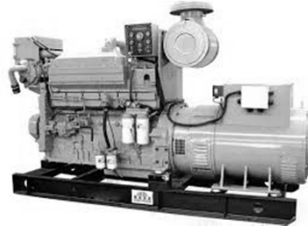




Rule 1110.2

Working Group Meeting No. 2



Emissions from Gaseous- and Liquid- fueled Engines
September 27, 2018

Agenda

2

- Summary of Working Group Meeting #1
- Status of rule development
- Rules affecting engines
- Revised universe and equipment
- Best Available Retrofit Control Technology (BARCT) assessment
- Survey questionnaire
- Next steps and proposed schedule

Summary of Working Group Meeting #1

3

- Background on RECLAIM transition
- Applicability of PAR 1110.2
- BARCT overview
- Regulatory history of SCAQMD Rule 1110.2
- Initial evaluation of affected universe

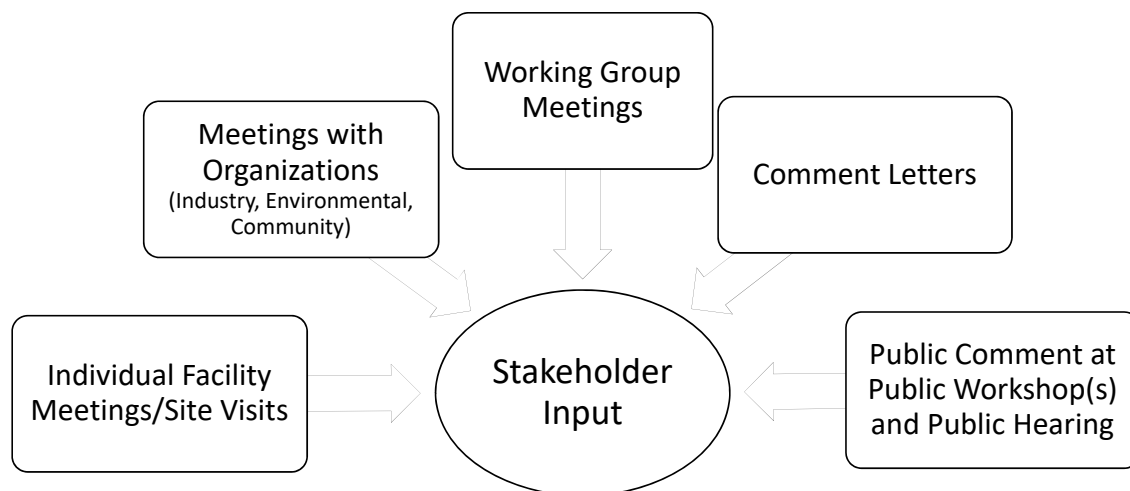


Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Status of Rule Development

4



Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Status of Rule Development

5

- Continued evaluation of existing engines at RECLAIM facilities
- Reviewed other jurisdictions' regulatory limits
- Initiated contact for technology assessment
- Scheduling site visits with affected facilities
- Developing survey questionnaire to assess equipment and operations

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Rules Affecting Engines

6

RECLAIM internal combustion engines are affected by two rules:

- Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines
- Rule 1470 – Requirements for Stationary, Diesel-Fueled Internal Combustion and Other Compression Ignition Engines

Let's compare the two rules

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Rules Affecting Engines

7

Applicability

Rule 1110.2	Rule 1470
<ul style="list-style-type: none"> • All stationary and portable engines with a rated brake horsepower greater than 50 bhp • Spark-ignited and compression-ignited engines • Limits NO_x, CO, and VOC 	<ul style="list-style-type: none"> • Stationary compression ignition engines with a rated brake horsepower greater than 50 bhp • Diesel fueled • Limits diesel PM

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Emissions Standards for New Rule 1470 Engines

8

New stationary prime diesel-fueled CI engines that have a rated brake horsepower of > 50 bhp

Diesel PM Standard

- All new stationary prime diesel-fueled CI engines (> 50 bhp) shall either emit diesel PM at a rate ≤ 0.01 g/bhp-hr; or
- Shall meet the diesel PM standard specified in the Off-Road Compression Ignition Engine Standards for off-road engines per Title 13, CCR, Section 2423, whichever is more stringent

HC, NO_x, NMHC + NO_x, and CO Standards

- All new stationary prime diesel-fueled CI engines (> 50 bhp) shall meet the applicable emission standards specified in SCAQMD Rule 1110.2 – Emissions From Gaseous and Liquid-Fueled Engines

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Emissions Standards for In-use Rule 1470 Engines

9

In-use stationary prime diesel-fueled CI engines that have a rated brake horsepower of > 50 bhp

Diesel PM Standard

- Option 1: Reduce the diesel PM emission rate by at least 85 percent, by weight, from the baseline level; or
- Option 2: Emit diesel PM at a rate ≤ 0.01 g/bhp-hr

HC, NOx, NMHC + NOx, and CO Standards

- Meet the applicable HC, NOx, NMHC+NOx, and CO emission standards specified in SCAQMD Rule 1110.2

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Emissions Standards for Rule 1470 Engines

10

Conclusions

- Rule 1470 establishes diesel PM emission limits for new and in-use diesel engines
- All new and in-use stationary prime diesel-fueled CI engines shall meet applicable emission standards specified in Rule 1110.2 for NOx, VOC, and CO

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Emissions Standards for Rule 1110.2 Engines

11

Pollutant	Rule 1110.2 (ppmv)
PM	Emission limits per Rule 1470
NOx ¹	11
VOC ²	30
CO ¹	250

¹ Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes

² Parts per million, measured as carbon, corrected to 15% oxygen on a dry basis and averaged over the sampling period required by the test method

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Distribution of RECLAIM Engines by Use

12

Category	No. of Engines
Rule 1110.2	
• Emergency	78
• Covered by Proposed Rule 1109.1	4
• Prime engines	87
Total	169

Currently, emergency engines are exempt from Rule 1110.2 emissions limits

The focus of the amendment will be on the Rule 1110.2 prime engines

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Focus of PAR 1110.2

13

- Rule development to focus on prime engines located at RECLAIM facilities that were previously exempt from Rule 1110.2 requirements
- Prime engines are those not used as emergency, stand-by engines
- Emission standards for NO_x/VOC/CO do not apply to engines permitted to operate 200 hours or less per year (e.g., engines covered under Rule 1470)
- PM standards for diesel engines are contained in Rule 1470 and are not part of the PAR 1110.2 analysis

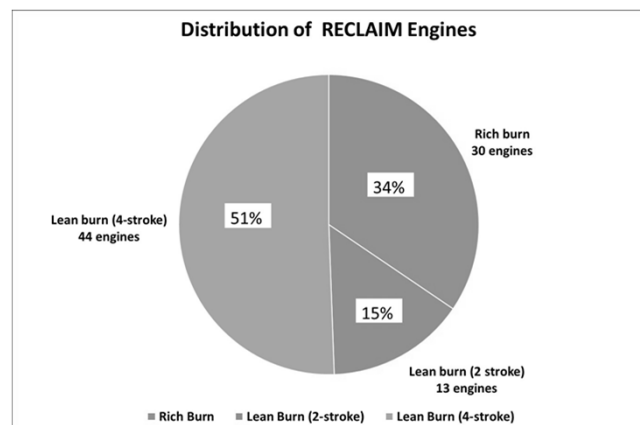
Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Revised Universe and Equipment

14

- Previous universe of engines: 98 engines
- Analysis of previous universe found:
 - 8 engines removed from service and
 - 3 additional engines soon to be removed
 - 87 remaining engines
- 16 of the 87 engines located at offshore oil production facilities
- 18 of the 87 engines operate less than 11 ppmv¹ NO_x
- Total number of facilities affected: 24 (87 engines)



¹ Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes

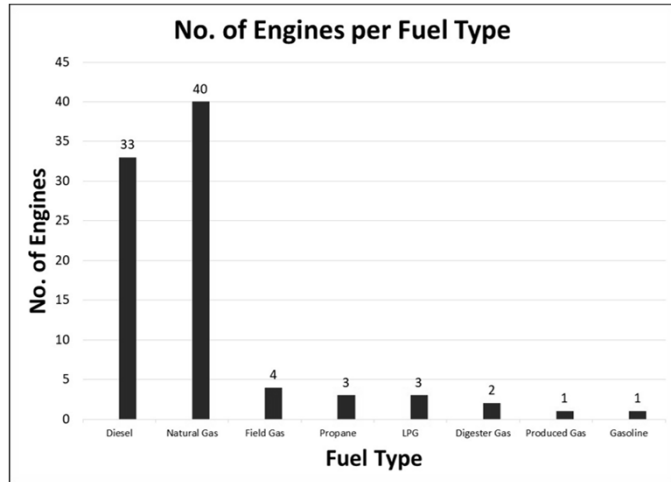
Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Revised Universe and Equipment

15

No. of Engines per Fuel Type	
Diesel	33
Natural Gas	40
Field Gas	4
Propane	3
LPG	3
Digester Gas	2
Produced Gas	1
Gasoline	1
Total	87

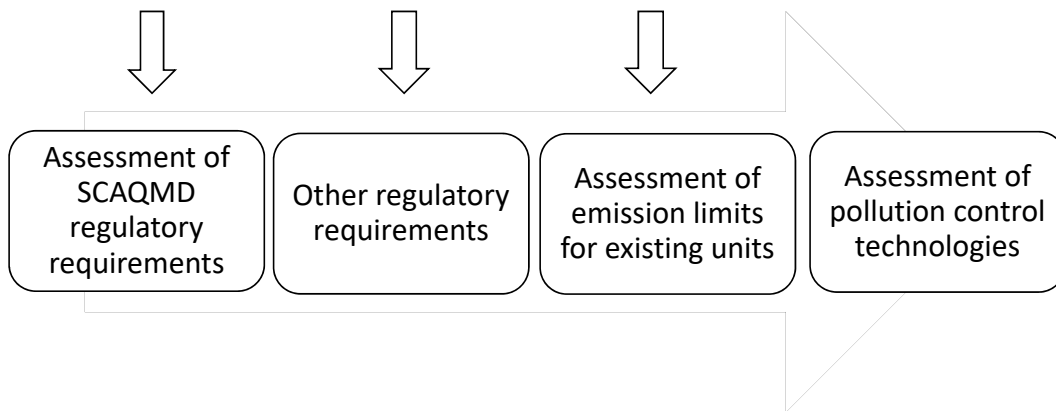


- Engine fuel type was collected from RECLAIM permits

BARCT Technology Assessment Approach

16

Focus will be on the first three steps of the process



Assessment of SCAQMD Regulatory Requirements

17



**Assessment
of SCAQMD
regulatory
requirements**

Other regulatory
requirements

Assessment of
emission limits
for existing units

Assessment of
pollution control
technologies

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Assessment of SCAQMD Regulatory Requirements

18


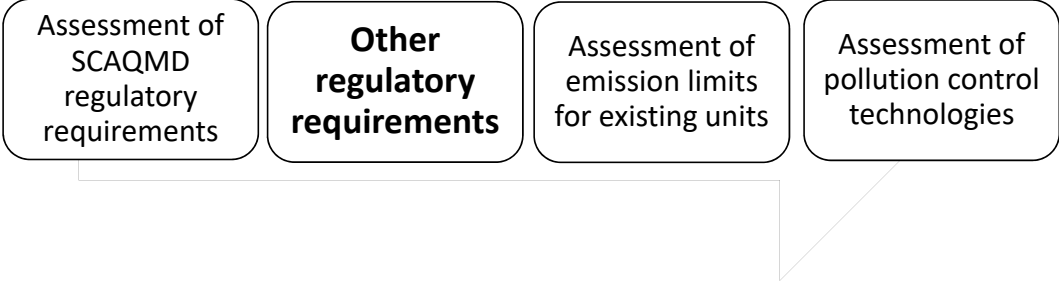
Currently, SCAQMD Rule 1110.2 requires that all non-RECLAIM stationary, non-emergency internal combustion engines comply with the following emissions standards for any gaseous or liquid fuel:

- 11 ppmv NO_x (@ 15% O₂)
- 30 ppmv VOC (@ 15% O₂)
- 250 ppmv CO (@ 15% O₂)



Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Regulatory Comparison	19
	
	
Rule 1110.2 – Working Group Meeting No. 2	September 27, 2018

Regulatory Comparison	20
<p>How does the SCAQMD Rule 1110.2 compare with other similar regulations in other air districts?</p>	
Rule 1110.2 – Working Group Meeting No. 2	September 27, 2018

Regulatory Comparison

21

Rules in other air districts differentiate engines by type, fuel, and application

- Engine Type
 - Two-Stroke and Four-Stroke
 - Rich-Burn and Lean-Burn
 - hp size
- Fuel Source
 - Natural Gas
 - LPG
 - Digester Gas
 - Diesel
- Application
 - Prime use
 - Emergency
 - Agriculture

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Regulatory Comparison

22

Staff compared emission limits for similar equipment in other air districts

- In State – Antelope Valley AQMD; Bay Area AQMD; Mojave Desert APCD; Santa Barbara APCD; San Diego APCD; San Joaquin Valley APCD; San Luis Obispo APCD; and Ventura County APCD
- Out of State – New Jersey, New York, and Texas

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Regulatory Comparison

23

Lowest NOx Emission Limits in Other Jurisdictions		
Jurisdiction	Type of Engine	Limit (ppmv ¹)
Antelope Valley AQMD	General, spark-ignited	36
Bay Area AQMD	Fossil-derived fuel, rich-burn	25
Mojave Desert APCD	Non-agriculture, rich-burn, spark-ignited engines	50
Santa Barbara APCD	Rich-burn, noncyclically-loaded spark ignition engines	50
San Diego APCD	Gaseous fuel or gasoline, rich-burn	25
San Joaquin Valley APCD	Non-exempted ICEs	11
San Luis Obispo APCD	Spark-ignited, rich-burn	50
Ventura County APCD	General, rich-burn	25
New Jersey	Non-exempted ICEs	70
New York	Natural gas, >200 hp	116
Texas ICE Standards (Dallas-Fort Worth Non-attainment Area)	Non-exempted ICEs	39

¹ ppmv corrected to 15% oxygen, dry basis

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Regulatory Comparison

24

San Joaquin Valley APCD – ICE Standards			
Rule 4702: Table 2 – Emission limits for a spark-ignited ICE rated at >50 bhp used exclusively in non-agricultural operations			
Engine Type	NOx (ppmv ¹)	CO (ppmv ¹)	VOC (ppmv ¹)
1. Rich-burn			
a. Waste gas fueled	50	2000	250
b. Cyclic loaded, field gas fueled	50	2000	250
c. Limited use (operated <4,000 hrs per calendar year)	25	2000	250
d. Rich-burn engine not listed in 1a – 1c	11	2000	250
2. Lean-burn			
a. Two-stroke, gaseous fueled >50 bhp but <100 bhp	75	2000	750
b. Limited use (operated <4,000 hrs per calendar year)	65	2000	750
c. Engine used for gas compression	65	2000	750
d. Waste gas fueled	65	2000	750
e. Lean-burn engine not listed in 2a – 2d	11	2000	750

¹ ppmv corrected to 15% oxygen, dry basis



Let's take
a closer look
at SJV limits

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Regulatory Comparison

25

Conclusions

- SCAQMD has the lowest NOx limits for stationary ICE equipment relative to other air districts except for two engine categories in the SJV APCD
- SCAQMD has the lowest emissions standards for CO and VOC relative to other air districts

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Assessment of Emission Limits for Existing Units

26



Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Assessment of Emission Limits for Existing Units

27

- The initial assessment of emission limits relied on permitted limits
- For major sources, data from Relative Accuracy Test Audits (RATA) was used
- More data will be collected via a survey to be sent to facilities affected by Rule 1110.2

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Assessment of Emission Limits for Existing Units

28

- 87 engines have been identified as part of the RECLAIM Rule 1110.2 Universe
- Evaluated existing universe for:
 - Current emission levels
 - Engine distribution by fuel
- Assessed engines already meeting current Rule 1110.2 NOx limits
- Data may change upon evaluation of surveys

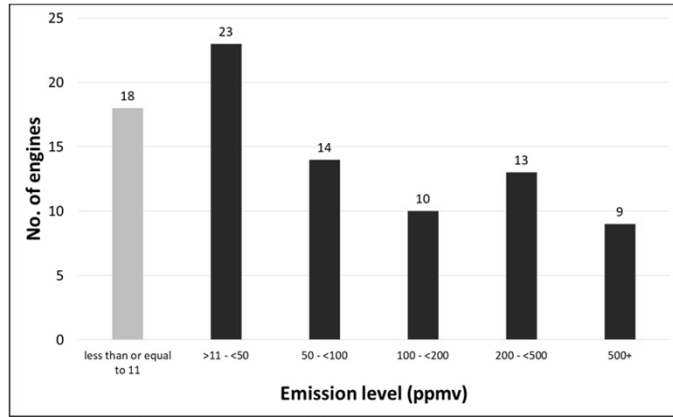
Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Distribution of Engines per Emission Level

29

NOx Emissions level (ppmv)	No. of Engines
≤ 11	18
>11 - <50	23
50 - <100	14
100 - <200	10
200 - <500	13
500+	9
Total	87



- Emission level data was collected from RECLAIM permit limits
- For major sources without a permit limit, RATA test data was used
- ppmv @ 15% O2

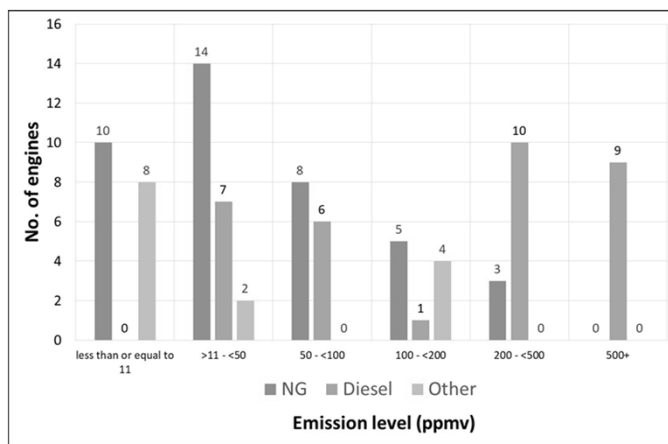
Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Distribution of Engines per Emission Level and Fuel Type

30

NOx Emissions level (ppmv)	Total	Natural Gas	Diesel	Other
≤ 11	18	10	0	8
>11 - <50	23	14	7	2
50 - <100	14	8	6	0
100 - <200	10	5	1	4
200 - <500	13	3	10	0
500+	9	0	9	0
Total	87	40	33	14



- Emission level data was collected from RECLAIM permit limits
- For major sources without a permit limit, RATA test data was used
- ppmv @ 15% O2
- Other fuel types: gasoline, biogas, field gas, and process gas

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Distribution of Engines per Size and Fuel Type

31



Let's review the 18 RECLAIM engines that currently meet the SCAQMD NOx limit of 11 ppmv

Engine Size (bhp)	Natural Gas	LPG	Produced Gas	Field Gas
<250	3	3	1	0
250 - <500	1	0	0	4
500 - <750	0	0	0	0
750 - <1000	3	0	0	0
1000 - <1250	1	0	0	0
>1250	2	0	0	0
Total	10	3	1	4

- Emission level data was collected from RECLAIM permit limits
- ppmv @ 15% O2

Rule 1110.2 – Working Group Meeting No. 2

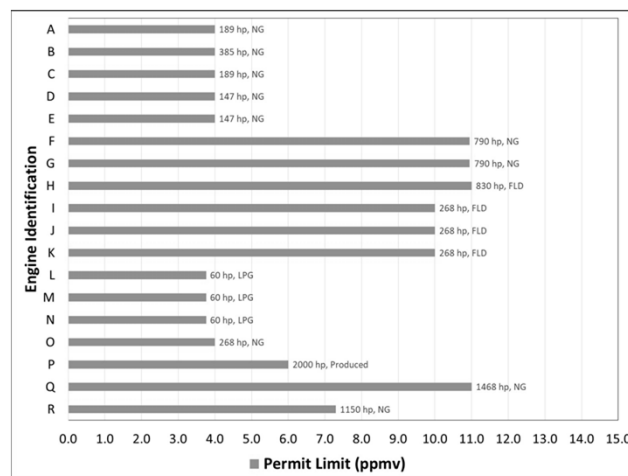
September 27, 2018

Distribution of Engines Meeting 11 ppmv NOx

32



- 18 engines currently permitted at or below 11 ppmv
- Vary by size and fuel type
- Non-diesel
- Non-retrofitted
- SCR / NSCR controls



- Emission level data was collected from RECLAIM permit limits
- ppmv @ 15% O2

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Assessment of Emission Limits for Existing Units

33

Emerging technology –

- Recently installed diesel engines at a RECLAIM facility are permitted at 12.3 ppmv (@15% O₂) – awaiting testing results for actual emissions
- Source Test results from recently permitted Tier-4 diesel engines (limit at 22 ppmv) show operation at less than 5 ppmv NO_x @ 15% O₂
 - One at 225 bhp
 - Two at 190 bhp

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Assessment of Emission Limits for Existing Units

34

- As part of the analysis, staff will look at non-RECLAIM engines as well
- Will be looking for any advancements of technology that are achieving lower emission limits

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Survey Questionnaire

35

Information needed to evaluate existing units

Analysis of Permitted Emission Levels

- Permitted emission limit
- Air pollution control technology
- Equipment type
- Fuel type
- Age of equipment
- Retrofit or replacement
- Operational history

Analysis of Actual Emissions Data

- Emission limit (source tests or CEMS data)
- Throughput data (Annual Emission Reports)

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Survey Questionnaire

36

- Survey to be sent to all affected sources – RECLAIM and non-RECLAIM
- Data ensures existing equipment information is updated
- Opportunity for sources to add any missing equipment
- Deadline to submit surveys by October 28, 2018
- Follow-up with facilities on a case-by-case basis

Rule 1110.2 Survey – September 2018

Facility ID – 12456 (Example)

Device ID	Application	Size (hp)	Primary Fuel Type	2-stroke engine (Y/N)	Lean Burn (Y/N)	Age of Engine (yrs)	Primary Engine Use	Type of Emission Control	Ammonia Slip (ppm)	Ammonia Type
D1	252525	150	NG	Y	Rich					
D2	252526	150	NG	Y	Rich					
D3	252527	150	NG	Y	Rich					
D13	252532	300	Diesel	N	Lean					

Device ID	Engine Model (Y/N)	Tier Rating	Engine Efficiency (%)	Typical Load Factor	Air Retrofit (Y/N)	Fuel Usage Units	Annual Fuel Usage			Annual Operating Hours	
							2016	2017	2018	2016	2017
D1											
D2											
D3											
D13											

Additional Comments:

Instructions:

- Please review data (1) – (6) for each engine.
- Please provide data (3) – (5) for each engine.
- Attach most recent emissions data for each engine (e.g. source test report, hand-held portable data, etc.)
- For any IC engine(s) not identified, please list them in the Additional Comments section.

Please return survey to:

South Coast Air Quality Management District
 Jim Kovic, Outreach
 21881 Chino Drive
 Diamond Bar, California 91765-4178
 Or via E-mail: jimkovic@scqmd.com

Page 1 of 2

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Next Steps and Proposed Rule Schedule

37

Staff will continue with rule development process, which will include:

- Review of control technologies
- Site visits of affected facilities
- Meetings with facility representatives
- Survey distribution and evaluation by staff

Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Next Steps and Proposed Rule Schedule

38



Rule 1110.2 – Working Group Meeting No. 2

September 27, 2018

Staff Contacts

39

Please contact the following SCAQMD staff with any questions or comments

Tracy Goss
Planning and Rules Manager
(909) 396-3106
tgoss@aqmd.gov

Kevin Orellana
Program Supervisor
(909) 396-3492
korellana@aqmd.gov

Rodolfo Chacon
Air Quality Specialist
(909) 396-2726
rchacon@aqmd.gov