Proposed Amended Rule 1110.2
Emissions from Gaseous- and Liquid- fueled Engines and
Proposed Amended Rule 1100
Implementation Schedule for NOx Facilities

WORKING GROUP MEETING NO. 4
Date – April 24, 2019
South Coast AQMD Headquarters – Room GB
Review of Working Group Meeting #3
Status of Rule Development
Proposed Emission Limits
Proposed Reductions
Cost-Effectiveness
Rule Language Concepts
Next Steps and Proposed Schedule
Summary of Working Group Meeting #3
• Reviewed survey questionnaire
• Revised engine universe
• Discussed site visits
• Reviewed comment letters
• Current regulatory limits – BARCT approach
  ➢ At South Coast AQMD
  ➢ Federal Tier 4
  ➢ State ATCM
• CEMS applicability
• Radio transmission towers
Status of Rule Development
Status of Rule Development

Stakeholder Input

Meetings with Organizations (Industry, Environmental, Community)

Individual Facility Meetings/Site Visits

Working Group Meetings

Comment Letters

Public Comment at Public Workshop(s) and Public Hearing
Summary of Assessment Activities

- Reviewed South Coast AQMD Rules 1110.2 and 1470 and applicability to RECLAIM equipment
- Surveyed emission limits in other jurisdictions for similar equipment
- Conducted site visits
- Meetings with technology vendors on exhaust emissions controls
- Solicited cost information for replacement and retrofit options
- Reviewed comment letters
- Met and conferred with stakeholders
### Engine Type

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Total Count</th>
<th>Meeting 11 ppmv&lt;sup&gt;1&lt;/sup&gt; NOx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean-Burn Engines (2-Stroke)</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Lean-Burn Engines (4-Stroke)</td>
<td>34</td>
<td>8</td>
</tr>
<tr>
<td>Engines Subject to ATCM</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Rich Burn Engines</td>
<td>23</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>76</strong></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

- 8 Lean-Burn engines have permitted limits at or below 50 ppmv
- Remaining 10 of 23 Rich-Burn engines are expected to achieve compliance with 11 ppmv<sup>1</sup> NOx through tuning or minor catalyst changes

<sup>1</sup> Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes
Proposed Emission Limits
BARCT Assessment

BARCT analysis conducted for each equipment category

Technology Assessment:
- Assessment of South Coast AQMD Regulatory Requirements
- Assessment of Emission Limits of Existing Units
- Other Regulatory Requirements
- Assessment of Pollution Control Technologies

Initial BARCT Emission Limit and Other Considerations

Cost-Effective Analysis

BARCT Emission Limit
CURRENT TECHNOLOGY ASSESSMENT

- Selective Catalytic Reduction (SCR) for lean-burn engines
- Non-Selective Catalytic Reduction (NSCR), 3-way catalysts for rich-burn engines

Both technologies are commercially available
TECOGEN
• Retrofit technology
• Installed in limited use within the South Coast AQMD
• Applied to natural gas engines
• 100 – 150 bhp application
• Can meet more stringent Distributed Generation (DG) emission limits

*Development is on-going*
ETAGEN

- Technology for new installations; no retrofit application
- Non-traditional combustion design; considered as a new, non-emergency electrical generator
- Potential installation – later in 2019
- Can meet more stringent Distributed Generation (DG) emission limits

*Development is on-going*
INITIAL PROPOSAL

Require RECLAIM engines to comply with:

- Current Rule 1110.2 NOx limit of 11 ppmv (@ 15% O₂)
- Demonstrated technology exists for rich-burn and lean-burn engines to achieve compliance
- Some exceptions (next slides)
**Portable Engines Subject to ATCM**

- Propose to include phase out schedule in the rule
- Issue compliance advisory for Tier 1 portable engines

<table>
<thead>
<tr>
<th>Engine Certification</th>
<th>Engines rated 50 to 750 bhp</th>
<th>Engines Rated &gt;750 bhp</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large Fleet</td>
<td>Small Fleet</td>
</tr>
<tr>
<td>Tier 1</td>
<td>1/1/2020</td>
<td>1/1/2020</td>
</tr>
<tr>
<td>Tier 2 built prior to 1/1/2009</td>
<td>1/1/2022</td>
<td>1/1/2023</td>
</tr>
<tr>
<td>Tier 2 built on or after 1/1/2009</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Tier 3 built prior to 1/1/2009</td>
<td>1/1/2025</td>
<td>1/1/2029</td>
</tr>
<tr>
<td>Tier 3 built on or before 1/1/2009</td>
<td>1/1/2027</td>
<td>1/1/2029</td>
</tr>
<tr>
<td>Tier 1, 2, and 3 flexibility engines</td>
<td>December 31 of the year 17 years after the date of manufacture. This provision shall not apply to any engine operation before date of this regulation.</td>
<td></td>
</tr>
</tbody>
</table>

**Exemptions**

For portable, diesel-fueled:

- (A) operated exclusively outside of California or only within OCS
- (B) emergency-use
- (C) low-use (< 200 hours per calendar year)
**HARMONIZE RULE 1110.2 WITH RULES 219 AND 222 FOR REMOTE TRANSMISSION TOWERS**

- May 2013 – Governing Board amended Rules 219 and 222 providing permit exemption for remote two-way transmission towers
- No utility, electricity, or natural gas available within ½ mile radius
- Engines rated less than 100 bhp
- Fueled on #2 diesel, CNG, or LPG
- Proposed language to clarify that these engines are not required to meet the emission limits in Rule 1110.2 (d)

<table>
<thead>
<tr>
<th>Engine Manufacturer</th>
<th>No. of Engines</th>
<th>Model No.</th>
<th>Engine Rating (bhp)</th>
<th>Fuel Type</th>
<th>NOx (ppmv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cummins</td>
<td>2</td>
<td>4BT3.3 G5</td>
<td>69</td>
<td>Diesel</td>
<td>219</td>
</tr>
<tr>
<td>John Deere</td>
<td>16</td>
<td>4024HF285B</td>
<td>80</td>
<td>Diesel</td>
<td>213</td>
</tr>
<tr>
<td>Generac</td>
<td>1</td>
<td>68GLPN 7075</td>
<td>107(^1)</td>
<td>LPG</td>
<td>73</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Derated to under 100 bhp
Anticipated NOx Reductions
Total Anticipated Reduction – 0.310 tons per day of NOx

- Equipment to be removed and/or replaced – 0.135 tpd
- Retrofit and/or tune-up – 0.175 tons tpd

Diagram showing the breakdown of the reduction:
- 0.135 tpd (Equipment to be removed and/or replaced)
- 0.175 tpd (Retrofit and/or tune-up)
- Total: 0.310 tpd
Cost-Effectiveness Analysis
Cost-Effectiveness Analysis

• Cost-Effectiveness is based on Present Worth Value calculation

• Factors and assumptions include:
  - Total Installed Cost
  - Annual Costs
  - Assumes a 4% interest rate
  - 25-year equipment life
  - Emission reductions
PRESENT WORTH VALUE & COST-EFFECTIVENESS CALCULATIONS

- PWV = TIC + 15.622 x AC
- CE = PWV / (ER x 365 x 25 years)

PWV = Present Worth Value ($)
TIC = Total Installed Cost ($)
AC = Annual Cost ($)
CE = Cost-Effectiveness ($/ton)
ER = Emission Reduction (ton/yr)

Note: the Uniform Series Present Worth factor at 4% interest for 25 years is **15.622**
Cost-Effectiveness Analysis

• Data collected from vendors and facilities
  ➢ SCR installation
  ➢ Catalyst cost
  ➢ Total engine replacement
  ➢ Service cost
  ➢ New CEMS costs

• Data also collected using past evaluations and adjusted using Marshall & Swift Index inflation factor
• Preliminary Cost-Effectiveness data to be presented at the next Working Group meeting
• Staff continues to collect cost data and welcomes submission of project costs or estimates for new engine installations and retrofits completed in the last ten years
Rule Language Concepts
Include definitions of RECLAIM and non-RECLAIM facilities consistent with other rules

Remove requirements for engines designated as process units under RECLAIM

Remove references to Rule 2012 and Regulation XX as applicable
Rule Language Concepts

- Implementation schedule under Rule 1100
- Consideration of situations where engines operate in emergency situations (i.e. wildfires, natural disasters, etc.)
- Clarify exemption for remote radio transmission towers
• Welcome any additional comments
• Available for site visits
Schedule
Next Steps and Proposed Rule Schedule

- On-going working group meetings
- Public workshop 2nd Quarter 2019
- Public hearing September 2019
Contacts
Please contact the following South Coast AQMD staff members with any questions or comments:

**General RECLAIM**

Susan Nakamura  
Assistant Deputy Executive Officer  
(909) 396-3105  
snakamura@aqmd.gov

Michael Morris  
Planning and Rules Manager  
(909) 396-3282  
morris@aqmd.gov

**Proposed Amended Rule 1110.2**

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

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