Proposed Rule 1179.1

NOx Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities

Working Group Meeting #1

May 2, 2019

Agenda

- Background
- Rule development process
- Current and proposed applicability
- BARCT assessment
- Equipment located at POTWs
- Next Steps

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Background

- Proposed Rule 1179.1 is designed to address NOx emissions from certain combustion equipment at Publicly Owned Treatment Works facilities
- Publicly owned treatment works (POTWs) are
  - Wastewater treatment or reclamation plants owned or operated by a public entity
  - Includes all operations within the boundaries of the wastewater and sludge treatment plant
- 30 publicly owned wastewater treatment facilities
- Addressing NOx combustion equipment in a rule that is specific to POTWs can better tailor requirements to issues that are unique to these facilities

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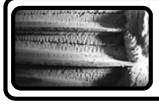
Unique Characteristics of POTWs

Use of digester gas



Siloxanes

Potential Effects of SB 1383

Financial Challenges

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Digester Gas

- Digester gas has a lower heating value than natural gas
  - Digester gas ≈ 650 Btu; Natural gas ≈ 1050 Btu*
  - Lower energy content (Btu) – almost twice as much digester gas needed to do the same amount of work as natural gas
- Digester gas being used to fuel engines, boilers, turbines and fuel cells
- Digester gas produced from wastewater contains siloxanes
  - Fouls combustion equipment (e.g., engines and turbines)
  - Affects catalyst performance in conventional NOx pollutant control equipment such as Selective Catalytic Reduction (SCR) and Non-Selective Catalytic Reduction (NSCR) technologies

*Staff Report for Proposed Amended Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines, Appendix G

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Siloxanes

- Siloxane combustion causes silicon dioxide forming a glass-like deposit on equipment
  - Increases equipment maintenance
  - May cause significant damage if left unremoved
  - Can make catalyst-based post-combustion controls less effective
- Gas cleaning technology is available to remove some siloxanes and other impurities
  - 7 out of 10 facilities with engines and/or turbines fueled with digester gas are using gas cleaning technology
  - 2 facilities are using a gas cleaning technology for fuel cell projects

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Potential Effects of SB 1383

- SB 1383 approved by the Governor on September 19, 2016 seeks to reduce short-lived climate pollutants and requires a diversion of food waste to landfills
  - 50% reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020
  - 75% reduction in the level of the statewide disposal of organic waste from the 2014 level by 2025
- An alternative to landfills are POTWs for food processing
  - Some POTWs currently accepting food waste to convert to usable biogas
- More information is needed to understand the scope of any potential impacts on POTW operations/NOx equipment
  - e.g., digester gas production, more combustion sources, emission impacts, contaminants

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Financial Challenges

- POTWs are essential public services that have structured procurement processes
  - Requires approval from governing bodies (e.g., city council, board of directors, board of county supervisors, etc.)
- Consideration of existing gas-to-energy contracts
- Unknown costs of accepting organic waste

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RULE DEVELOPMENT PROCESS

Stakeholder Input is Key

- Staff encourages early and continued input from all stakeholders throughout the rulemaking process
- Goal is a proposal that all facilities can comply with and that meets the objectives of the proposed rule
- Staff encourages facilities to meet with staff to discuss any concerns – unique situations, clarification of provisions, etc.
- Facilities with unique equipment are encouraged to schedule site visits with staff

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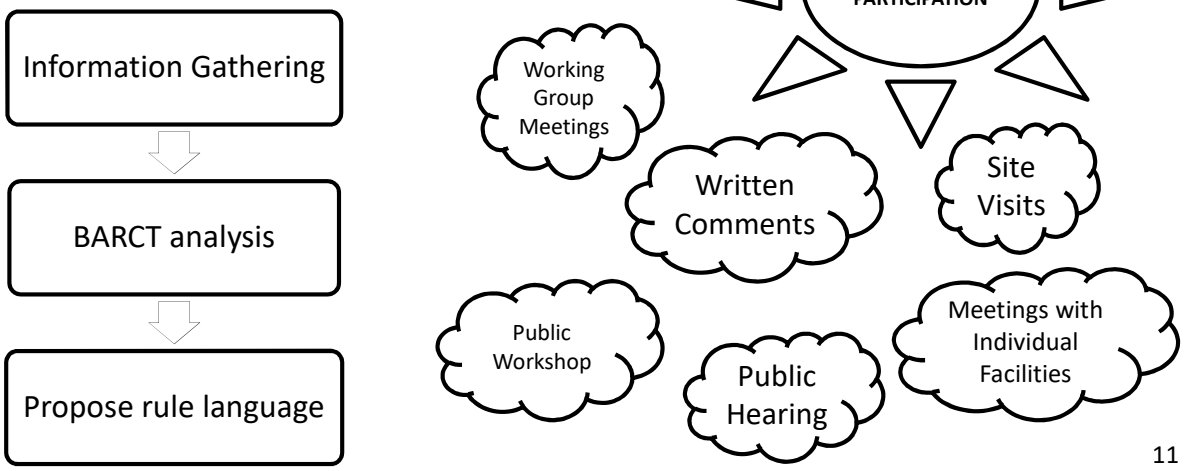
Rule Development Process



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CURRENT AND PROPOSED APPLICABILITY

Regulatory Background

- South Coast AQMD Rule 1179 applies to POTWs and has provisions pertaining to volatile organic compounds (VOCs)
- Combustion equipment at POTWs are currently subject to NOx source-specific rules

RULE	NOx SOURCE-SPECIFIC
No rule	Turbines
1146, 1146.1, 1146.2 (Rule 1146 Series)	Boilers
1110.2	Non-emergency Internal Combustion Engines
1147	Miscellaneous Combustion Equipment
1118.1	Non-Refinery Flares

- The following slides will discuss the current applicability of these rules

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Rule 1134

- Applies to stationary gas turbines 0.3 megawatt or larger
- However, it excludes turbines located at publicly owned treatment works

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Rule 1146 Series

- Rule 1146 and 1146.1 apply to boilers, steam generators, and process heaters
  - Rule 1146 applies to those units ≥ 5 mmbtu/hr
  - Rule 1146.1 applies to those units >2 and <5 mmbtu/hr
- Rule 1146.2 applies to only natural gas-fired water heaters, boilers, and process heaters ≤ 2 mmbtu/hr
- Rule 1146 Series is applicable to POTWs only until equipment is subject to a NOx emission limit in a Regulation XI rule adopted or amended after December 7, 2018
  - Upon adoption of Rule 1179.1, the requirements contained in Rule 1146 Series would no longer apply

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Rule 1110.2

- Applies to all stationary gaseous and liquid fueled engines over 50 bhp
- Rule contains:
  - NOx, VOC, and CO limitations
  - Inspection and monitoring (I&M) plans
  - CEMS requirements
- Currently applicable to engines at wastewater treatment facilities
- Previous rulemaking assessments (2012 amendments, plus technology assessments) included engines fueled by digester gas
  - Current limit of 11 ppm NOx (corrected to 15% oxygen) has been in effect since January 1, 2017

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Rule 1147

- Regulates NOx emissions from miscellaneous sources
- Included are dryers, heaters, kilns, furnaces, fryers, afterburners, etc.
- Includes miscellaneous combustion equipment located at wastewater treatment facilities
- BARCT assessment to be conducted during 1147 series rulemakings

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Rule 1118.1

- Addresses non-refinery flares (e.g., fired on digester gas)
- Technology evaluation conducted as part of the rulemaking
- Rule adopted January 4, 2019

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Proposed Applicability

- Objective: to capture combustion equipment that has not undergone a recent BARCT analysis
- Proposed Applicability:
  - Turbines fueled by digester gas produced at POTWs
  - Natural gas turbines located at POTWs (none currently exist)
  - Boilers fueled by digester gas produced at POTWs
  - Natural gas boilers located at POTWs

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Proposed Applicability (continued)

- Stakeholders requesting consideration of engines
  - Although Rule 1110.2 represents current BARCT, there are other specific operational provisions unique to POTWs that could be addressed in this rule
- Staff will be exploring options for these unique operational provisions

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Equipment Not Proposed for Inclusion

- Staff evaluated the equipment located at the 30 facilities and reviewed:
  - Permits
  - Equipment registrations
  - Inspection reports
- The following NOx combustion equipment were identified:
  - 10 microturbines (permit exempt)
  - 5 hot water heaters (permit exempt)
  - 2 emergency turbines
  - Emergency engines (Rule 1470)
  - Other miscellaneous equipment covered by Rule 1147
  - 1 dryer (Rule 1147)
  - 2 afterburners (Rule 1147)
  - 4 portable engines (1110.2)
  - Flares (Rule 1118.1)

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Equipment Not Proposed for Inclusion (continued)

- Staff recommends that this equipment not be included in the applicability of Rule 1179.1
  - Not unique to wastewater treatment operations
  - Covered by other rules

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BARCT ASSESSMENT

Purpose of a BARCT Assessment

- A Best Available Retrofit Control Technology (BARCT) assessment is conducted periodically for specific sources to identify any potential emission reductions
- BARCT assessments for some rulemakings were not completed for equipment at POTWs due to their inherent uniqueness
  - Rule 1134 (turbines) and Rule 1146 series (boilers)
- BARCT assessments will be continued from these previous rulemakings

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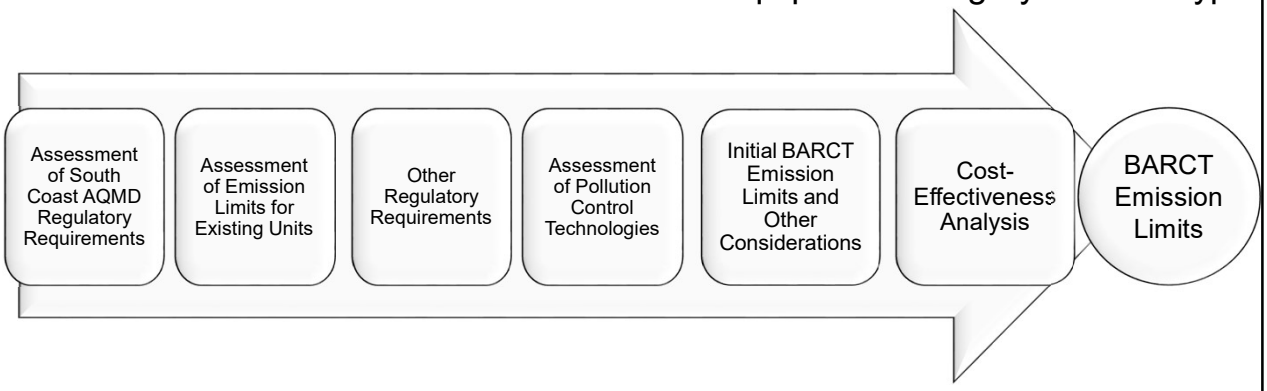
BARCT Assessment

A BARCT assessment is conducted for each equipment category and fuel type



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EQUIPMENT LOCATED AT POTWS

Equipment Breakdown

- Before assessing regulatory requirements and emission limits of existing units, staff conducted an initial review of specific combustion equipment located at POTWs
- Staff reviewed:
  - Type of equipment (boilers, turbines, and engines)
    - Fuel type
    - Size
    - Number of units

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Boilers

- 52 Boilers located at POTWs
  - Provide heat for anaerobic digesters
- Fuel types
  - Digester gas
  - Natural gas
  - Dual fuel (digester or natural gas)

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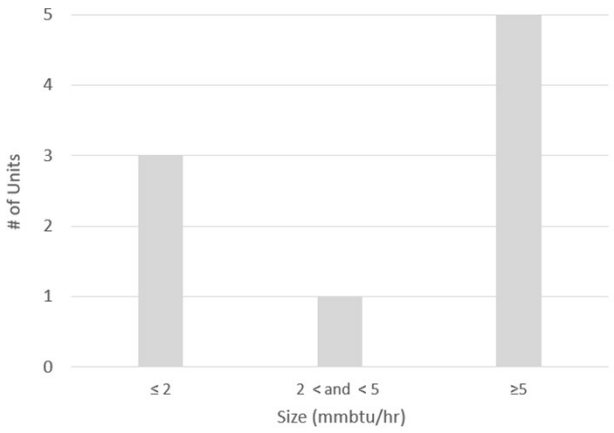
Digester Gas Boilers at POTWs

- 9 boilers fueled by digester gas
- Digester gas units less than 2 mmbtu/hr are meeting 30 ppmv limit (Rule 1146.2)
- Digester gas units larger than 2 mmbtu/hr are meeting 15 ppmv limit (Rules 1146 and 1146.1)
- Need additional information for digester gas limits on some units
  - Rule 1146.2 applies only to natural gas



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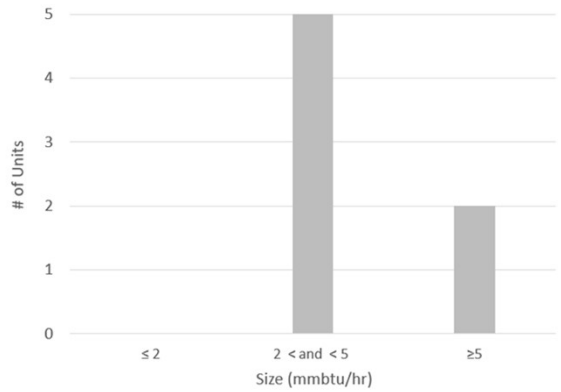
Natural Gas Boilers at POTWs

- 7 natural gas boilers
- Natural gas units are meeting the 9 ppmv limit



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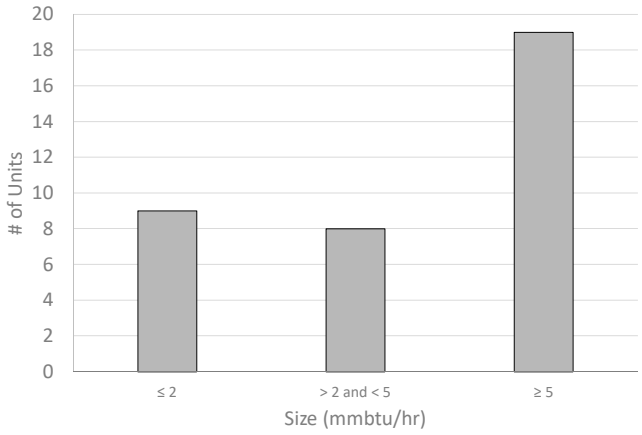
Dual Fuel Boilers at POTWs

- 36 dual fuel boilers
  - Digester or natural gas fired
- Dual fuel units are meeting the natural gas and digester gas limits in Rules 1146 and 1146.1
- Need additional information for digester gas limits on some units
  - Rule 1146.2 applies only to natural gas



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Turbines

- 6 Turbines (2 facilities)
  - Electricity generation
- Units meet emission limits specified in permits

Turbines			
Fuel	Size (MW)	Units	NOx Limit (ppmv)
Digester Gas	15.75	3	18.8
Digester Gas	18.6	3	25

*NOx limit corrected to 15% oxygen, by volume on a dry basis

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Engines

- 43 Non-emergency internal combustion engines
  - Electricity generation
  - Pumps
  - Aeration blowers
- Sizes range from 200 to 4,200 bhp

Fuel	Size (hp)	Units
Dual fuel Digester gas (primary) and Natural gas	50-500	2
	>500	18
Digester gas	>500	1
Natural gas	50-500	8
	>500	6
Dual Fuel Natural gas (primary) and LPG	50-500	3
	>500	5

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Engines - Summary

- BARCT analysis was conducted for engines at POTWs in previous Rule 1110.2 rulemakings
- Most engines are complying with Rule 1110.2 limits for natural gas and digester gas (11 ppm NOx) and utilize control technology
  - Control equipment used are SCR (w/ gas clean up) and NSCR (3 way catalysts)
  - 2 facilities are under variances and will convert to fuel cell technology, along with electrification and Tecogen technology

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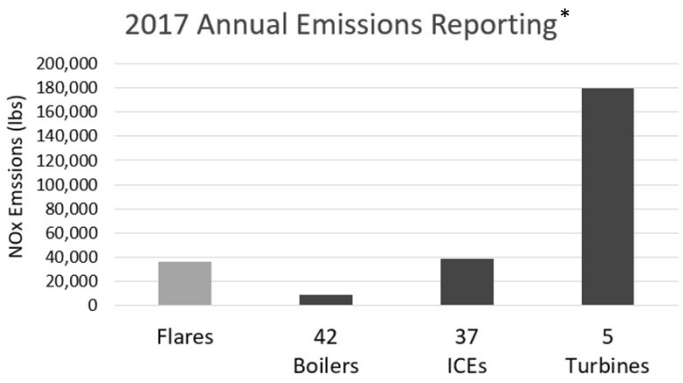
Emissions Inventory

- Emissions summary:
  - Facilities using the majority of digester gas for beneficial use
    - Approximately 15% of produced digester gas is flared
- Majority of emissions from POTWs are from turbines



*5 facilities did not report emissions in 2017

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Summary

- Proposed Rule 1179.1 is a NOx rule specific to POTWs that addresses their unique operations/equipment
  - Digester gas production, financial constraints, food waste
- Proposed applicability includes digester and natural gas fueled boilers and turbines
  - Rule 1146 series (boilers) is only applicable until adoption of Rule 1179.1
  - Rule 1134 (turbines) exempts wastewater facilities
- BARCT assessment on boilers and turbines
  - Other NOx combustion equipment have recent or upcoming BARCT assessments
- Initial stages of information gathering (types of equipment, emission limits, emissions)

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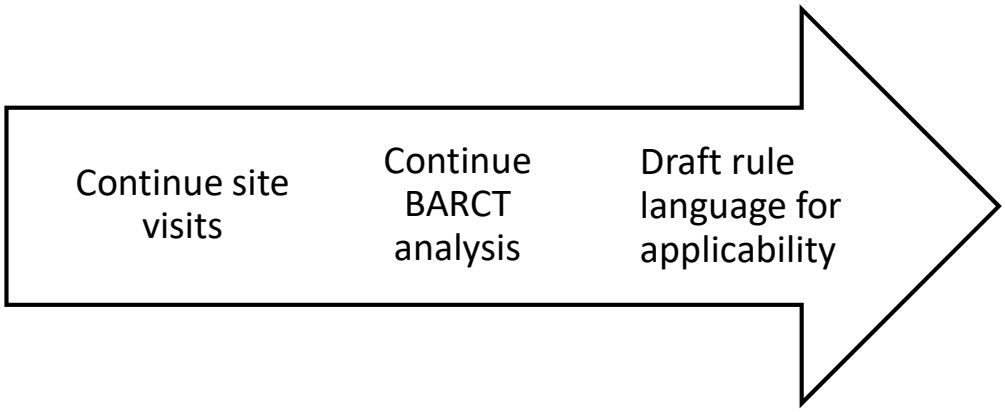
Next Steps



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