Energy, Incorporated/Lineage Logistics
198042	Mainspring Energy, Incorporated/Lineage Logistics
198085	Mainspring Energy, Incorporated/Lineage Logistics
198227	Mainspring Energy, Incorporated/Ralphs
198228	Mainspring Energy, Incorporated/Ralphs
198645	Prologis Denker

APPENDIX B – RESPONSES TO PUBLIC COMMENTS

Public Workshop Comments

Public Workshop Commenter #1: Alison Torres- Southern California Alliance of Publicly Owned Treatment Works

The commenter expressed the following:

a) Concerned about linear generators fueled with biogas reliably meeting emissions limits over the life of the equipment due to the lack of emissions data.
b) Concerned about the proposed rule emission limits potentially hindering the adoption of linear generator technology by publicly owner treatment works and requested the same emission limits as Rule 1179.1 for biogas fueled linear generators.

Staff Response to Public Workshop Commenter #1:

a) Staff acknowledged the lack of emissions data for biogas fueled linear generators. Staff will continue to work with manufacturers to obtain emissions data as well as address concerns regarding durability of the equipment.
b) Staff is narrowing the applicability of PR 1110.3 to units fueled solely by natural gas. Units fueled with biogas will be evaluated by South Coast AQMD engineering staff to determine the appropriate emission limits as emission data becomes available.

Public Workshop Commenter #2: Dan McGivney- Southern California Gas Company

The commenter expressed the following:

a) Due to linear generator technology being fairly new, questioned the timing of submittal of PR 1110.3 to U.S. EPA for inclusion into the State Implementation Plan (SIP) and suggested that staff delay submittal until more emissions data for biogas fueled units was received.

Staff Response to Public Workshop Commenter #2:

a) Staff narrowed the applicability of PR 1110.3 to only include natural gas fueled linear generators. PR 1110.3 will be submitted for inclusion into the SIP.

Public Workshop Commenter #3: Adam Simpson- Mainspring Energy, Incorporated

The commentor expressed looking forward to continued engagement on the rulemakings and thanked the Working Group.

Staff Response to Public Workshop Commenter #3:

Staff likewise looks forward to continued public engagement throughout this rule development.

Public Workshop Commenter #4: Bipul Saraf- York Engineering

The commenter expressed the following:

a) Asked if source tests were the only acceptable compliance test in PR 1110.3.

b) Concern over linear generator technology meeting emission limits over the life of the equipment.

Staff Response to Public Workshop Commenter #4:

a) PR 1110.3 contains both source testing and portable analyzer testing requirements. Staff updated the source test frequency and monitoring requirements in PR 1110.3. The proposed source test frequency is every five years.
b) Staff is working with the technology manufacturers to determine the durability of the equipment over time as it relates to emissions.

Email Comments

Email Comment #1: Corrie Zuppo- Mainspring Energy, Incorporated

Attached are Mainspring Energy's comments to South Coast AQMD Proposed Rule 1110.3.

(Adopted TBD)
V012023

PROPOSED
RULE 1110.3 EMISSIONS FROM LINEAR GENERATORS

(a) Purpose

The purpose of this rule is to reduce emissions of Oxides of Nitrogen (NO_x), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO) from linear generators.

(b) Applicability

This rule shall apply to linear generators fueled on natural gas, landfill gas, ~~or~~ digester gas~~,~~ or hydrogen~~or propane gas~~, with the exception of those units exempt under Section (h)~~All linear generators are subject to this rule.~~ 1-1

(c) Definitions

(1) BREAKDOWN means a physical or mechanical failure or malfunction of a linear generator, air pollution control equipment, or related operating equipment that is not the result of operator error, neglect, improper operation or improper maintenance procedures, which results in~~may lead to~~ excess emissions beyond rule related emission limits or permit conditions. 1-2

(2) DAILY means the time period starting at 12 midnight and continuing through 11:59 p.m.

(3) DIGESTER GAS means gas that is produced by anaerobic decomposition of organic material.

(4) EMERGENCY STANDBY UNIT means any Linear Generator which operates as a temporary replacement for primary ~~mechanical or~~ electrical power during periods of fuel or energy shortage or while the primary power supply is under repair. 1-3

(5) FACILITY means any source or group of sources or other air contaminant emitting activities which are located on one or more contiguous properties within the South Coast AQMD, in actual physical contact or separated solely by a public roadway or other public right-of-way, and are owned or operated by the same person (or by persons under common control), or an outer continental shelf (OCS) source as determined in Section 55.2 of Title 40, Part 55 of the Code of Federal Regulations (40 CFR Part 55). Such above-described groups, if noncontiguous, but connected only by land carrying a pipeline, shall not be considered one

facility. Sources or installations involved in crude oil and gas production in Southern California Coastal or OCS Waters and transport of such crude oil and gas in Southern California Coastal or OCS Waters shall be included in the same facility which is under the same ownership or use entitlement as the crude oil and gas production facility on-shore.

(6) LANDFILL GAS means any gas derived through a natural process from the decomposition of waste deposited in an MSW Landfill.

(7) LINEAR GENERATOR means any power generation technology that uses a thermochemical reaction to create linear motion that is directly converted into electricity.

(8) MUNICIPAL SOLID WASTE or MSW LANDFILL means an entire disposal facility in a contiguous geographical space where solid waste is placed in or on land. An MSW Landfill may be active, inactive, or closed.

(A) Active MSW Landfill means a Municipal Solid Waste Landfill that has received solid waste on or after November 8, 1987.

(B) Inactive MSW Landfill means a Municipal Solid Waste Landfill that has not accepted solid waste after November 8, 1987 and subsequently no further solid waste disposal activity has been conducted within the disposal facility.

(C) Closed MSW Landfill means a Municipal Solid Waste Landfill that has ceased accepting solid waste for disposal and the closure was conducted in accordance with all applicable federal, state and local statutes, regulations, and ordinances in effect at the time of closure.

(9) NATURAL GAS means a mixture of gaseous hydrocarbons, with at least 80 percent methane by volume, and of pipeline quality, such as the gas sold or distributed by any utility company regulated by the California Public Utilities Commission.

(10) ~~OPERATING CYCLE means a period of time within which a round of regularly recurring events is completed, and cannot be stopped without the risk of endangering public safety or health, causing material damage to the equipment or product, or cannot be stopped due to technical constraints. Economic reasons alone will not be sufficient to extend this time period. The Operating Cycle includes batch processes that may start and finish several times within a twenty-four hour period, in which case each start to finish interval is considered a complete cycle.~~ 1-4

(11) OXIDES OF NITROGEN (NO_x) means the sum of nitric oxides and nitrogen dioxides emitted, collectively expressed as nitrogen dioxide emissions.

(12) STANDARDIZED SOURCE TEST PROTOCOL means a source test protocol specific to the make and model of the equipment that is approved by the South Coast AQMD and may be used for all source tests on linear generators of the same make and model. 1-5

(13) TUNING means adjusting, optimizing, rebalancing, or other similar operations to an electric generating Unit or an associated control device or as otherwise defined in the Permit to Operate. Tuning does not include normal operations to meet load fluctuations.

(14) UNIT means, for purposes of this rule, any linear generator. 1-6

(15) VOLATILE ORGANIC COMPOUND (VOC) as defined in Rule 102 – Definition of Terms.

(d) Emission Limits

(1) An owner or operator of a Unit shall not operate the Unit in a manner that exceeds the NO_x, CO, and VOC emission limits listed in Table 1: Concentration Limits for Linear Generators, pursuant to subdivision (f):

Table 1: Concentration Limits for Linear Generators 1-7

Units with a Permit to Operate Issued on and after *[Date of Adoption]*			
Fuel Type	**NO_x (ppmv)[1]**	**CO (ppmv)[1]**	**VOC (ppmv)[2]**
Natural Gas, ~~Propane Gas,~~ Hydrogen Gas, Landfill Gas, and Digester Gas	2.5	12	10

[1] Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes.
[2] Parts per million by volume, measured as carbon, corrected to 15% oxygen on a dry basis, and averaged over the sampling time required by the test method.

(2) In the event of a potential breakdown that results in emissions in excess of those allowed by Table 1, the Unit's Inspection and Monitoring Plan will be adhered too. 1-8

(3) ~~An owner or operator shall shut down a Unit having a Breakdown that results in~~ 1-9

~~emissions in excess of those allowed by Table 1 by the end of an Operating Cycle, or within 24 hours from the time the owner or operator knew of the Breakdown or excess emissions, or reasonably should have known, whichever is sooner~~¶

1-9 cont'd

~~(4) Maintenance Requirements~~

1-10

(5) An owner or operator of a Unit shall perform maintenance per manufacturer's recommendations as specified in the operating and maintenance manual.

(6) An owner or operator of a Unit shall keep a copy of the manufacturer's operating manual and be made available to the Executive Officer upon request.

(e) Certification

(1) The manufacturer shall obtain confirmation from an independent testing laboratory prior to applying for certification that each unit model complies with the applicable requirements of subdivision (d). This confirmation shall be based upon emission tests of a randomly selected unit of each model, and the agreed upon standardized source test protocol shall be adhered to during the confirmation testing of all units subject to this rule.

(2) When applying for unit(s) certification, the manufacturer shall submit to the Executive Officer the following:

(A) A statement that the model is in compliance with subdivision (d). The statement shall be signed and dated, and shall attest to the accuracy of all statements;

(B) General Information

(i) Name and address of manufacturer,

(ii) Brand name, and

(iii) Model number

(C) A description of each model being certified; and

(D) A source test report verifying compliance with the emission limits in subdivision (d) for each model to be certified. The source test report shall be prepared by the confirming independent testing laboratory. The source test shall have been conducted no more than ninety (90) days prior to the date of submittal of a certification application to the Executive Officer.

1-11

(3) When applying for unit certification, the manufacturer shall submit the items identified in paragraph (f)(2) no more than ninety (90) days after the date of the source test identified in subparagraph (f)(2)(D) and at least 120 days prior to the date of the proposed sale of the units.

(4) The Executive Officer shall certify a unit model which complies with the

provisions of subdivision (d) and of paragraphs (f)(1), (f)(2), and (f)(3) within 30 days of receipt of the items identified in paragraph (f)(2).

(5) Certification status shall be valid for three years from the date of approval by the Executive Officer. After the third year, recertification may be required according to the requirements of paragraphs (f)(1) and (f)(2).

1-11 cont'd

(f) Source Testing

(1) An owner or operator of a Unit shall conduct source testing for NOx, VOC reported as carbon, and CO concentrations (concentrations in ppm by volume, corrected to 15 percent oxygen on dry basis) at least once every three ~~two~~ years from the date of the previous source test, no later than the last day of the calendar month that the test is due~~, or every 8,760 operating hours, whichever occurs first.~~ The source test schedule may be changed under the following circumstances:

1-12

¶

~~An owner or operator of a Unit may elect to reduce the source test frequency to once every three years if the Unit has operated less than 2,000 hours since the last source test; or~~

1-13

(A) An owner or operator of a Unit that has not been operated before the date a source test is due, shall conduct a source test by the end of 90~~seven consecutive days or 15 cumulative~~ days of resumed operation.

1-14

(B) In lieu of a source test every three years, a diagnostic emission check for NOx and CO concentrations (concentrations in ppm by volume, corrected to 15 percent oxygen on dry basis) may be conducted using a portable analyzer or equivalent measurement device. The operator shall measure NOx and CO concentrations as outlined in an approved Inspection and Monitoring Plan. If emissions are found to exceed the emissions limits in Table 1, the operator shall conduct a source test.

1-15

(2) An owner or operator of a Unit shall conduct the source test by using a contractor that is approved under the South Coast AQMD's Laboratory Approval Program (LAP) for the test methods specified in Table 2: Testing Methods, or any test methods approved by CARB and EPA, and authorized by the Executive Officer.

Table 2: Testing Methods

Pollutant	Method
NOx	South Coast AQMD Method 100.1

CO	South Coast AQMD Method 100.1
VOC	South Coast AQMD Method 25.1* or Method 25.3*

*Excluding ethane and methane

(3) An owner or operator of a Unit shall submit a source test protocol to the Executive Officer for written approval at least 60 days before the scheduled date of the test. The source test protocol shall include, but not limited to the following:

(A) Name, address, and phone number of the Unit operator and a South Coast AQMD-approved source testing contractor that will conduct the test;

(B) Application number(s), permit number(s), and emission limits;

(C) Description of the Unit(s) to be tested and the test methods and procedures to be used;

(D) Number of tests to be conducted and under what loads; and

(E) Required minimum sampling time for the VOC test, based on the analytical detection limit and expected VOC levels.

(4) An owner or operator of a Unit shall conduct the source test within 90 days after a written approval of the source test protocol by the Executive Officer is electronically distributed.

(5) An owner or operator of a Unit subject to a previously approved standarized source test protocol shall submit a subsequent protocol if the Unit has been altered in a manner that requires a permit alteration, if emission limits for the Unit have changed since the previous source test, or if requested by the Executive Officer. 1-16

(6) An owner or operator of a Unit shall provide the Executive Officer at least 30 days prior notice of any source test to afford the Executive Officer the opportunity to have an observer present. If, after the 30 days prior notice is given, there is a delay (due to operational problems, etc.) in conducting the scheduled source test, the owner or operator of a Unit shall notify the Executive Officer as soon as possible of any delay in the original test date, either by providing notice of the rescheduled date of the source test at least seven days prior, or by arranging a rescheduled date mutually agreed upon with the Executive Officer.

(7) An owner or operator of a Unit shall provide source testing facilities as follows:

(A) Sampling ports adequate for the applicable test methods. This includes constructing the air pollution control system and stack or duct such that

pollutant concentrations can be accurately determined by applicable test methods;

(B) Safe sampling platform(s), scaffolding or mechanical lifts, including safe access, that comply with California General Safety Orders; and

(C) ~~Utilities for sampling and testing equipment.~~ 1-17

(8) The LAP contractor shall conduct source testing for at least 30 minutes during normal operation (actual duty cycle). This test shall not be conducted under a steady-state condition unless it is the normal operation. ~~In addition, the LAP contractor shall conduct source testing for NOx and CO emissions for at least 15 minutes at: a Unit's actual peak load, or the maximum load that can be practically achieved during the test, and at actual minimum load, excluding idle, or theminimum load that can be practically achieved during the test. These additional two tests are not required if the permit limits the Unit to operating at one defined load ± 10%.~~ The LAP contractor shall not conduct any pre-tests for compliance. If an emission exceedance is found during any of the three phases of the test, that phase shall be completed and reported. An operator shall correct the exceedance, and the source test may be immediately resumed. 1-18

(9) ~~The LAP contractor shall conduct the source test at least 40 operating hours, or at least 1 week, whichever occurs later, after any Unit servicing or tuning.~~ 1-19

(10) A Unit certified in accordance with subdivision (e), Certification, shall be exempt from the requirements of subdivision (f) for the period of the certification. 1-20

(g) Monitoring, Recordkeeping, and Reporting

(1) Monitoring

(A) ~~An owner or operator of a Unit shall maintain an operational non-resettable totalizing time meter to determine the elapsed operating time of the Unit.~~ 1-21

(B) An owner or operator of a Unit shall maintain a utility grade ~~calibrated~~ electric meter that measures the net electrical output of the Unit, which is the difference between the electrical output and the electricity consumed by the auxiliary equipment necessary to operate the Unit. 1-22

(C) An owner or operator of a Unit shall maintain a District approved parametric monitoring system ~~consisting of an air-to-fuel ratio controller (AFRC), an oxygen sensor, a fuel flow meter, and an air flow meter, which has a malfunction indicator light and audible alarm~~. 1-23

(D) An owner or operator of a Unit shall inspect and, maintain, ~~and replace~~ all sensors and meters used by the parametric monitoring system per manufacturer's recommendations as specified in the operating manual. 1-24

(E) An owner or operator of a Unit shall develop and implement procedures for at least daily monitoring of the parametric monitoring system. ~~monitor and record at least daily the following:~~ 1-25

~~(i) fuel flow rate;¶~~

~~(ii) elapsed time meter operating hours;¶~~

~~(iii) AFRC system faults, alarms, and any other related emission control malfunctions; and¶~~

~~(iv) operating hours since the last source test required by subdivision (f).~~

(2) Recordkeeping

An owner or operator of a Unit shall retain all data logs, source test reports, and other records required by this rule for at least five years and be made available to the Executive Officer upon request.

(A) The owner or operator of a Unit shall maintain records, on a monthly basis, for the following parameters(s) or item(s):

(i) Total hours of operation;

(ii) Type of fuel and quantity of fuel consumption (e.g., cubic feet of gas);

~~Cumulative hours of operation since the last source test required in subdivision (f);~~ 1-26

(iii) Megawatt-hours of electricity produced; and

(iv) Air-to-Fuel~~AFRC~~ system faults, alarms, and any other related emission control malfunctions.

(B) An owner or operator of a Unit shall keep records to demonstrate compliance with paragraphs (e)(1), (f)(1)., ~~and (f)(9).~~ 1-27

(C) An owner or operator of a Unit shall keep sufficient operating records to demonstrate that it meets the requirements for extension of the source testing deadlines, pursuant to paragraph (f)(1).

(3) Reporting

(A) In the event of a breakdown, the operator shall follow the procedures in Rule 430 for reporting of the breakdown. ~~The operator shall report to the Executive Officer, by telephone (1-800-CUT-SMOG or 1-800-288-7664) or other South Coast AQMD approved method, any Breakdown resulting~~ 1-28

in emissions in excess of rule or permit emission limits within one hour of such noncompliance or within one hour of the time the operator knew or reasonably should have known of its occurrence. Such report shall identify the time, specific location, equipment involved, responsible party to contact for further information, and to the extent known, the causes of the noncompliance, and the estimated time for repairs. In the case of emergencies that prevent a person from reporting all required information within the one-hour limit, the Executive Officer may extend the time for the reporting of required information provided the operator has notified the Executive Officer of the noncompliance within the one-hour limit.

(B) Within seven calendar days after the reported Breakdown has been corrected, but no later than thirty calendar days from the initial date of the Breakdown, unless an extension has been approved in writing by the Executive Officer, the owner or operator shall submit a written Breakdown report to the Executive Officer which includes:¶

(i) An identification of the equipment involved in causing, or suspected of having caused, or having been affected by the Breakdown;¶

(ii) The duration of the Breakdown;¶

(iii) The date of corrective action and information demonstrating that compliance is achieved;¶

(iv) An identification of the types of excess emissions, if any, resulting from the Breakdown;¶

(v) A quantification of the excess emissions, if any, resulting from the Breakdown and the basis used to quantify the emissions;¶

(vi) Information substantiating whether the Breakdown resulted from operator error, neglect or improper operation or maintenance procedures;¶

(vii) Information substantiating that steps were immediately taken to correct the condition causing the Breakdown, and to minimize the emissions, if any, resulting from the Breakdown;¶

(viii) A description of the corrective measures undertaken and/or to be undertaken to avoid such a Breakdown in the future; and¶

(C) Pictures of any equipment which failed, if available.

(D) An owner or operator of a Unit shall submit all source test reports;

1-28 cont'd

~~including a description of the equipment tested,~~ to the Executive Officer within 60 days of completion of the test. 1-29

(h) Exemptions

(1) The requirements of Section (g) shall not apply to linear generators that have been certified under Section (f).

(2) The provisions of this rule shall not apply to linear generators that have received a California Air Resources Board Executive Order issued under the Distributed Generation (DG) Certification Regulation 1-30

(3) The provisions of subdivisions (d) shall not apply to:

(A) Laboratory Units used for testing and research purposes; and

(B) Units operating pursuant to Rule 441 with a valid experimental research operations permit to operate, operated for the purposes of performance verification and testing of such Units.

(4) The provisions of subdivisions (f) shall not apply to:

(A) Emergency Standby Units, Units used for fire-fighting and flood control, and any other emergency Unit approved by the Executive Officer, which have permit conditions that limit operation to 200 hours or less per year as determined by an elapsed operating time meter.

Staff Responses to Email Comment #1:

Response to Email Comment 1-1:
Staff narrowed the applicability of PR 1110.3 to natural gas fueled linear generators only. Source test data was provided for natural gas fueled units which verified the achievability of the proposed emission limits. Since no source test data was provided for any fuel besides natural gas, other fuels are not included in PR 1110.3 applicability.

Response to Email Comment 1-2:
Staff removed this definition from PR 1110.3. Units subject to PR 1110.3 will be subject to the breakdown provisions in Rule 430.

Response to Email Comment 1-3:
Staff updated the definition to reflect this edit and to further streamline the definition.

Response to Email Comment 1-4:
Staff updated this provision to reflect the suggested edit.

Response to Email Comment 1-5:
Staff is not including the proposed definition because South Coast AQMD recognizes the source test protocol submitted by the equipment manufacturer as a generic source test protocol rather than a standardized source test protocol. Standardized source test protocols are available to the public through the South Coast AQMD website, whereas generic source test protocols are not publicly available. PR 1110.3 includes verbiage to reference generic source test protocols in subdivision (f) and the staff report provides clarity on what a generic protocol is.

Response to Email Comment 1-6:
Staff updated subdivision (c) of PR 1110.3 to clarify that the definitions provided are for the purposes of the rule. In addition, the definition of Unit was updated to clarify that a Unit means any single linear generator core.

Response to Email Comment 1-7:
Please see Response to Email Comment 1-1. In addition, Table 1 has been updated to reflect the updated applicability in PR 1110.3.

Response to Email Comment 1-8:
Please see Response to Email Comment 1-2. Staff did not include the proposed provision for allowing the Unit's Inspection and Monitoring Plan to be adhered to in the event of a breakdown in PR 1110.3, as it could potentially conflict with the requirements set forth in Rule 430 clause (b)(3)(A)(iv).

Response to Email Comment 1-9:
Staff updated the provision to reflect the suggested edit.

Response to Email Comment 1-10:
Staff will keep maintenance requirements as a separate subdivision from emission limits.

Response to Email Comment 1-11:
Staff did not include the proposed rule language as U.S. EPA indicated that the provisions related to a South Coast AQMD certification program would likely be disapproved since the certification program has not been developed.

Response to Email Comment 1-12:
Staff updated the source testing frequency for non-pooled units to every five years to address concerns about source test frequency. In addition, an option to pool test facilities with six of more identical units has been added to further reduce source testing burdens.

Response to Email Comment 1-13:
Staff updated this provision to reflect the suggested edit.

Response to Email Comment 1-14:
Staff will require that the source test be conducted within 90 days as requested.

Response to Email Comment 1-15:
This proposal is not acceptable as the emission measurements taken from portable analyzers by a facility operator are not enforceable. U.S. EPA would likely not approve PR 1110.3 into the SIP without an enforceable mechanism to determine compliance with emission limits. In addition, source testing can be done for all pollutants regulated by PR 1110.3 (i.e. NOx, CO, and VOC), whereas portable analyzer testing would not measure VOC emissions.

Response to Email Comment 1-16:
Please see Response to Email Comment 1-5.

Response to Email Comment 1-17:
Consistent with other rules with source testing requirements, this provision is necessary to ensure that LAP contractors have access to needed utilities to conduct source tests.

Response to Email Comment 1-18:
Staff updated this provision to reflect the suggested edit.

Response to Email Comment 1-19:
Staff retained and clarified this provision, as is important to ensure that units are not tuned prior to testing, thus ensuring the integrity and validity source test data.

Response to Email Comment 1-20:
Please see Response to Email Comment 1-11.

Response to Email Comment 1-21:
Staff updated the rule to remove this provision.

Response to Email Comment 1-22:
Staff updated this to a net output meter that is compliant with ANSI C12.20 or equivalent.

Response to Email Comment 1-23:
Staff does not believe that it is necessary to have a specific District approved parametric monitoring system. However, staff recognizes the variation of parametric monitoring systems and thus, the provision has been updated to be more general in the event of potential design changes.

Response to Email Comment 1-24:
Staff updated this provision to reflect the suggested edits.

Response to Email Comment 1-25:
Staff updated this provision to reflect the suggested edits.

Response to Email Comment 1-26:
Staff removed this provision and has updated PR 1110.3 subparagraph (g)(2)(A) to reflect the suggested edits.

Response to Email Comment 1-27:
Please see Response to Email Comment 1-19. Recordkeeping requirements are necessary to verify compliance with maintenance and emission testing requirements in PR 1110.3.

Response to Email Comment 1-28:
Staff deleted the breakdown reporting requirements in PR 1110.3, as requested. Rule 430 will apply to units regulated under PR 1110.3. Staff did not include the proposed language to directly reference Rule 430 for reporting of breakdown requirements.

Response to Email Comment 1-29:
Staff updated this provision to reflect the suggested edits, since the source test protocol contains requirements to submit source test reports that include a description of the equipment tested.

Response to Email Comment 1-30:
Please see Response to Email Comment 1-11. Staff discussed the proposal to provide an exemption for units certified under the California Air Resources Board (CARB) Distributed Generation (DG) Certification Regulation with U.S. EPA. U.S. EPA expressed concerns about

establishing an exemption from PR 1110.3 for units with CARB DG certifications when the CARB DG Certification Regulation is not SIP approved.

Email Comment #2: Corrie Zuppo- Mainspring Energy, Incorporated

Hay Lo

From: Corrie Zupo <corrie.zupo@mainspringenergy.com>
Sent: Monday, February 6, 2023 5:00 PM
To: Hay Lo
Cc: Isabelle Shine; Michael Morris; Michael Krause; Adam Simpson; Scott Weaver; Melicia Charles
Subject: PR 11110.3 tuning and breakdown reporting

Good afternoon Hay,

As an additional follow-up to last week's PR 1110.3 call, we wanted to provide further comments on the definition of tuning and breakdown reporting. The definition of tuning suggestions is from SoCal Gas, who have been champions of linear generator technology. The breakdown reporting language is a condensed version of our current I&M Plan process.

Section c(13) Tuning:

TUNING means adjusting, optimizing, rebalancing, or other similar action operations to an electric generating Unit or an associated control device or otherwise defined in the Permit to Operate. Tuning does not include normal operations, for example, adjustments to meet load fluctuations or any adjustment made automatically by the control system. 2-1

Section g(3) Reporting:

(A) In the event of a breakdown, the operator shall follow the procedures in Rule 430 for reporting of the breakdown.
(B) A remote audit will commence upon notification of potential evidence of the emissions limits. If it is determined that there was an exceedance event, the operator will make any necessary adjustments to get the operation within the emissions limits. If the operator is unsuccessful in achieving and maintaining operation within the emission limits within 72 hours of the remote audit, the unit will be shut down until an onsite inspection can occur and the unit is operating below the emission limits. 2-2
(C) In the event of a breakdown, the operator shall follow the procedures in Rule 430 for reporting of a breakdown.
(D) An owner or operator of a Unit shall submit all source test reports to the Executive Officer within 60 days of completion of the test.

Please let me know if you have any questions and/or would like to discuss this further.

Best regards,

Corrie Zupo | Environmental Manager Permitting & Compliance | Mainspring | (c) 424-241-8959

Need to chat? Here's access to my calendar to set up an invite.

Staff Responses to Email Comment #2:

Response to Email Comment 2-1:
Staff provided additional clarity as to what is considered tuning, which incorporates most of the suggested language. Staff did not include the term "action operations" as it was not clearly defined from other operations.

Response to Email Comment 2-2:
Please see Response to Email Comments 1-28. The proposed rule language referred to as section (g)(3)(B) was not included in Proposed Rule 1110.3, as it seems to conflict with Rule 430 requirements.

Email Comment #3: Corrie Zuppo- Mainspring Energy, Incorporated

Hay Lo

From: Corrie Zupo <corrie.zupo@mainspringenergy.com>
Sent: Monday, February 6, 2023 4:33 PM
To: Hay Lo
Cc: Isabelle Shine; Michael Morris; Adam Simpson; Scott Weaver; Melicia Charles; Michael Krause
Subject: PR 1110.3 testing follow-up

Good afternoon Hay,

Mainspring appreciates the SCAQMD staff's work on the PR1110.3 proposed rule language. In our meeting on February 2, we discussed Mainspring's proposal to update rule language to allow for annual NOx and CO emission testing with a portable analyzer in lieu of performing a source test every three years. Just to clarify, our proposal is to require testing using a portable analyzer, and if the results are above the permit limits, then we would take corrective action and then perform a source test. Our hope is that this will address the enforceability concerns. 3-1

With respect to the timing of any testing (source or portable analyzer), Mainspring would strongly prefer the test schedule to be tied to operating hours rather than calendar months or years. We have a lot of projects in the pipeline that only operate 40-70% of the time (e.g., solar paired or EV charging), and having testing based on calendar months or years puts these projects at an economic disadvantage relative to projects that operate continuously. 3-2

We discussed this on the call, but we want to reiterate that Mainspring remains concerned about the disparate treatment of the linear generator technology when compared to other non-emergency electrical generation technologies of comparable rating (i.e., microturbines and fuel cells). As shown in the table below, emissions of NOx and CO from linear generators are comparable to those of microturbines and fuel cells. However, there are no source testing requirements for microturbines (permitted or registered) or registered fuel cells. The District's proposal to require source tests on linear generators causes a significant regulatory disparity, especially given the similar emissions profiles. 3-3

Table 1. Emission Comparison

Pollutant	Emissions (lb/MWhr)[1,2]		
	Linear Generator	**Fuel Cell**	**Microturbine**
NOx	0.06	0.07	0.07
CO	0.02	0.10	0.10

1. Based on Montrose Source Test Report for Colton location. Test date: 4/1/21.
2. Microturbne and Fuel Cell emissions based on CARB Distributed Generation Executive Orders: https://ww2.arb.ca.gov/our-work/programs/dgcert/exec-orders

Requiring source testing also causes a competitive disadvantage when compared to those other distributed generation technologies. A 15-year cost comparison, under the current permitting rules, of these technologies is presented below. 3-4

Table 2. Source Test Cost Comparison

Fee/Cost	Linear Generator	Fuel Cell	Microturbine (Registered)	Microturbine (permitted)
SCAQMD source test protocol review[1]	$471.83	$0.00	$0.00	$0.00
SCAQMD source test report review (15 yrs)[2,3]	$14,231.25	$0.00	$0.00	$0.00
Cost of source test (15 yrs)[3,4]	$150,000	$0.00	$0.00	$0.00
Total	**$164,703.08**	**$0.00**	**$0.00**	**$0.00**

1. Rule 306(m)(1). Based on a 5 hr evaluation. Fees are increased on an hourly basis beyond 5 hrs. However, the SCAQMD source test engineer stated that the protocol evaluation typically takes 5 hrs.
2. Based on invoice # 4082044, reference #PR220000, for 8 hours of source test review billed at $948,75 per review.
3. Assumes source test is required upon startup and every year thereafter.
4. Assumes $10,000 per source test for a single unit project/site.

Even at a 3-year source test interval, costs are drastically disproportional. The District has suggested requiring source tests because this is a new technology. However, several of these units have been operating within the District and in BAAQMD for multiple years. A growing number of source tests have been performed, all demonstrating compliance with the emission limits in PR1110.3. The lack of variation in the equipment performance should provide the District with the needed assurance that the emissions will not vary from unit to unit. Mainspring is respectfully requesting that the District reconsiders and adopt Mainspring's proposal to allow for portable analyzer testing in lieu of source tests.

Please let me know if you have any questions and/or would like to discuss this further.

Best regards,

Corrie Zupo | Environmental Manager Permitting & Compliance | Mainspring | (c) 424-241-8959

Need to chat? Here's access to my calendar to set up an invite.

3-4 cont'd

Staff Responses to Email Comment #3:

Response to Email Comment 3-1:
Please see Response to Email Comment 1-15.

Response to Email Comment 3-2:
Staff updated PR 1110.3 to remove the requirements for a non-resettable hour meter and thus, emission testing frequencies will be determined by calendar dates. Please see Response to Email Comment 1-12.

Response to Email Comment 3-3:
Although linear generator emission profiles are similar to those of microturbines and fuel cells, staff believes that emission testing is necessary. Some microturbines and fuel cells carry CARB Certifications for specific units, meeting CARB's Distributed Generation standards. The proposed emissions testing requirements will provide staff with assurances of the durability and robustness of the technology.

Response to Email Comment 3-4:
Staff proposed a new emissions testing schedule to help alleviate costs associated with emission testing. Based on the new testing schedule and an estimated cost of $10,000 per source test, staff calculates the cost of source testing each unit to be approximately $30,000 over a 15-year period. The new test schedule translates to over 60% cost savings over the originally proposed source test frequency that units are currently subject to in R1110.2. In addition, staff has also incorporated pooled initial source testing for facilities with six or more identical units. Since the pooled source testing will allow for testing of one-third of the Units, this provision will further reduce source testing costs.

Email Comment #4: Steve Jepsen- Southern California Alliance of Publicly Owned Treatment Works

Please find a comment letter and rule redlines attached from SCAP/Clean Water SoCal. We appreciate the opportunity to comment.

PROPOSED CHANGES TO PR 1110.3-
CLEANWATER SOCAL REDLINES 2/8/23

(Adopted TBD)
V120822

PROPOSED
RULE 1110.3 EMISSIONS FROM LINEAR GENERATORS

(a) Purpose
The purpose of this rule is to reduce emissions of Oxides of Nitrogen (NO_x), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO) from Linear Generators.

(b) Applicability
All Linear Generators are subject to this rule.

(c) Definitions

(1) BREAKDOWN means a physical or mechanical failure or malfunction of a Linear Generator, air pollution control equipment, or related operating equipment that is not the result of operator error, neglect, improper operation or improper maintenance procedures, which may lead to excess emissions beyond rule related emission limits or permit conditions.

(2) DAILY means the time period starting at 12 midnight and continuing through 11:59 p.m.

(3) DIGESTER GAS means gas that is produced by anaerobic decomposition of organic material.

(4) DUAL FUEL UNIT is any Unit subject to this rule permitted to fire digester gas and another fuel

4-1

~~(4)~~(5) FACILITY means any source or group of sources or other air contaminant emitting activities which are located on one or more contiguous properties within the South Coast AQMD, in actual physical contact or separated solely by a public roadway or other public right-of-way, and are owned or operated by the same person (or by persons under common control), or an outer continental shelf (OCS) source as determined in Section 55.2 of Title 40, Part 55 of the Code of Federal Regulations (40 CFR Part 55). Such above-described groups, if noncontiguous, but connected only by land carrying a pipeline, shall not be considered one Facility.

~~(5)~~(6) LANDFILL GAS means any gas derived through a natural process from the decomposition of waste deposited in an MSW Landfill.

~~(6)~~(7) LINEAR GENERATOR means any power generation technology that uses a thermochemical reaction to create linear motion that is directly converted into electricity.

PROPOSED CHANGES TO PR 1110.3-
CLEANWATER SOCAL REDLINES 2/8/23

~~(7)~~(8) MUNICIPAL SOLID WASTE or MSW LANDFILL means an entire disposal Facility in a contiguous geographical space where solid waste is placed in or on land. An MSW Landfill may be active, inactive, or closed.

(A) Active MSW Landfill means a Municipal Solid Waste Landfill that has received solid waste on or after November 8, 1987.

(B) Inactive MSW Landfill means a Municipal Solid Waste Landfill that has not accepted solid waste after November 8, 1987 and subsequently no further solid waste disposal activity has been conducted within the disposal Facility.

(C) Closed MSW Landfill means a Municipal Solid Waste Landfill that has ceased accepting solid waste for disposal and the closure was conducted in accordance with all applicable federal, state and local statutes, regulations, and ordinances in effect at the time of closure.

~~(8)~~(9) NATURAL GAS means a mixture of gaseous hydrocarbons, with at least 80 percent methane by volume, and of pipeline quality, such as the gas sold or distributed by any utility company regulated by the California Public Utilities Commission.

(10) OPERATING CYCLE means a period of time within which a round of regularly recurring events is completed, and cannot be stopped without the risk of endangering public safety or health, causing material damage to the equipment or product, or cannot be stopped due to technical constraints. Economic reasons alone will not be sufficient to extend this time period. The Operating Cycle includes batch processes that may start and finish several times within a twenty-four hour period, in which case each start to finish interval is considered a complete cycle.

~~(9)~~(11) PUBLICLY OWNED TREATMENT WORKS FACILITY OR POTW FACILITY is a wastewater treatment or reclamation plant owned or operated by a public entity, including all operations within the boundaries of the wastewater and sludge treatment plant.

4-2

~~(10)~~(12) OXIDES OF NITROGEN (NO_x) means the sum of nitric oxides and nitrogen dioxides emitted, collectively expressed as nitrogen dioxide emissions.

~~(11)~~(13) TUNING means adjusting, optimizing, rebalancing, or other similar operations to an electric generating Unit or an associated control device or as otherwise defined in the Permit to Operate. Tuning does not include normal operations to meet load fluctuations.

~~(12)~~(14) UNIT means any Linear Generator.

PROPOSED CHANGES TO PR 1110.3-
CLEANWATER SOCAL REDLINES 2/8/23

Proposed Rule 1110.3 (Cont.) **(Adopted TBD)**

~~(13)~~(15) VOLATILE ORGANIC COMPOUND (VOC) as defined in Rule 102 – Definition of Terms.

(d) Emission Limits

(1) An owner or operator of a Unit shall not operate it in a manner that exceeds the NO_x, CO, and VOC emission limits listed in Table 1: Concentration Limits for Linear Generators, pursuant to subdivision (f):

Table 1: Concentration Limits for Linear Generators

Table 1A: Units Installed on and after *[Date of Adoption]*			
Fuel Type	**NO_x (ppmv)[1]**	**CO (ppmv)[1]**	**VOC (ppmv)[2]**
Natural Gas, Propane Gas, Hydrogen Gas, Landfill Gas~~, and Digester Gas~~	2.5	12	10
Table 1B Interim Limits			
Digester Gas, or Dual Fuel[3]	11	250	30

[1] Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes.
[2] Parts per million by volume, measured as carbon, corrected to 15% oxygen on a dry basis, and averaged over the sampling time required by the test method.
[3] Table 1B Emission Limits shall continue to apply unless amended or otherwise superseded following a technology assessment referenced in Rule 1110.3 (d)(2).

4-3

(2) The concentration limits in Table 1A shall become effective for digester and dual fuel Units provided the Executive Officer conducts a technology assessment that confirms that the limits are achievable and reports to the Governing Board by July 2024, at a regularly scheduled public meeting. Interim concentration limits effective upon rule adoption are listed in Table 1B.

4-4

~~(2)~~(3) An owner or operator shall shut down a Unit having a Breakdown that results in emissions in excess of those allowed by Table 1 by the end of an Operating Cycle, or within 24 hours from the time the operator knew of the Breakdown or excess emissions, or reasonably should have known, whichever is sooner.

PROPOSED CHANGES TO PR 1110.3-
CLEANWATER SOCAL REDLINES 2/8/23

Proposed Rule 1110.3 (Cont.) **(Adopted TBD)**

(e) Maintenance Requirements

(1) An owner or operator of a Unit shall perform maintenance per manufacturer's recommendations as specified in the operating and maintenance manual.

(2) An owner or operator of a Unit shall keep a copy of the manufacturer's operating manual and make it available to South Coast AQMD upon request.

(f) Source Testing

(1) An owner or operator of a Unit shall conduct source testing for NOx, VOC reported as carbon, and CO concentrations (concentrations in ppm by volume, corrected to 15 percent oxygen on dry basis) at least once every two years from the date of the previous source test, no later than the last day of the calendar month that the test is due, or every 8,760 operating hours, whichever occurs first. The source test schedule may be changed under the following circumstances:

(A) An owner or operator of a Unit may elect to reduce the source test frequency to once every three years if the Unit has operated less than 2,000 hours since the last source test; and

(B) An owner or operator of a Unit that has not been operated before the date a source test is due, shall conduct a source test by the end of seven consecutive days or 15 cumulative days of resumed operation.

(2) An owner or operator of a Unit shall conduct the source test by using a contractor that is approved under the South Coast AQMD's Laboratory Approval Program (LAP) for the test methods specified in Table 2: Testing Methods, or any test methods approved by CARB and EPA, and authorized by the Executive Officer.

Table 2: Testing Methods

Pollutant	Method
NOx	South Coast AQMD Method 100.1
CO	South Coast AQMD Method 100.1
VOC	South Coast AQMD Method 25.1* or Method 25.3*

*Excluding ethane and methane

(3) An owner or operator of a Unit shall submit a source test protocol to the Executive Officer for written approval at least 60 days before the scheduled date of the test. The source test protocol shall include, but not limited to the following:

(A) Name, address, and phone number of the Unit operator and a South Coast

PROPOSED CHANGES TO PR 1110.3-
CLEANWATER SOCAL REDLINES 2/8/23

AQMD-approved source testing contractor that will conduct the test;

(B) Application number(s), permit number(s), and emission limits;

(C) Description of the Unit(s) to be tested and the test methods and procedures to be used;

(D) Number of tests to be conducted and under what loads; and

(E) Required minimum sampling time for the VOC test, based on the analytical detection limit and expected VOC levels.

(4) An owner or operator of a Unit shall conduct the testing after the receipt of source test protocol approval from the Executive Officer. If an owner or operator submits the protocol by the required date, and the Executive Officer takes longer than 60 days to approve the protocol, the owner or operator shall be allowed the additional time needed to conduct the test.

(5) In lieu of meeting the requirements in paragraph (f)(3), an owner or operator of a Unit may elect not to submit a source test protocol for approval if:

(A) There is a previously approved protocol for the Unit that meets the requirements in subparagraphs (f)(3)(A) through (f)(3)(E); and

(B) The Unit has not been altered in a manner that requires a permit modification.

(6) An owner or operator of a Unit shall provide South Coast AQMD at least 30 days prior notice of any source test to afford South Coast AQMD the opportunity to have an observer present. If, after the 30 days prior notice is given, there is a delay (due to operational problems, etc.) in conducting the scheduled source test, the owner or operator of a Unit shall notify South Coast AQMD as soon as possible of any delay in the original test date, either by providing notice of the rescheduled date of the source test at least seven days prior, or by arranging a rescheduled date mutually agreed upon with South Coast AQMD.

(7) An owner or operator of a Unit shall provide source testing facilities as follows:

(A) Sampling ports adequate for the applicable test methods. This includes constructing the air pollution control system and stack or duct such that pollutant concentrations can be accurately determined by applicable test methods;

(B) Safe sampling platform(s), scaffolding or mechanical lifts, including safe access, that comply with California General Safety Orders; and

(C) Utilities for sampling and testing equipment.

(8) The LAP contractor shall conduct source testing for at least 30 minutes during

PROPOSED CHANGES TO PR 1110.3-
CLEANWATER SOCAL REDLINES 2/8/23

normal operation (actual duty cycle). This test shall not be conducted under a steady-state condition unless it is the normal operation. In addition, the LAP contractor shall conduct source testing for NOx and CO emissions for at least 15 minutes at: a Unit's actual peak load, or the maximum load that can be practically achieved during the test, and at actual minimum load, excluding idle, or the minimum load that can be practically achieved during the test. These additional two tests are not required if the permit limits the Unit to operating at one defined load ± 10%. The LAP contractor shall not conduct any pre-tests for compliance. If an emission exceedance is found during any of the three phases of the test, that phase shall be completed and reported. An operator shall correct the exceedance, and the source test may be immediately resumed.

(9) The LAP contractor shall conduct the source test at least 40 operating hours, or at least 1 week, after any Unit servicing or Tuning.

(g) Monitoring, Recordkeeping, and Reporting

(1) Monitoring

(A) An owner or operator of a Unit shall maintain an operational non-resettable totalizing time meter to determine the elapsed Unit operating time.

(B) An owner or operator of a Unit shall maintain a calibrated electric meter that measures the net electrical output of the Unit, which is the difference between the electrical output and the electricity consumed by the auxiliary equipment necessary to operate the Unit.

(C) An owner or operator of a Unit shall maintain a parametric monitoring system consisting of an air-to-fuel ratio controller (AFRC), an oxygen sensor, a fuel flow meter, and an air flow meter, which has a malfunction indicator light and audible alarm.

(D) An owner or operator of a Unit shall inspect, maintain, and replace all sensors and meters used by the parametric monitoring system per manufacturer's recommendations as specified in the operating manual.

(E) An owner or operator of a Unit shall develop and implement procedures for at least Daily monitoring and inspection of:

(i) fuel flow rate;

(ii) elapsed time meter operating hours;

(iii) AFRC system faults, alarms, and any other related emission control malfunctions; and

(iv) operating hours since the last source test required by subdivision (f).

PROPOSED CHANGES TO PR 1110.3-
CLEANWATER SOCAL REDLINES 2/8/23

Proposed Rule 1110.3 (Cont.) **(Adopted TBD)**

(2) Recordkeeping

An owner or an operator of a Unit shall retain all data logs, source test reports, and other records required by this rule for at least five years and be made available to South Coast AQMD upon request.

(A) The owner or operator of a Unit shall maintain records, on a monthly basis, for the following parameters(s) or item(s):

(i) Total hours of operation;

(ii) Type of fuel and quantity of fuel consumption (cubic feet of gas);

(iii) Cumulative hours of operation since the last source test required in subdivision (f);

(iv) Megawatt-hours of electricity produced; and

(v) AFRC system faults, alarms, and any other related emission control malfunctions.

(B) An owner or operator of a Unit shall keep records to demonstrate compliance with paragraphs (e)(1) and (f)(9).

(C) An owner or operator of a Unit shall keep sufficient operating records to demonstrate that it meets the requirements for extension of the source testing deadlines, pursuant to paragraph (f)(1).

(3) Reporting

(A) The operator shall report to South Coast AQMD, by telephone (1-800 CUT-SMOG or 1-800-288-7664) or other Executive Officer approved method, any Breakdown resulting in emissions in excess of rule or permit emission limits within one hour of such noncompliance or within one hour of the time the operator knew or reasonably should have known of its occurrence. Such report shall identify the time, specific location, equipment involved, responsible party to contact for further information, and to the extent known, the causes of the noncompliance, and the estimated time for repairs. In the case of emergencies that prevent a person from reporting all required information within the one-hour limit, the Executive Officer may extend the time for the reporting of required information provided the operator has notified South Coast AQMD of the noncompliance within the one-hour limit.

(B) Within seven calendar days after the reported Breakdown has been corrected, but no later than thirty calendar days from the initial date of the Breakdown, unless an extension has been approved in writing by the

PR 1110.3 - 7

PROPOSED CHANGES TO PR 1110.3-
CLEANWATER SOCAL REDLINES 2/8/23

Proposed Rule 1110.3 (Cont.) **(Adopted TBD)**

Executive Officer, the operator shall submit a written Breakdown report to South Coast AQMD which includes:

(i) An identification of the equipment involved in causing, or suspected of having caused, or having been affected by the Breakdown;

(ii) The duration of the Breakdown;

(iii) The date of corrective action and information demonstrating that compliance is achieved;

(iv) An identification of the types of excess emissions, if any, resulting from the Breakdown;

(v) A quantification of the excess emissions, if any, resulting from the Breakdown and the basis used to quantify the emissions;

(vi) Information substantiating whether the Breakdown resulted from operator error, neglect or improper operation or maintenance procedures;

(vii) Information substantiating that steps were immediately taken to correct the condition causing the Breakdown, and to minimize the emissions, if any, resulting from the Breakdown;

(viii) A description of the corrective measures undertaken and/or to be undertaken to avoid such a Breakdown in the future; and

(ix) Pictures of any equipment which failed, if available.

(C) An owner or operator of a Unit shall submit all source test reports, including a description of the equipment tested, to South Coast AQMD within 60 days of completion of the test.

Staff Responses to Email Comment #4

Response to Email Comment 4-1
Staff updated the applicability of PR 1110.3 to only include natural gas fueled units, as staff has only received source test data for natural gas fired units. Please see Response to Email Comment 1-1. Rule amendments can be made in the future as more emission data for various fuels is available.

Response to Email Comment 4-2:
The proposed rule language is not necessary at this time, as the applicability of PR1110.3 was narrowed to natural gas fueled units. Please see Response to Email Comment 1-1.

Response to Email Comment 4-3:
Please see Response to Email Comment 4-2.

Response to Email Comment 4-4:
Please see Response to Email Comment 4-2.

Email Comment #5: Corrie Zuppo- Mainspring Energy, Incorporated

Attached are our minor staff report proposed updates.

Citation	Proposed Amended Language	Comments	
Executive Summary, Page EX-1, Paragraph 1	Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines is source-specific rule which applies to non-RECLAIM facilities and RECLAIM facilities with engines greater than 50 rated brake horsepower. The rule was last amended in 2019 to implement Control Measure CMB-05 of the Final 2016 Air Quality Management Plan. During the rule development process, linear generators were introduced as an alternative technology to reduce emissions and stakeholders commented on the unique characteristics of linear generators. Unlike ~~traditional~~ internal combustion engines (ICEs), linear generators produce electricity by driving magnets through copper coils in a linear motion. One unique feature of linear generators is that the ~~combustion~~ thermochemical reaction takes place at lower temperatures than ~~traditional~~ ICE, which results in lower emissions without add-on control devices (e.g., selective catalytic reduction). In addition, linear generators utilize a parametric monitoring system that monitors performance and controls emission levels. Linear generators are currently being used for prime power applications but can be used for emergency backup power to implement Control Measure L-CMB-04 of the Final 2022 Air Quality Management Plan. In response to stakeholder comments, Proposed Rule 1110.3 – Emissions from Linear Generators (PR 1110.3), is being developed to allow for specific considerations of the technology and capabilities of linear generators.	1. Linear Generators are not internal combustion engines. The use of the word "traditional" provides a comparison that is inaccurate. Therefore we are requesting removal of the word "traditional" from the staff report. 2. The reaction that takes place is a thermochemical reaction, not a combustion reaction. Please remove the word "combustion" wherever it is used to describe Linear Generator operation.	5-1
Chapter 1: Background, Page 1-1 Paragraph 2	Unlike ~~traditional~~ combustion engines, linear generators produce electricity by driving magnets through copper coils in a linear motion (Figure 1). In this reaction, a mixture of fuel and air are compressed, causing a chemical ~~combustion~~ reaction that drives the magnets through the copper coils. One of the features that makes linear generators unique is that this ~~combustion~~ thermochemical reaction takes place in the "reaction zone" and occurs at lower temperatures than ~~traditional~~ engines, resulting in lower NOx and CO emissions. Linear generators also do not utilize add-on control technologies such as selective catalytic reduction (SCR) to control NOx emissions. Although they are equipped with an oxidation catalyst, they are not dependent on this catalyst to reach a destruction temperature and thus, start-up emissions are low. As a result of the lower ~~combustion~~ reaction temperatures of linear generators, the oxidation catalyst's ability to control VOC emissions is limited and its main function is to reduce CO emissions. In addition, linear generators utilize a parametric monitoring system to maintain fuel and air injection ~~proper combustion~~ to meet energy demands. The parametric monitoring system works by monitoring and adjusting air and fuel flow to ensure proper air-to-fuel ratio is achieved, which also ensures emissions are under control. Finally, linear generators are also unique in that~~, based on stakeholder comments,~~ they have the ability to operate on different fuels without any hardware changes to the equipment.	1. Linear Generators are not internal combustion engines. The use of the word "traditional" provides a comparison that is inaccurate. Therefore we are requesting removal of the word "traditional" from the staff report. 2. The reaction that takes place is a thermochemical reaction, not a combustion reaction. Please remove the word "combustion" wherever it is used to describe Linear Generator operation. 3. Linear Generators do have the ability to operate on different fuels. This statement should not be tied to stakeholder comments	5-2
Chapter 2. Proposed Rule 1110.3, Subdivision (b) - Applicability, Page 2-1	PR 1110.3 applies to all linear generators, both portable and stationary, ~~regardless of size and fuel type~~ fueled by natural gas, landfill gas, digester gas, or hydrogen, with the exception of those units exempt under Section (h) of Rule 1110.3.	Mainspring is requesting the rule specify the listed fuels. Additionally, Mainspring is recommending that the provisions of the rule not apply to linear generators certified under the California Air Resources Board Distributed Generation Certification Regulation.	5-3
Chapter 2. Proposed Rule 1110.3, Subdivision (c) - Definitions, Page 2-1	With input from stakeholders and South Coast AQMD engineering staff, this definition provides clarification and distinguishes linear generator technology from generators that utilize ~~traditional~~ internal combustion engines to generate electricity	Linear Generators are not internal combustion engines. The use of the word "traditional" provides a comparison that is inaccurate. Therefore we are requesting removal of the word "traditional" from the staff report.	5-4
Chapter 2. Proposed Rule 1110.3, Subdivision (d) - Emission Limits, Page 2-1	Paragraph (d)(1) specifies emission limits in Table 1 of PR 1110.3 (Table 2 in Staff Report) and applies to all linear generators, both portable and stationary, ~~regardless of size and fuel type~~ fueled by natural gas, landfill gas, digester gas, or hydrogen, with the exception of those units exempt under Section (h) of Rule 1110.3.	Mainspring is requesting the rule specify the listed fuels. Additionally, Mainspring is recommending that the provisions of the rule not apply to linear generators certified under the California Air Resources Board Distributed Generation Certification Regulation.	5-5
Chapter 2. Proposed Rule 1110.3, Subdivision (d) - Emission Limits, Page 2-2	The manufacturer also indicated that the oxidation catalyst contribution to VOC reductions were negligible due to the lower ~~combustion~~ temperatures, and VOC emissions are primarily controlled through the parametric monitoring system.	The reaction that takes place is a thermochemical reaction, not a combustion reaction. Please remove the word "combustion" wherever it is used to describe Linear Generator operation.	5-6
Chapter 2. Proposed Rule 1110.3, Subdivision (g) - Monitoring, Recordkeeping, and Reporting, Page 2-3	In addition, records to demonstrate compliance with other rule provisions are also required to be ~~kept and~~ maintained ~~on-site~~ for a period of 5 years and made available to the South Coast AQMD upon request for compliance verification	The Linear Generators are operated remotely. The rule language is written with that understanding, and states: *"An owner or operator of a Unit shall retain all data logs, source test reports, and other records required by this rule for at least five years and be made available to the Executive Officer upon request"* The staff report should be updated to reflect that there will be no requirement to keep the records on-site.	5-7
Chapter 2. Proposed Amended Rule 1110.2, Subdivision (c) - Definitions, Page 2-4	This definition was created with input from stakeholders and South Coast AQMD engineering staff, and provides clarification and distinguishes linear generator technology from engines that utilize ~~traditional~~ internal combustion engines to produce electricity	Linear Generators are not internal combustion engines. The use of the word "traditional" provides a comparison that is inaccurate. Therefore we are requesting removal of the word "traditional" from the staff report.	5-8
Chapter 3. Table 3-1, PR1110.3 Column	Table 1110.3	Update language based on feedback provided by Mainspring Energy to SCAQMD on 1/27/23, and included here as Attachment B	5-9

Staff Responses to Email Comment #5

Response to Email Comment 5-1:
The staff report has been updated to reflect these corrections.

Response to Email Comment 5-2:
The staff report has been updated to reflect these corrections.

Response to Email Comment 5-3:
Please see Response to Email Comment 1-1.

Response to Email Comment 5-4:
The staff report has been updated to reflect these corrections.

Response to Email Comment 5-5:
Please see Response to Email Comment 1-1.

Response to Email Comment 5-6:
The staff report has been updated to reflect these corrections.

Response to Email Comment 5-7:
Staff has made the corrections as records may be maintained electronically at a remote location.

Response to Email Comment 5-8:
The staff report has been updated to reflect these corrections.

Response to Email Comment 5-9:
Please see Response to Email Comment 1-1.

Email Comment #6: Robert Benz- Benz Air Engineering Co

Hay Lo

From: Robert Benz <RBenz@benzaireng.com>
Sent: Sunday, March 19, 2023 2:59 PM
To: Michael Morris; hio1@aqmd.gov; Isabelle Shine; Sarah Rees; Michael Krause
Cc: Erwin dela Cruz; support+id15706@gobiz.zendesk.com; Jason Aspell; Wayne Nastri; Patrica Spiritus; Jason Aspell; Christian Aviles; cchron@aqmd.gov; Bahareh Farahani; mferandez@aqmd.gov; Shannon Lee; Tommy Mai; Kevin Orellana; Barbara Radlein; Bill Welch; michael@therechargeoasis.com; Mark Nair; Andrew Newman; Dietrich Hartmann; d.mac@omstaff.com; Shelby Benz; Shelby Benz
Subject: PR1110.3 - A Proposed Rule based on a Fictional Narrative.

Follow Up Flag: Follow up
Flag Status: Flagged

The fictional justification of Proposed Rule 1110.3 – Emissions from Linear Generators Proposed Amended Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines

Dear Mr. Morris and Fellow Staff of AQMD.

The proposed rule 1110.3 in its entirety serves no useful purpose other than to provide regulatory relief to one specific manufacturer. The central premise of the modification of 1110.2 and the proposed rule 1110.3 is predicated on a fiction that the linear generator is not a compression ignition engine – which in no uncertain terms categorically false. Based on nothing more than a sales brochure, the AQMD has been duped into believing that one specific linear generator is unlike internal combustion engines – in fact not an engine at all. The PR1110.3 and the accompanying PAR 1110.2 then defines the linear generator as using a "thermochemical reaction" which is the oxidation of fuel with oxygen in air, and defining all other engines in 1110.2 as one using either spark or compression ignition- the latter being precisely the ignition being used in the linear generator – a nonsense distinction without difference. The stakeholder posits that their technology is based on a mystical chemical reaction that is somehow "different" than the thermochemical oxidation reaction of fuel and air that occurs within the "reaction zone" of any spark ignited or compression ignited engine. 6-1

The linear generator deserves no special consideration and regulatory relief as prescribed by PR1110.3. Quite the contrary, a cursory review of the underlying combustion technology of the linear generator and the substantially complex control needed to maintain homogenous charge combustion ignition leaves little doubt that the technology requires more stringent monitoring. Unfortunately, the AQMD staff were erroneously led to believe by one stakeholder that the subject linear generator is different than any other engine, hence the reliance of only the stakeholder's claims and no wonder. So far as I know, there simply isn't any peer reviewed technical paper describing the stakeholder's technology, the only mention of successful commercialization in a paper "Recent progress on performance and control of linear engine generator" https://journals.sagepub.com/doi/full/10.1177/14680874221118014. Interestingly, this paper describes the subject linear generator as "high compression ratio natural gas-powered ODPP (Opposed piston dual power) LEG employs low-temperature combustion to achieve chemical to mechanical energy conversion, and the piston assembly motion is electrically controlled." 6-2

A review of PR1110.3 reveals significant problems. Specifically,

1. As defined, "any power generation technology that uses a thermochemical reaction to create linear motion that is directly converted into electricity" includes all linear generators be they spark ignited, or compression ignition as all combustion processes are a "thermochemical reaction." 6-3

1

2. PR1110.3 less frequent source testing (Rule 1110.2, paragraph (f)(1)) favors one manufacture over all others. The stakeholder's claim that "performing the emissions checks required them to override their safety protocol in order to access the testing ports" is a red herring statement having no factual basis whatsoever.
3. Pooled testing - paragraph (f)(10) provides economic favoritism to one manufacturer over all other generator manufacturers and suppliers. Irrespective of Stakeholders concerns of cost or logistics, there is no logical reason supporting that source testing a third of a number of generators located a certain location or within a certain distance from another generator would somehow convey emission compliance. Likewise significantly increasing the time between periodic source testing from 2 years or 8760 hours, whichever occurs first to 5 years or 24000hours whichever comes first, grants one specific manufacturer a significant favor over all other manufacturers and suppliers of "thermochemical reaction" engine generators. As the Staff Draft Report makes abundantly clear, the linear generator is a new technology that has minimal collective run time hours compared with other engine generators. Therefore, allowing this particular manufacture of this new product less restrictive source testing requirements over the plethora of other engine generator manufacturers is without an reasonable explanation.
4. Amending PAR 1110.2 definition of "ENGINE is any spark- or compression-ignited internal combustion engine, including engines used for control of VOCs, but not including Linear Generators" is a distinction without a difference for the subject linear generator of PR1110.3 is a compression ignition engine. The linear generator subject to PR1110.3 is not some "new" type of chemistry rather a well-known and significantly researched combustion process called "homogeneous charge compression ignition."

6-4

6-5

6-6

Disclosure, we are a company that provides a Combined Heat and Power system based on a reciprocating engine that is proven to yield over 90 percent net thermal efficiency. So its no wonder we are miffed to why the AQMD is providing special status to one particular engine manufacture. To be sure, the linear generator has received substantial funding in excess of $800million. Nevertheless, we expect that air pollution regulations will be applied evenly regardless be it spark or compression ignition based technology. So please understand this special status afforded a technology that has no special benefits to either air pollution or efficiency indicates that the SCAQMD is picking favorites. Unfortunately, as the Staff Draft Report documents, these linear generators (otherwise known as engines) high single cycle efficiency have little or no waste heat to be otherwise used in combined heat and power application. Indeed, the particular stakeholder's technology currently has no capability at all. So its little wonder the stakeholder seeks permitting relief for there is less of an economic advantage to their engine.

6-7

Background: The linear generator is an internal combustion engine that utilizes HCCI to operate during a portion of its duty cycle. For years, HCCI has been a holy grail for some prominent contemporary heat-engine research and development programs. http://www.engr.wisc.edu/news/archive/2009/Aug03.html http://magazine.sae.org/12aeid0403 http://www.sae.org/mags/aei/6635 Yet, this feat had already been demonstrated in the early 1950's before the term HCCI was coined when an undergraduate student in engineering at MIT constructed a simple free-piston internal combustion engine and operated it with HCCI.

The HCCI combustion process and consequences can be summarized as follows. HCCI shares characteristics with the two familiar combustion processes in common use in existing internal combustion engines. These processes are (1) homogeneous charge spark ignition (gasoline engines) and (2) heterogeneous charge compression ignition (diesel engines). As in (1), HCCI mixes the fuel and air together prior to ignition but it does not use an electric discharge (spark) to ignite a portion of the mixture and rely on that small flame to propagate into and inflame the bulk. Rather, in HCCI, the whole charge is inflamed at once by compressing the mixture sufficiently to raise its density and temperature until the entire flammable mass ignites spontaneously producing an avalanche of combustion reactions as in an explosion. Thus, HCCI resembles the diesel combustion process in that the charge is heated above the auto-ignition temperature of the fuel by compression. But that is where the similarity ends. In the diesel, the compressed charge consists solely of air with combustion occurring only in the wakes of the fuel droplets as they are injected in to the compression-heated air. In HCCI, the fuel and air are premixed and homogenized before they are compressed together until combustion occurs throughout the charge as a strictly vapor-phase reaction.

2

The defining characteristic of HCCI is simultaneous ignition at many places throughout a compressed and pre-mixed fuel-air charge. Such multi-point ignition makes the fuel-air mixture burn very rapidly. However, since there is no definite trigger for timing the combustion event (like in a spark or fuel pulse), the process is spontaneous, i.e. timed by circumstances. These circumstances are inherently challenging to control in an intermittent combustion engine cycle. Consequently, sophisticated microprocessors and instrumentation have been brought to bear to control the various parameters affecting the physics of the ignition process. When appropriate timing has been achieved, gasoline engine-like emissions with diesel engine-like thermal efficiencies are attained. HCCI engines have demonstrated extremely low levels of nitrogen oxides (NOX) and particulate matter (PM) emissions in the laboratory. However, the exhaust still contains products of incomplete combustion (unburned hydrocarbon and carbon monoxide) at levels comparable to gasoline engines. Advantages attributed to HCCI engine operation include the following:

- Lower emissions and fuel consumption.
- Reduced peak combustion temperatures for reduced NO_x formation.
- Leaner premixed charges avoid soot production.
- Compression-ignite and lean-burn various fuels without detonation including gasoline, diesel and most alternative fuels.
- Higher compression ratios and leaner mixtures without throttling improve thermal efficiency at partial loads.
- Simplified after-treatment of exhaust gases to reduce particulate and oxides of nitrogen emissions using catalytic oxidation only.

These accomplishments have given rise to expectations that the need for expensive and bulky exhaust gas after-treatment equipment (e.g. catalytic converter and particle filter) can be eliminated. But the residual combustion fragments will require oxidation catalysts to meet automotive emission regulations and the current Rule 1110.2. The HCCI mode of engine operation promises superior thermal single cycle efficiency and reduced emissions with cheaper fuels and without expensive fuel injection or ignition equipment. It perfects the more thermodynamically efficient Otto Cycle while enhancing the use of the simpler and safer distillate fuels without problematic spark ignition, direct ultra-high-pressure cylinder injection or loss-prone inlet throttling. That the stakeholder has perfected HCCI is impressive, but without any peer reviewed technical paper published by SAE or ASME, who knows?

Initially HCCI combustion is familiar only as a symptom of engine distress, such as that which occurs during severe overheating due to inadvertent coolant loss. Then, it is experienced as "run-on" after spark ignition has been turned off. The symptoms of noise, smoke and odor associated with this experience are hard to reconcile with recent laboratory results to the contrary. Schwartzman's free-piston engine research at MIT is a rare example of deliberate HCCI engine operation http://www.freepatentsonline.com/4860702.html. But it is significant background for permitting because it demonstrated ignition control by compression ratio variation. The unrestrained travel of the free piston permitted compression to proceed on each stroke until ignition occurred. The attainment of whatever clearance volume or "reaction volume" as claimed in Staff Draft report, is required on each compression stroke to produce auto-ignition of the entire charge is a challenge for an engine that uses a fixed-center-of-rotation slider-crank mechanism having a fixed stroke. On the other hand, a mechanical output is a challenge for a free piston engine which apparently the stakeholder has developed. Again, what isn't known to either the SCAQMD or anyone else for that matter, is technical peer review paper that verifies that result. The stakeholder has provided to the SCAQMD staff nothing but source tests which are point of time data without any peer reviewed paper to substantiate the leeway in permitting provided by PR1110.1. Given the challenge of the problem maintain HCCI there is simply no way SCAQMD Staff can conclude that the technology warrants such benefits as significantly long period between source testing.

6-8

To that point, HCCI combustion occurs in a sufficiently homogeneous mixture of vaporous fuel and air when conditions throughout the mixture are favorable for auto-ignition of the whole combustible charge at once, molecule by molecule. To produce such ignition and combustion repetitively with sufficient reliability for continuous internal combustion engine operation, "duds" and "bombs" must be avoided. HCCI operation occurs in the narrow region between misfire ("duds") and detonation ("bombs"). This accomplishment requires a uniform charge with a prescribed composition after which it is necessary to control the reactivity of the charge from cycle to cycle. To be successful, an HCCI engine must obtain positive control of charge reactivity with sufficient effectiveness and transient response to

6-9

avoid these ignition failures altogether. It only takes one misfire to utterly defeat the best emission after-treatment system. And no engine endures for long with detonation in the combustion chamber. Regardless of the stakeholders claim of their "parametric monitoring system" to maintain the precise air fuel ratio, the extremely tight air fuel ratio control given the substantial transients of weather alone requires transmitters of high accuracy which simply is over the heads of most owners upon which PR1110.3 relies for compliance. Its simply absurd to assume owners of facilities to be sufficiently cognizant in analyzing whether the large data set of analog to digital transmitters having extremely high resolution to effectuate an extremely complex control of proper air fuel ratio needed of HCCI combustion based on multiple dependent variables.

6-9 cont'd.

Conclusion: PR1110.3 in its entirety is not needed. It serves no purpose other than granting regulatory relief without justification to one particular manufacturer.

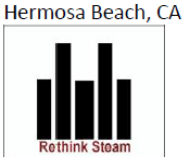
6-10

Please provide the proper channels to put this on the next agenda in the hearing process involving PR1110.3 and PAR1110.2. Furthermore, I would like to copy all the commissioners and if need be provide a comprehensive technical presentation outlining the significant problems with PR1110.3. Obviously, I would welcome any questions the AQMD staff may have.

6-11

Very Respectfully,

Robert Benz PE
209-602-1019 cell
Benz Air Engineering Co
531 Cypress Ave
Hermosa Beach, CA 90254



Staff Responses to Email Comment #6

Response to Email Comment 6-1:
Staff is currently aware of two linear generator manufacturers and PR 1110.3 will apply to both manufacturers, as well as any other manufacturers of the technology. While fuel and air are compressed in linear generators, there is no flame or burning, and the resulting chemical reaction drives magnets through copper coils in a linear motion to produce electricity. Therefore, linear generators have differences from internal combustion engines. In addition, linear generators are able to achieve near-zero NOx emissions without the need for aftertreatment devices. Due to these unique characteristics, PR 1110.3 is being developed to allow for specific considerations of linear generator technology running solely on natural gas.

Response to Email Comment 6-2:
Please see response to Email Comment 6-1.

Response to Email Comment 6-3:
PR 1110.3 was developed through a public process and the definition of linear generator was developed with input from multiple stakeholders, including two different linear generator manufacturers.

Response to Email Comment 6-4:
Please see response to Email Comment 6-1.

Response to Email Comment 6-5:
Please see response to Email Comment 6-1.

Response to Email Comment 6-6:
Please see response to Email Comment 6-1. PR 1110.3 specifies requirements for linear generators and thus, the proposed amendments to Rule 1110.2 are necessary for the purpose of clarity and non-duplication.

Response to Email Comment 6-7:
Please see response to Email Comments 6-1.

Response to Email Comment 6-8:
Please see response to Email Comment 6-1. Staff established emission limits for natural gas fueled linear generations based on achieved in practice source test data. Technical peer reviewed papers of a technology are not a pre-requisite for South Coast AQMD to develop rules and regulations.

Response to Email Comment 6-9:
Although parametric monitoring is required in PR 1110.3, it is not relied upon for compliance determination for emission limits. PR 1110.3 requires periodic source testing to verify

compliance with emission limits. Additionally, PR 1110.3 contains requirements for diagnostic emission checks.

Response to Email Comment 6-10
Please response to Email Comment 6-1.

Response to Email Comment 6-11:
PR 1110.3 and PAR 1110.2 are scheduled for a Set Hearing on October 6, 2023 and a Public Hearing on November 3, 2023. Public comments will be taken at both the Set Hearing and Public Hearing.

Comment Letters

Comment Letter #1: Steve Jepsen- Clean Water SoCal

CLEAN WATER SoCAL
CREATING SUSTAINABLE SOLUTIONS

February 8, 2023

Mr. Mike Morris, Planning and Rules Manager
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, California 91765

Comments on Proposed Rule 1110.3 - Emissions from Linear Generators

Dear Mr. Morris:

Clean Water SoCal, formerly known as SCAP, represents over 80 public water/wastewater agencies in Southern California. Clean Water SoCal members provide essential water supply and wastewater treatment for approximately 20 million people in Los Angeles, Orange, San Diego, Santa Barbara, Riverside, San Bernardino, and Ventura counties. Clean Water SoCal's wastewater members provide environmentally sound, cost-effective management of more than two billion gallons of wastewater each day and, in the process, convert wastewater into resources for beneficial uses such as recycled water and renewable energy.

Clean Water SoCal appreciates the opportunity to provide comments on Proposed Rule 1110.3 - Emissions from Linear Generators (PR1110.3). While we understand the need to establish a source specific rule for linear generators, we remain concerned with the proposed emission limits for digester gas units (biogas) at wastewater facilities. In the absence of completed demonstration projects to verify the viability of the technology on biogas, we're concerned that the proposed emission limits in PR1110.3 will preclude wastewater facilities from pursing this new technology using biogas. Our members are always seeking opportunities to beneficially use biogas at wastewater facilities in a way that utilizes sustainable and best available technologies, and we are encouraged by this new emerging technology. However, it should be demonstrated in practice while using biogas prior to establishing stringent emission limits in a source specific rule. Until such time, we believe that it is appropriate to adopt Rule 1179.1 biogas engine limits to biogas fueled linear generators. 1-1

Attached for your review and consideration please find proposed redline changes to PR1110.3. The proposed revisions essentially apply Rule 1179.1 biogas engine limits to biogas fueled linear generators until a technology demonstration on biogas units is complete. 1-2

P.O Box 231565
Encinitas, CA 92024

email: info@scap1.org
phone: 760.415.4332

CLEAN WATER SoCAL
CREATING SUSTAINABLE SOLUTIONS

We appreciate you considering our comments and would be happy to meet to discuss in more detail. If there are any questions or concerns regarding this transmittal, please contact:

Alison Torres, Clean Water SoCal Air Quality Committee Co-Vice Chair torresa@emwd.org, or

David Rothbart, Clean Water SoCal Air Quality Committee Chair drothbart@lacsd.org

Sincerely,

Steve Jepsen

Executive Director – Clean Water SoCal

Cc:
Hay Lo, hlo1@aqmd.gov
Isabelle Shine, ishine@aqmd.gov

P.O Box 231565
Encinitas, CA 92024

email: info@scap1.org
phone: 760.415.4332

Staff Response to Comment Letter #1:

Response to Comment Letter 1-1:
Your concerns have been noted. Staff has decided to narrow the focus of the proposed rule to natural gas fueled linear generators at this time. Please see Response to Email Comment 4-1. Staff agrees that the achievability of meeting emission limits be demonstrated in practice before establishing emission limits in a rule. For this reason, we believe that it is also not appropriate to include Rule 1179.1 emission limits for biogas fueled linear generators.

Response to Comment Letter 1-2:
Please see responses to Email Comments 4-1 through 4-4.

Comment Letter #2: Chris Chavez- Coalition for Clean Air

COALITION FOR CLEAN AIR

March 1, 2023

Susan Rees, Deputy Executive Officer
Michael Krause, Assistant Deputy Executive Officer
South Coast Air Quality Management District
1865 Copley Drive
Diamond Bar, CA 91765

Re: Proposed Rule 1110.3

Dear Ms. Rees and Mr. Krause:

Coalition for Clean Air is writing in support of Proposed Rule 1110.3, which would streamline permitting requirements for linear generators. Establishing a supportive framework for emerging technologies, such as linear generators, creates opportunities to replace polluting generators with cleaner alternatives.

The South Coast Air Basin is the nation's smog capital, and diesel particulate matter is the number one air toxic contaminant in our air. Meanwhile, the number of diesel backup generators jumped by 22 percent from 2020 to 2021. Given concerns about grid reliability, increasingly severe summer and winter weather due to the climate crisis and the impacts of California's longstanding air quality crisis, we cannot continue to rely on diesel combustion. Linear generators, along with other low-emitting and zero-emissions technologies, can yield significant emission reductions while also providing the same functions as a diesel generator.

2-1

Though we support the deployment of clean end-use technologies, we urge SCAQMD to work with all stakeholders to promote the use of clean, renewable fuels. Additionally, we urge SCAQMD to work with potential customers to ensure the deployment of the cleanest avaliable application-appropriate technology.

Thank you for your time and consideration of this important rule.

Sincerely,

Chris Chavez
Deputy Policy Director

Cc:
Mike Morris, Manager
Hay Lo, Air Quality Specialist
Isabelle Shine, Air Quality Specialist

Staff Response to Comment Letter #2:

Response to Comment Letter 2-1:
Staff appreciates support of PR 1110.3.

Comment Letter #3- Julia Levin- Bioenergy Association of California and Katrina M. Fritz- California Hydrogen Business Council

March 1, 2023

Wayne Nastri, Executive Officer
South Coast Air Quality Management District
1865 Copley Drive
Diamond Bar, CA 91765

Re: Proposed Rule 1110.3

Dear Mr. Nastri:

The Bioenergy Association of California (BAC) and the California Hydrogen Business Council (CHBC) are writing to commend South Coast Air Quality Management District (SCAQMD) for its development of Proposed Rule 1110.3 to streamline permitting requirements for linear generators.

Linear generators provide many air quality and emissions reduction benefits that are critical to SCAQMD's mission. In addition to being fuel-flexible and fully dispatchable, linear generators have extremely low criteria pollutant emissions. In the SCAQMD, the number of diesel backup generators jumped by 22 percent from 2020 to 2021.[1] Linear generators can serve as a low emissions replacement for emissions-intensive diesel generation. Linear generators can also help reduce emissions in the marine ports by powering electric truck fleets using low and zero-carbon fuels, such as hydrogen. 3-1

While we understand and support SCAQMD's need for sufficient data to ensure the safe operation of linear generators, we urge SCAQMD to remove any costly or onerous permitting and compliance requirements that discourage deployment of this clean technology. Doing so will risk slowing the installation of linear generators that can provide significant environmental benefits to the South Coast region. 3-2

Thank you for your time and consideration of this important rule.

[1] Steven Moss and Andy Bilich, M.Cubed, "Diesel Back-Up Generator Population Grows Rapidly in the Bay Area and Southern California" (2020). https://bit.ly/34qOr0b. BUGs have reached 7,360 MW of capacity in the South Coast AQMD and 4,840 MW of capacity in the Bay Area AQMD based on information for BAAQMD and SCAQMD. The report estimates an average capacity of 0.543 MW for units in SCAQMD and 0.628-0.642 MW for units in BAAQMD.

Sincerely,

/s/
Julia Levin, Executive Director, Bioenergy Association of California
Katrina M. Fritz, Executive Director, California Hydrogen Business Council

Cc:
Vanessa Delgado, Chair of the Board
Michael A. Cacciotti, Vice-Chair of the Board
Andrew Do, Board Member
Curt Hagman, Board Member
Gideon Kracov, Board Member
Larry McCallon, Board Member
Holly J. Mitchell, Board Member
Veronica Padilla-Campos, Board Member
V. Manuel Perez, Board Member
Nithya Raman, Board Member
Carlos Rodriguez, Board Member

Staff Response to Comment Letter #3:

Response to Comment Letter 3-1:
Staff appreciates support of PR 1110.3 and your concerns have been noted.

Response to Comment Letter 3-2:
South Coast AQMD Rule 219 – Equipment Not Requiring a Written Permit Pursuant to Regulation II identifies equipment, processes, or operations that do not require a written permit. Linear generators were evaluated during the rule development process for the April 7, 2023 amendment to Rule 219 and it was determined that linear generators would not be exempt from permitting requirements. PR 1110.3 includes a new source testing schedule to help alleviate compliance costs associated with source testing. Based on the new source testing schedule and an estimated cost of $10,000 per source test, staff calculates the cost of source testing each unit to be approximately $30,000 over a 15-year period. The new source test schedule translates to approximately 60% cost savings over the originally proposed source test frequency that units are currently subject to in Rule 1110.2. In addition, facilities with six or more identical units may elect to do pooled source testing further alleviating costs.

Comment Letter #4- Corrie Zuppo- Mainspring Energy, Inc.

Michael Krause
Assistant Deputy Executive Officer
Planning, Rule Development and Implementation
South Coast Air Quality Management District
21865 Copley Dr.
Diamond Bar, CA 91765
MKrause@aqmd.gov

Proposed Rule 1110.3
Request for Rulemaking Delay to Reconsider Proposed Rule Language

Dear Mr. Krause,

At the South Coast Air Quality Management District (SCAQMD or District) Governing Board meeting held on March 3, 2023, District Staff proposed to set a public hearing for Proposed Rule (PR) 1110.3, Emissions from Linear Generators. The Staff's proposed language for PR1110.3 at the time of the Governing Board meeting included the following agreed exemptions for certified equipment:

- An exemption from PR1110.3 for linear generators which become certified under the California Air Resources Board (CARB) Distributed Generation Executive Order program, and 4-1
- An exemption from PR1110.3 source testing requirements for linear generators which become certified under a SCAQMD certification program. 4-2

These two pathways for certified equipment would result in regulatory treatment similar to other, comparably scaled distributed generation (DG) technologies (e.g., microturbines, fuel cells).

On the basis of the draft PR1110.3 language that was publicly available on March 3, Mainspring was supportive of the rule and provided such a public comment during the Governing Board meeting. Unfortunately, the rule language contained in the 30-day package released on March 7 did not include the above provisions.

Since those provisions are absolutely critical to ensuring that linear generators receive regulatory treatment equivalent to other low emissions distributed generation technologies, Mainspring respectfully urges SCAQMD to delay the PR1110.3 schedule for Governing Board consideration until the Staff and stakeholders can further consider options for CARB and SCAQMD pathways for linear generator certification. 4-3

Please feel free to contact me at corrie.zupo@mainspringenergy.com or (424) 241-8959 with any questions or comments.

Best regards,

Corrie Zupo

Corrie Zupo

Environmental Manager Permitting & Compliance

CC: Wayne Nastri, SCAQMD
Susan Nakamura, SCAQMD
Dr. Sarah Rees, SCAQMD
Michael Morris, SCAQMD
ClearkofBoard@aqmd.gov
Adam Simpson, Mainspring Energy, Inc.
Scott Weaver, Ramboll US Consulting

Staff Response to Comment Letter #4:

Response to Comment Letter 4-1:
Staff was informed by U.S. EPA that an exemption for CARB Distributed Generation certified units would not be acceptable for SIP approval, and thus, was removed from PR 1110.3.

Response to Comment Letter 4-2:
Staff cannot include this provision since a South Coast AQMD certification program has not been developed. Once developed, a South Coast AQMD certification program would need to be submitted to U.S. EPA for SIP approval.

Response to Comment Letter 4-3:
The Public Hearing for PR 1110.3 and PAR 1110.2 was delayed from April 7, 2023 to November 3, 2023.