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

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

Unique Characteristics of POTWs

Use of digester gas

Siloxanes

Potential Effects of SB 1383

Financial Challenges

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

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

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

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

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

Rule Development Process

Information Gathering

BARCT analysis

Propose rule language

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

Rule 1134

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

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

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

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

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

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

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

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)

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

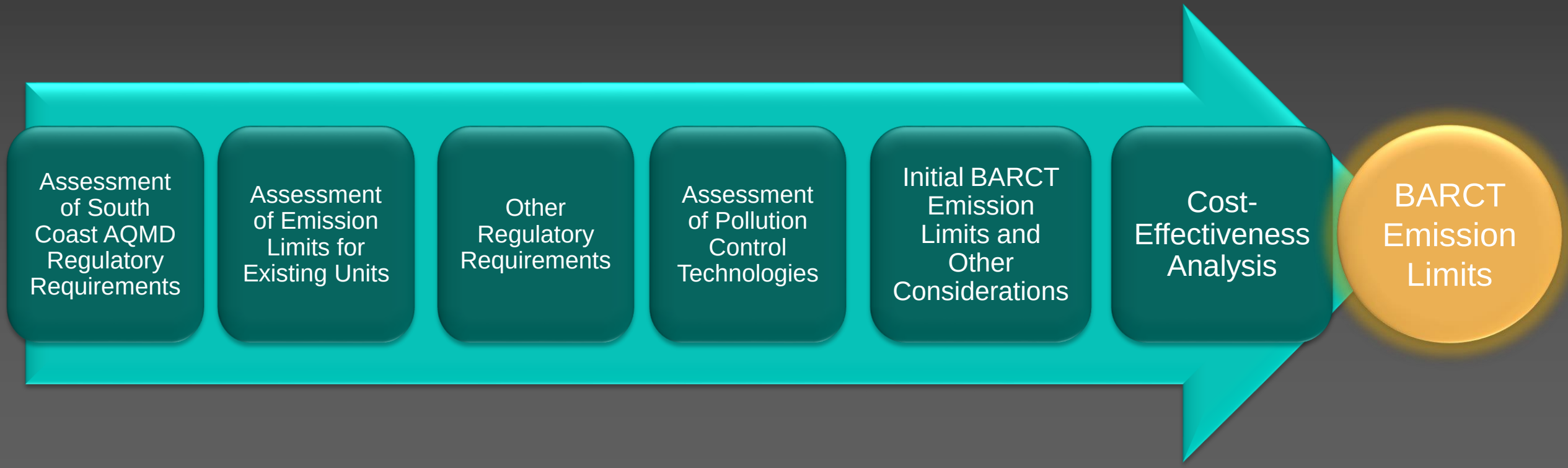
BARCT ASSESSMENT

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

BARCT Assessment

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



EQUIPMENT LOCATED AT POTWS

Equipment Breakdown

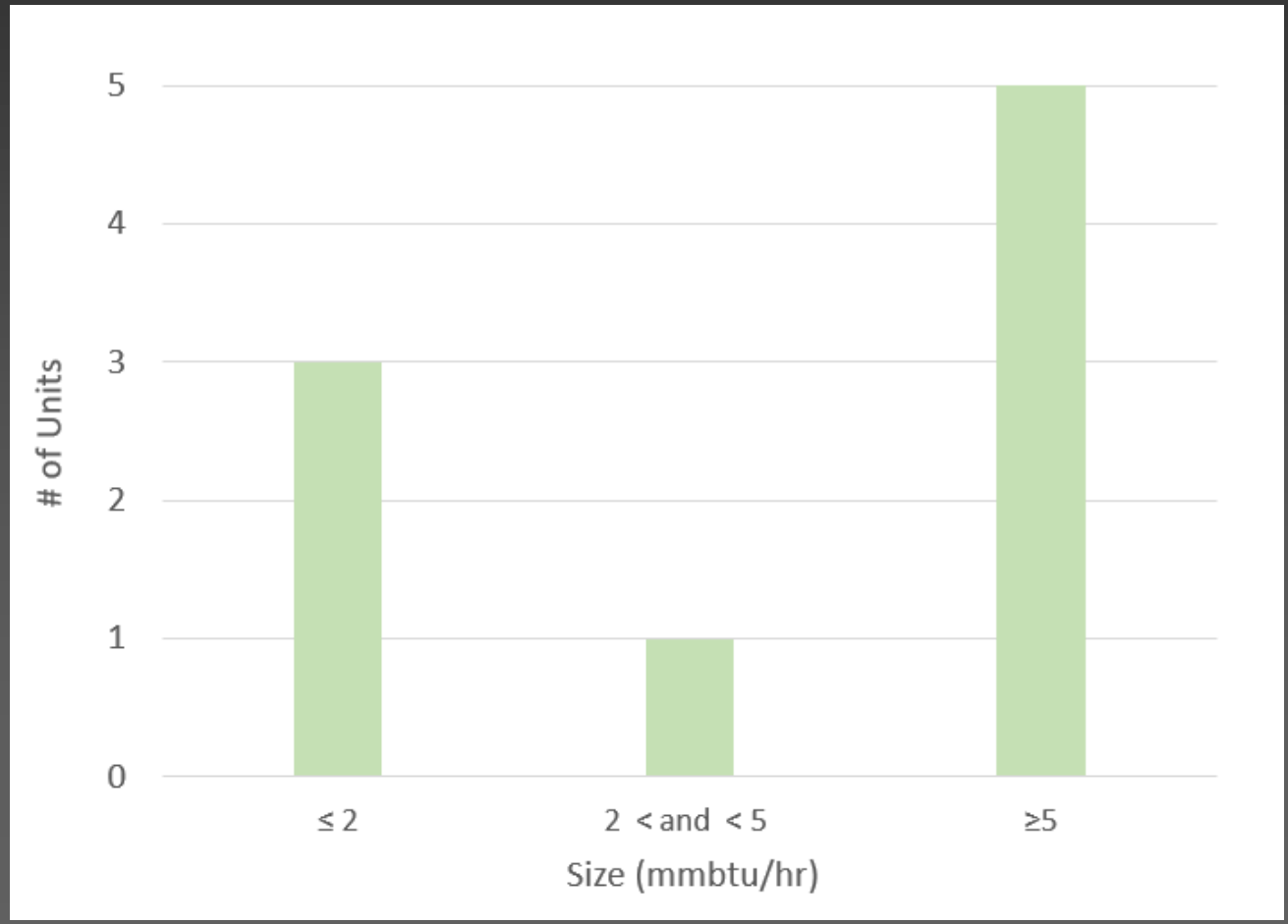
- Before assessing regulatory requirements and emission limits of existing units, staff conducted an initial review of specific combustion equipment located at POTWs
- Staff reviewed:
  - Type of equipment (boilers, turbines, and engines)
    - Fuel type
    - Size
    - Number of units

Boilers

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

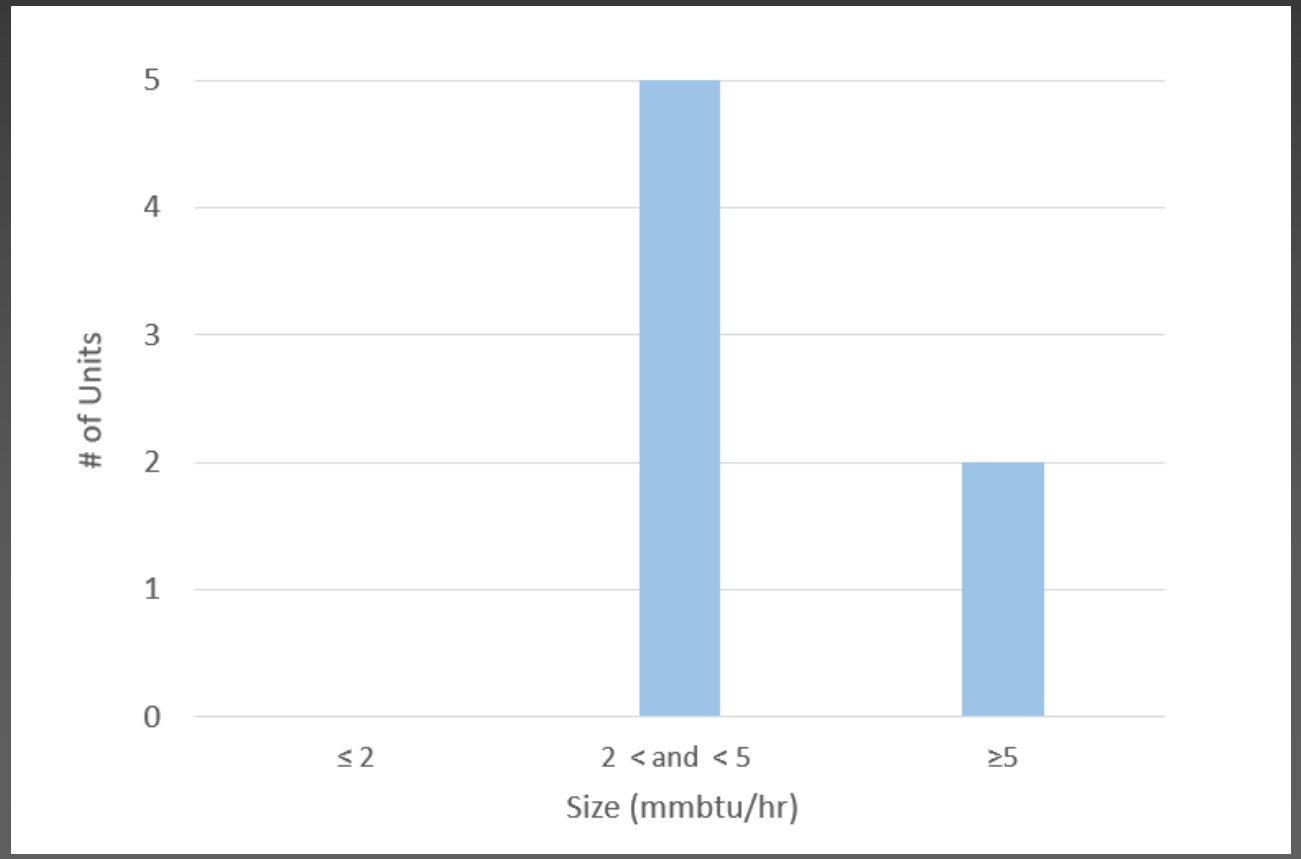
Digester Gas Boilers at POTWs

- 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



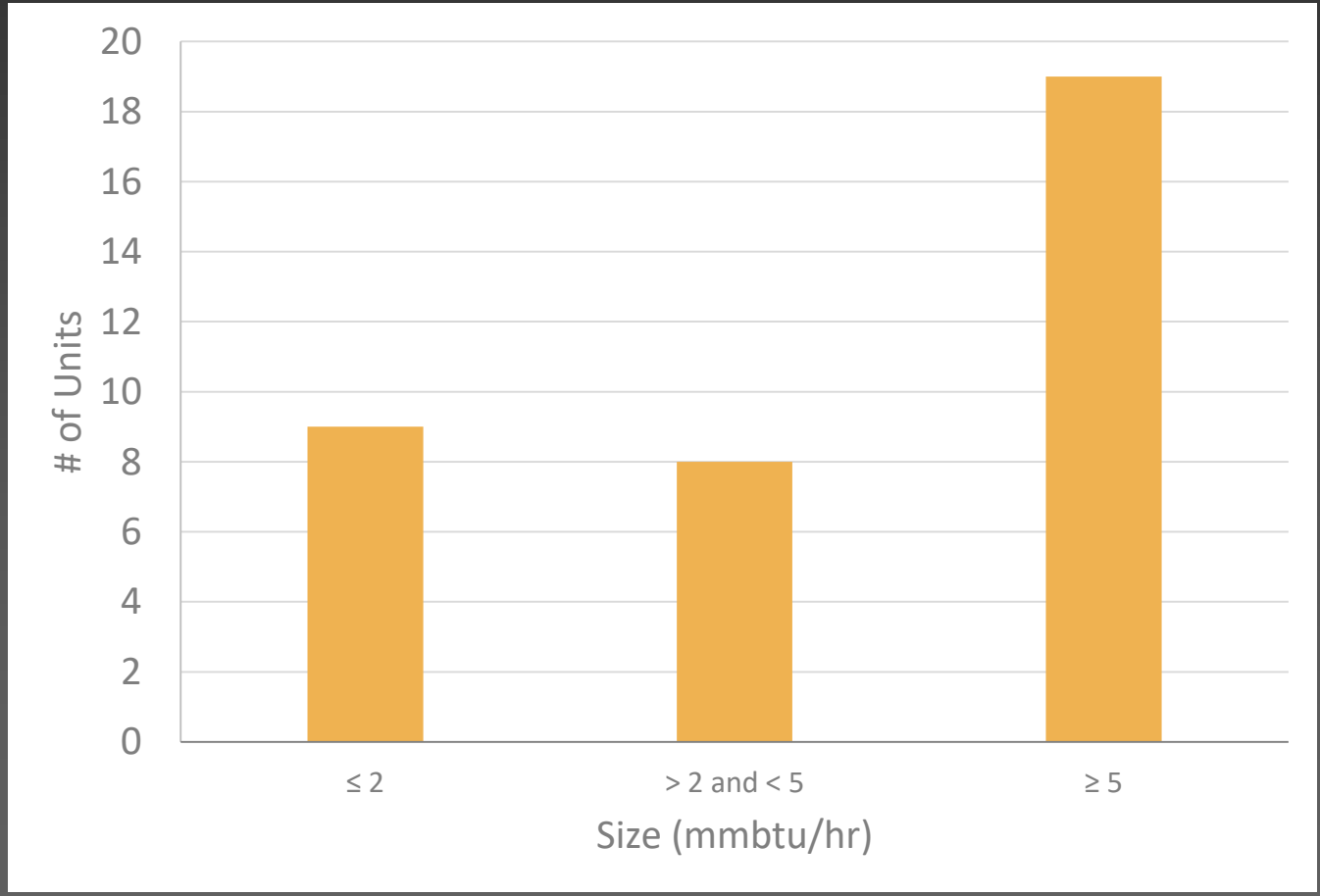
Natural Gas Boilers at POTWs

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



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



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

Engines

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

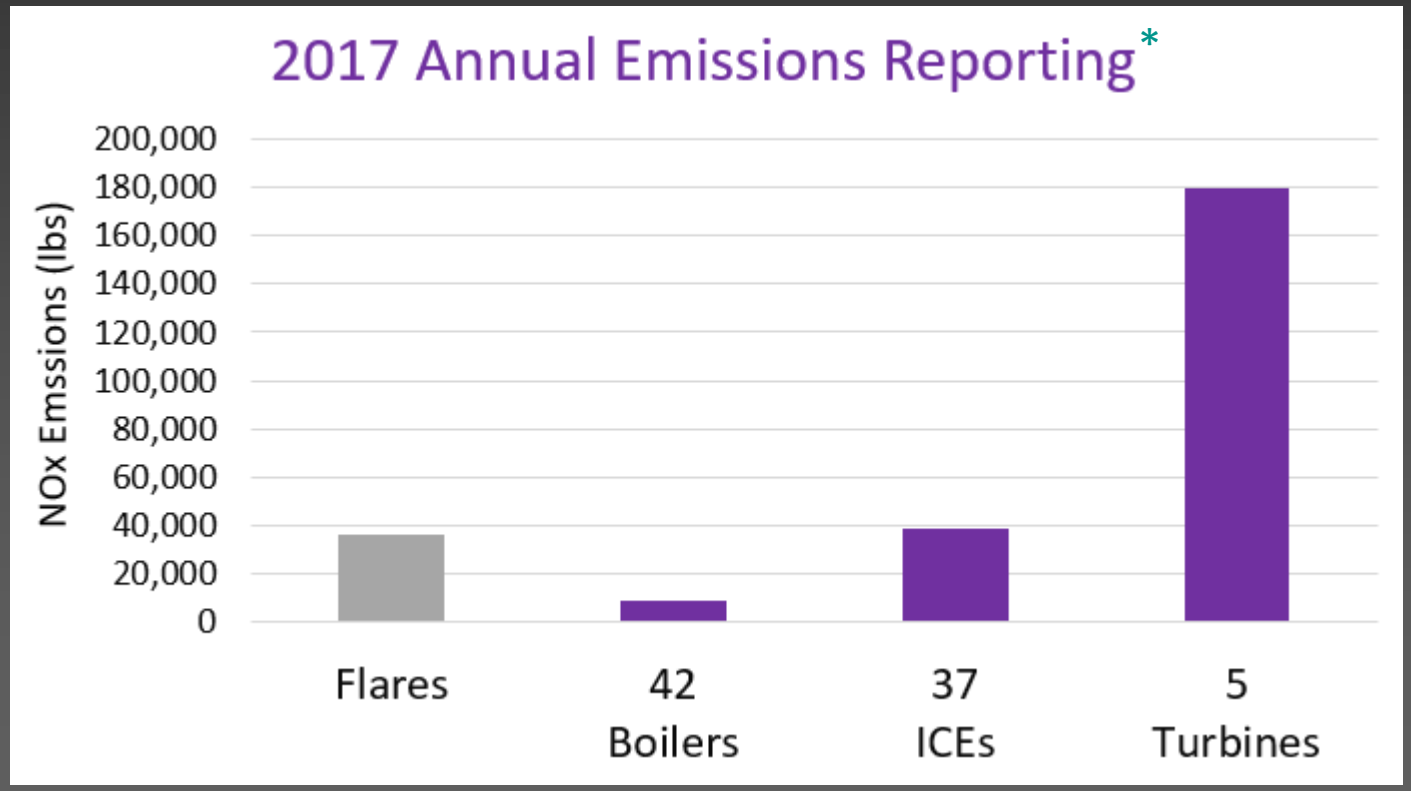
Fuel	Size (hp)	Units
Dual fuel Digester gas (primary) and Natural gas	50-500	2
	>500	18
Digester gas	>500	1
Natural gas	50-500	8
	>500	6
Dual Fuel Natural gas (primary) and LPG	50-500	3
	>500	5

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

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

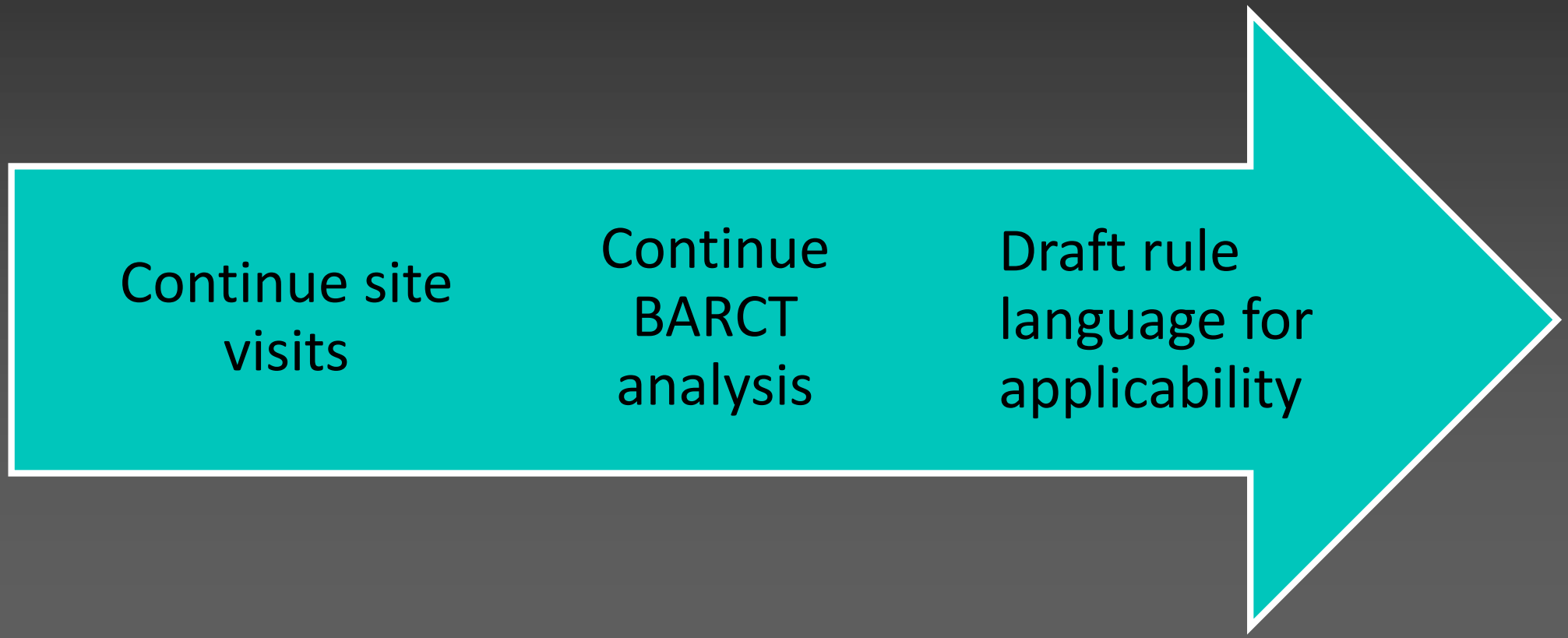


*5 facilities did not report emissions in 2017

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)

Next Steps


Continue site visits
Continue BARCT analysis
Draft rule language for applicability

Contacts

Melissa Gamoning
Assistant Air Quality Specialist
mgamoning@aqmd.gov
909-396-3115

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

Mike Morris
Planning and Rules Manager
mmorris@aqmd.gov
909-396-3282

To receive e-mail notifications for Rule 1179.1 - NOx Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities, sign up at:
www.aqmd.gov/sign-up