Proposed Amended Rule 1134 Working Group #4

August 10, 2018

Agenda

- Summary of Working Group Meeting #3
- Discuss preliminary rule language
- Concepts for Monitoring, Reporting, and Recordkeeping

Previous Working Group Meeting

- Presented BARCT analysis
  - Technology assessment
  - Established BARCT emission limits for most categories
  - Cost-effectiveness
- Provided initial rule concepts

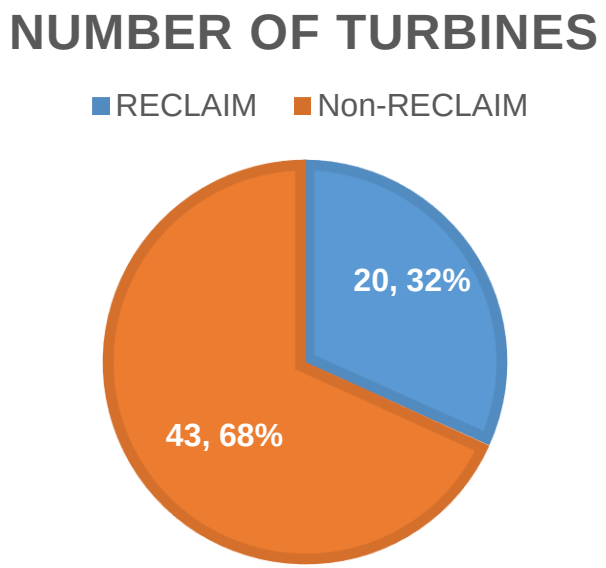
Preliminary Rule Language

Overview

- Rule language based on initial rule concepts with input from stakeholders
- Opportunities remain to revise rule language as rule development process progresses
  - Requesting further input from stakeholders where issues remain
- Presentation will highlight key provisions of preliminary rule language

Applicability – Subdivision (b)

- Apply to turbines regardless of installation date
- Retain size threshold of ≥ 0.3 MW output
- Does not apply to turbines subject to:
  - Electricity Generating Facilities regulated under Proposed Amended Rule 1135
  - Refineries regulated under Proposed Rule 1109.1
- BARCT assessment did not consider turbines subject PAR 1135 and PR 1109.1



Exemptions – Paragraphs (h)(1) and (h)(2)

- Retaining exemptions for:
  - Laboratory turbines
  - Fire fighting turbines
  - Flood control turbines
  - Emergency turbines
- These turbines are used very infrequently and have minimal emissions

Exemptions – Paragraphs (h)(1) and (h)(2) *(continued)*

- Deleting exemptions for:
  - Chemical processing turbines
    - Will be subject to applicable Rule 1134 fuel type emission limit or Rule 1109.1 if located at refinery
  - Turbines located in Southeast Desert Air Basin
    - No longer within SCAQMD boundaries
  - Turbines located on San Clemente Island
    - No turbines remain on San Clemente Island

Key Definitions – Subdivision (c)

- Annual Capacity Factor – Ratio between measured heat input during a calendar year and the potential heat input had it been operating continuously at the permitted rating
  - Term used for low-use provisions
- Existing Gas Turbine Unit – Turbines operating prior to August 4, 1989 that did not enter RECLAIM program
  - Existing units will remain subject to existing requirements in rule in the interim

Key Definitions – Subdivision (c) *(continued)*

- Landfill Gas – Gas derived from the decomposition of buried organic material (SCAQMD Rule 1150.1)
- Natural Gas – Pipeline quality gas (SCAQMD Rule 2000)
- Produced Gas – Gas associated with the production, gathering, separation, or processing of crude oil (SCAQMD Rule 1148.1)
- Sewage Digester Gas - Gas derived from anaerobic decomposition of organic sewage (unchanged)

Existing Requirements – Paragraphs (d)(1) and (d)(2)

- Current emission limits retained during interim for existing turbines until emission concentration limits in paragraph (d)(3) are met or become effective
- Current emission limits do not apply to:
  - Turbines exiting RECLAIM
  - Turbines in operation after August 1989
  - Applying current limits would add costs and slow progress to meet BARCT limits
- Retains notice of applicability of Regulation XIII if CO emissions increase when NOx controls installed
  - Informational statement that Regulation XIII applies if there are emission increases on other pollutants
  - No CO emission limits in PAR 1134

Emission Limitations – Paragraph (d)(3)

- Limits reflect BARCT assessment discussed in previous working group meetings
  - Limits provided by category and fuel type
  - Includes limit for ammonia
- Effective Date: January 1, 2024
- Proposed emission limits in Table I
- Seeking additional input on proposed emission limits

Proposed Emission Limits – Table I

Table I: Emissions Limits for Stationary Gas Turbines

Fuel Type	NOx (ppmv @ 15% O2)	Ammonia (NH3) (ppmv @ 15% O2)
Landfill Gas	12.5	5.0
Liquid – Outer Continental Shelf	25.0	5.0
Natural Gas – Combined Cycle	2.0	5.0
Natural Gas – Pipeline Gas Turbine	5.0	5.0
Natural Gas – Simple Cycle	2.5	5.0
Produced Gas	5.0	5.0
Produced Gas – Outer Continental Shelf	9.0	5.0
Sewage Digester	18.8	5.0
Other	12.5	5.0

Cost-Effectiveness for Landfill Gas Turbines

Fuel Type	NOx (ppmv @ 15% O2)	Ammonia (NH3) (ppmv @ 15% O2)
Landfill Gas	12.5	5.0

- Based on recent source testing, 12 of 16 landfill gas turbines can meet 12.5 ppm NOx limit
  - Short periods where low loads or SOx mass emission limits impact NOx emission concentrations
  - Including provisions in rule to address low loads (10% of maximum rated load) and SOx mass emissions
- Remaining four units installed in 2010 already using SCR control technology
  - Recent test results indicate that meeting 25 ppm permit limit is challenging
  - Experiencing high costs due to frequent catalyst replacement
- More recent version of turbine model reportedly has NOx emissions of 15 ppm with no SCR
  - Stranded assets may be somewhat offset by elimination of SCR control costs
  - Estimated to become cost effective (< $50,000 per ton reduced) by 2030

Liquid – Outer Continental Shelf

Fuel Type	NOx (ppmv @ 15% O2)	Ammonia (NH3) (ppmv @ 15% O2)
Liquid – Outer Continental Shelf	25.0	5.0

- Liquid only used when there is insufficient produced gas
- Applicable only for turbines where natural gas pipelines are not available
- Must utilize dry low NOx or water injection technology in combination with SCR
  - Examining cost-effectiveness of SCR installation on Outer Continental Shelf sources

Natural Gas Turbines

Fuel Type	NOx (ppmv @ 15% O2)	Ammonia (NH3) (ppmv @ 15% O2)
Natural Gas – Combined Cycle	2.0	5.0
Natural Gas – Pipeline Gas Turbine	5.0	5.0
Natural Gas – Simple Cycle	2.5	5.0

- Excluding low-use turbines and turbines permitted near proposed limits, proposed limits for combined cycle and simple cycle turbine are cost-effective
  - Average cost-effectiveness for combined cycle turbines: $15,200
  - Average cost-effectiveness for simple cycle turbines: $16,800

Pipeline Gas Turbines

- Four < 1 MW turbines used for natural gas pipelines
  - Challenged by variation in fuel flow
  - Currently emitting < 10 tons combined annually
- BACT and SJVAPCD limits are currently:
  - NOx - 8 ppmv @ 15% O2 steady / 12 ppmv @ 15% O2 transition
  - Ammonia - 20 ppmv @ 15% O2
  - Based on analysis nearly 25 years ago
- More recent (2014) installation at Kettleman has NOx limit of 8 ppmv @ 15% O2 and ammonia limit of 10 ppmv @ 15% O2
- Analyzing incremental cost-effectiveness between retrofit and replacement
  - Retrofit costs less but replacement realizes more emission reductions

Produced Gas

Fuel Type	NOx (ppmv @ 15% O2)	Ammonia (NH3) (ppmv @ 15% O2)
Produced Gas	5.0	5.0

- Produced gas has frequent load changes and low-load challenges
- Applicable only for turbines where natural gas is not used
- Must utilize dry low NOx or water injection technology in combination with SCR

Produced Gas – Outer Continental Shelf Source

Fuel Type	NOx (ppmv @ 15% O2)	Ammonia (NH3) (ppmv @ 15% O2)
Produced Gas – Outer Continental Shelf Source	9.0	5.0

- Produced gas has frequent load changes and low-load challenges
- Applicable only for turbines where natural gas pipelines are not available
- Must utilize dry low NOx or water injection technology in combination with SCR
  - Examining cost-effectiveness of SCR installation on Outer Continental Shelf sources

Sewage Digester Gas Turbines

Fuel Type	NOx (ppmv @ 15% O2)	Ammonia (NH3) (ppmv @ 15% O2)
Sewage Digester	18.8	5.0

- Sewage digester gas turbines challenged by high siloxane levels
- Three turbines currently meet 18.8 ppm NOx using SCR
- Other three turbines may meet same limit through water injection
- Analyzing impacts on power generation and averaging time

Other Gas

Fuel Type	NOx (ppmv @ 15% O2)	Ammonia (NH3) (ppmv @ 15% O2)
Other	12.5	5.0

- No “other” gas currently utilized
- Biogas may be utilized in future
  - Similar challenges as landfill gas turbines
- Must utilize dry low NOx technology

Start-Up, Shutdown, and Tuning Requirements – Paragraph (d)(4)

- Emission limits in Table I not applicable during Start-Up, Shutdown, and Tuning
- SCAQMD permits establish provisions for start-up, shutdown, and tunings
  - Specifies duration, mass emissions, frequency for start-up and shutdown
  - Permit may contain additional conditions for tunings

Averaging Time – Paragraph (d)(5)

- Units installed or retrofitted after rule amendment shall average emission limits over a 60 minute rolling average
  - 60 minute rolling average requires software modification
  - Permits will contain similar requirement
- Units installed prior to rule that comply with proposed limits shall retain current averaging time requirements specified in the permit
  - Existing averaging times vary widely

Prohibition of Liquid Fuel – Paragraph (d)(6)

- Prohibits use of liquid fuel except for gas turbines located on Outer Continental Shelf
  - Liquid fuel needed when produced gas is insufficient; no access to pipeline natural gas
- Fuel must be 10% or greater liquid content by volume to qualify for higher limit

Photo by Beta Offshore www.betaoffshore.com

Low-Use Turbines – Clauses (h)(3)(A) & (h)(3)(B)

- Many electric power generating units are operated sporadically to support renewables
  - Low-use units are not cost-effective to install additional control equipment
- NOx concentration not applicable for turbines that:
  - Operate less than 25% of annual capacity factor in one year;
  - Operate less than 10% averaged over three years;
  - Retain NOx and NH3 limits, averaging times, and start-up, shutdown, and tuning requirements in current permit; and
  - Have a permit condition limiting annual capacity factor

Low-Use Turbines – Clauses (h)(3)(A) & (h)(3)(B) *(Continued)*

- Turbines must demonstrate low-use over three year period from 2017-2019
- Apply for permit modification to include annual capacity limit by July 2020

Exceedance of Low-Use Exemption – Clause (d)(3)(C)

Ensures that low-use threshold is maintained and provides instructions if exceedance

- Demonstrate each July that turbine remains below annual capacity factor threshold
- If exceedance:
  - Submit permit application within 9 months from reported date
  - Submit CEMS Plan within six months
  - Operate in compliance with limits in Table I by three years from date of reported exceedance

Landfill Gas Turbines – Paragraphs (h)(4) and (h)(5)

Landfill Gas turbines can meet proposed limit except during low-load operations and when trying to limit SOx emissions

- NOx limits not applicable when operating below ten percent of the rating of a landfill gas turbine
  - Limited to 250 hours per year
- NOx limits not applicable when limiting SOx mass emissions
  - SOx mass emissions must be within 10% of daily permitted SOx mass emission limit
  - Limited to 100 hours per year

Monitoring, Recordkeeping, and Reporting (MRR)

Overview of Monitoring, Reporting, and Recordkeeping (MRR) – Subdivision (e)

Establish interim MRR for landing rules

- Retain MRR for non-RECLAIM facilities
  - CEMS for turbines > 2.9 MW
  - Source testing for turbines ≤ 2.9 MW
- RECLAIM facilities will retain Rule 2012 monitoring and recordkeeping
  - Includes CEMS requirement for turbines > 2.9 MW
  - Excludes emergency standby turbines

Considering companion rule to Rule 2012 to transition from current requirements into consistent and comprehensive MRRs for all PAR 1134 facilities

MRR for Non-RECLAIM Gas Turbines – Paragraph (e)(1)

- Require CEMS for NOx to meet the requirements of SCAQMD Rule 218 – Continuous Emission Monitoring
  - Many Rule 1134 applicable turbines already meeting Rule 218
  - Current provisions are inadequate and antiquated
- Retain measurement of flow rates of liquids or gases and elapsed time of operation

Source Testing – Paragraph (e)(2)

- Require source testing for turbines rated ≤ 2.9 MW
  - Adding SCAQMD Test Method 207.1 for ammonia – Paragraph (f)(1)
- Retain annual source test for NOx and ammonia for turbines emitting 25 tons or more of NOx per calendar year
- Source testing every three years otherwise
  - Previously was every 8,400 hours
  - New requirement provides consistency and predictability

MRR for RECLAIM Gas Turbines – Paragraph (e)(3)

- Comply with SCAQMD Rule 2012 – Requirements for Monitoring, Reporting, and Recordkeeping for Oxides of Nitrogen Emissions
  - Applicable only to turbines currently subject to RECLAIM
- Exclude requirements in Rule 2012 for reporting
  - Retains monitoring and recordkeeping requirements but minimizes reporting requirements

Recordkeeping - Paragraph (g)(3)

- Require data acquisition system to record compliance with emission concentration limits in rule
  - Monthly emission summary removed
  - Provides needed information to determine compliance without requiring extensive reporting

Schedule

Current Tentative Schedule

Next Working Group Meeting	September 2018
Public Workshop	Summer 2018
Stationary Source Committee	Fall 2018
Set Hearing	Fall 2018
Public Hearing	Winter 2019

Contacts

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