



Proposed Rule 1150.3

Emissions of Oxides of Nitrogen from Combustion Equipment at Landfills

Working Group #1

March 21, 2019

Agenda

- Rule Development Process
- Background
- Potential Equipment
- Applicability and Potential Universe
- BARCT Assessment Guiding Principles and Approach
 - *Identify Emissions Levels of Existing Units*
- Rule Schedule
- Contacts

Rule Development Process

Information Gathering



Initial Objective and Scope

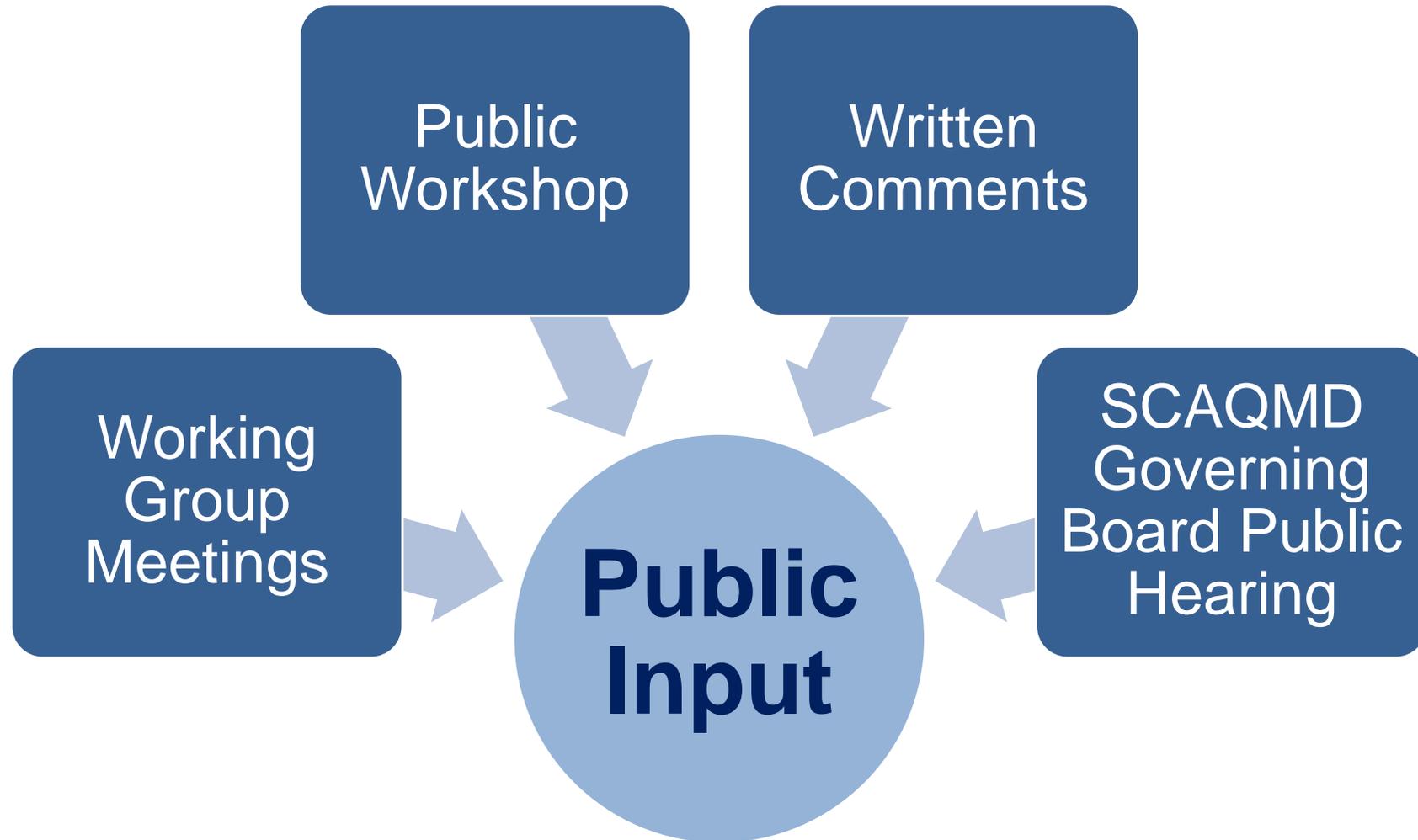


Develop Rule Concepts

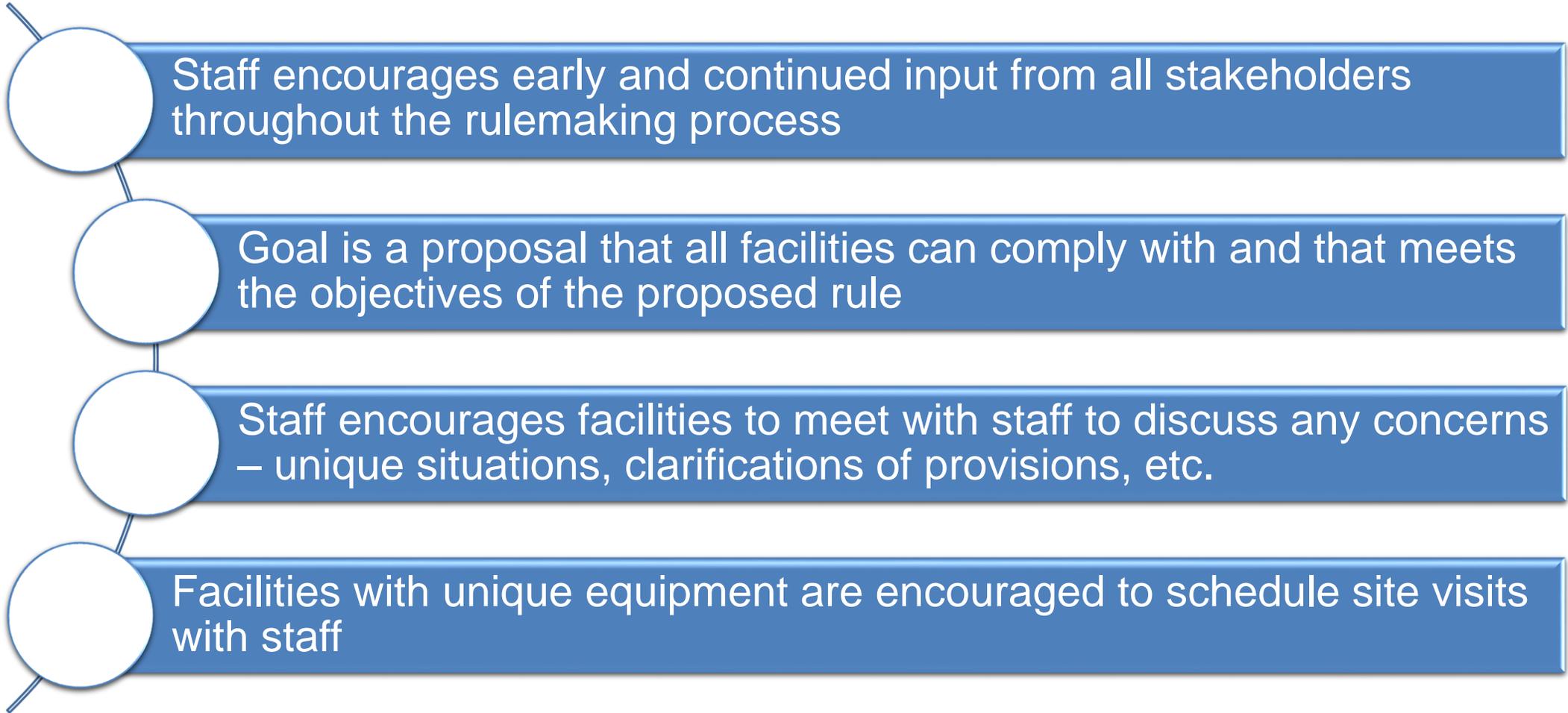


Draft Proposed Rule Language

Public Input



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, clarifications of provisions, etc.

Facilities with unique equipment are encouraged to schedule site visits with staff

Background

- Due to the 2016 AQMP and AB 617, SCAQMD is currently sunsetting the RECLAIM program and transitioning to a command-and-control regulatory structure
- For each RECLAIM landing rule being amended or adopted, a Best Available Retrofit Control (BARCT) analysis is conducted
- BARCT analyses showed that landfills have unique characteristics
- Therefore, SCAQMD proposed a separate rule for landfills

Unique Characteristics to Landfills

- Landfill Gas
 - Volume and quality changes over time
 - May contain contaminants, in particular siloxanes
- Financial Limitations
 - Landfills are essential public services that have structured procurements processes
 - Consideration of existing gas-to-energy contracts

Challenges with Landfill Gas

- Siloxanes
 - A type of organosilicon compound that exists in many cosmetic, personal and household products and is disposed of at landfills
 - Siloxane oxidation causes silicon dioxide forming a glass-like silicon deposit on equipment
 - Increases equipment maintenance
 - May cause significant damage if left unremoved
 - Can make catalyst-based post-combustion controls less effective

Potential Equipment



Combustion equipment that will be subject to rule:

- Turbines
 - Located at landfills (landfill gas and natural gas)
 - Utilizing landfill gas
- Boilers
 - Located at landfills utilizing landfill gas or natural gas



Combustion equipment under consideration:

- Non-emergency internal combustion engines
 - Considering keeping under Proposed Amended Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines



Combustion equipment not subject to rule:

- Flares (Rule 1118.1 – Control of Emissions from Non-refinery Flares)
- Miscellaneous combustion equipment (e.g. spray booth ovens, power washers, etc. – Rule 1147 – NOx Reductions from Miscellaneous Sources)
- Emergency engines (Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines)

Combustion Equipment Subject to PR 1150.3

- Turbines and boilers
 - Proposed Amended Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines
 - Excludes turbines located at landfills or utilizing landfill gas
- Rules 1146, 1146.1, and 1146.2
 - During December 2018 rule amendment, BARCT assessment was not conducted for boilers at landfills
 - Exclusion for boilers located at landfills if a new Regulation XI rule is adopted/amended after December 7, 2018

Combustion Equipment Under Consideration

- Non-emergency internal combustion engines
 - Rule 1110.2 currently is applicable to internal combustion engines over 50 brake horsepower
 - Landfill gas-fired engines operate similarly to lean-burn natural gas-fired engines with a higher level of exhaust oxygen
 - Currently, landfill gas-fired engines are subject to Rule 1110.2 and can meet existing limits

Applicability

- Approximately 11 landfills and landfill gas-to-energy facilities with 34 pieces of combustion equipment
 - 1 – Closed landfill (not accepting municipal solid waste)
 - 1 – Active landfill (accepting municipal solid waste)
 - 9 – Landfill gas-to-energy facilities
 - Located at a landfill or utilizes landfill gas to generate electricity
 - 3 piping in landfill gas from closed landfills
 - 6 piping in landfill gas from active landfills

Potential Universe

FID	NAME
18452	UNIVERSITY OF CALIFORNIA, LOS ANGELES
25070	LA CNTY SANITATION DISTRICT – PUENTE HILLS
42514	LA CNTY SANITATION DISTRICT - CALABASAS
104806	MM LOPEZ ENERGY LLC
113518	BREA PARENT
113873	MM WEST COVINA LLC
117297	MM PRIMA DESHECHA ENERGY LLC
139938	SUNSHINE GAS PRODUCERS LLC
140373	AMERESCO CHIQUITA ENERGY LLC
140846	J&A – WHITTIER LLC
157152	BOWERMAN POWER LFG LLC

Potential Universe

11 Facilities

3

Boilers

16

Turbines

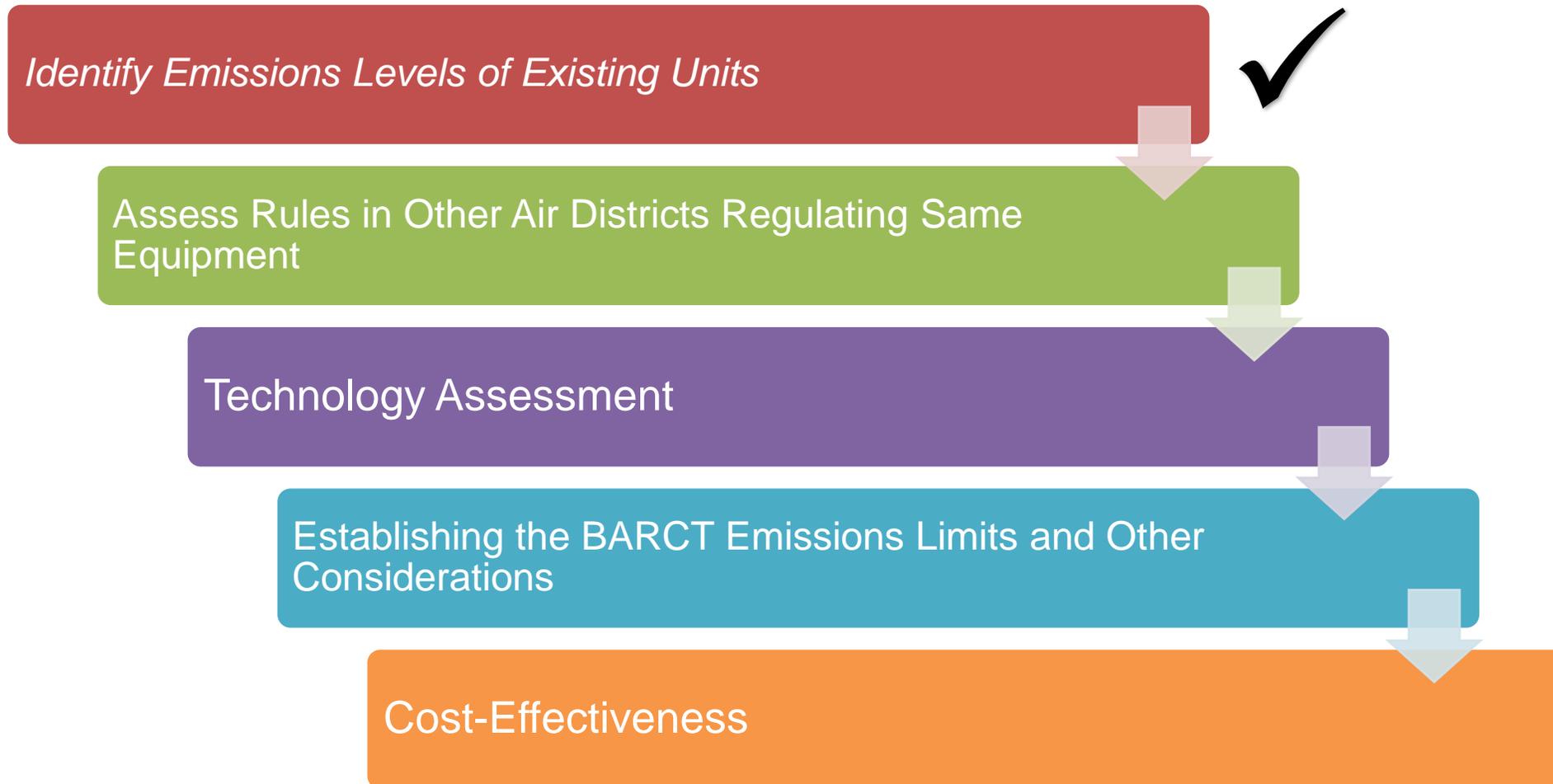
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Engines

BARCT Assessment Guiding Principles

- BARCT analysis includes a technology assessment
 - Equipment-specific
 - Fuel-specific
 - Size-specific
- Cost-effectiveness will consider
 - Incremental cost-effectiveness
 - Stranded assets
 - Outliers

BARCT Analysis Approach for PR 1150.3



Updated

Existing Permit Emissions Limits Boilers

Size (MMBtu/hr)	Fuel Usage (mmscf)	2017 Actual Emissions (lbs)	Output (MW)	Control	NOx Limit (ppm)	NH3 Limit (ppm)	Fuel Type
115	2,708	17,980	7.1	Flue gas recirculation	21	Not applicable	Landfill gas
335	8,924	85,411	25	Flue gas recirculation	24	Not applicable	Landfill gas
335	Not available	Not available	25	Flue gas recirculation	24	Not applicable	Landfill gas

Updated

Existing Permit Emissions Limits Simple Cycle Turbines

Size (MMBtu/hr)	Fuel Usage (mmscf)	2017 Actual Emissions (lbs)	Output (MW)	Turbine Type	Control	NOx Limit (ppm)	NH3 Limit (ppm)	Fuel Type
51	2,027	10,684	4.6	Simple	Lean mix	18.75	Not available	Landfill Gas– Natural Gas
51	Not available	Not available	4.6	Simple	Lean mix	18.75	Not available	Landfill Gas– Natural Gas
51	Not available	Not available	4.6	Simple	Lean mix	18.75	Not available	Landfill Gas– Natural Gas
53	654	7,399	4.6	Simple	Lean mix	18.75	Not available	Landfill Gas
53	622	8,341	4.6	Simple	Lean mix	18.75	Not available	Landfill Gas
61	780	7,094	4.9	Simple	Lean mix	12.5	Not available	Landfill Gas
61	742	6,722	4.9	Simple	Lean mix	12.5	Not available	Landfill Gas
61	742	5,929	4.9	Simple	Lean mix	12.5	Not available	Landfill Gas
61	754	6,598	4.9	Simple	Lean mix	12.5	Not available	Landfill Gas
61	737	6,690	4.9	Simple	Lean mix	12.5	Not available	Landfill Gas

Updated

Existing Permit Emissions Limits Combined Cycle Turbines

Size (MMBtu/hr)	Fuel Usage (mmscf)	2017 Actual Emissions (lbs)	Output (MW)	Turbine Type	Control	NOx Limit (ppm)	NH3 Limit (ppm)	Fuel Type
72	1,118	52,881	6.3	Combined	Selective catalytic reduction	25	5	Landfill Gas
72	1,097	52,652	6.3	Combined	Selective catalytic reduction	25	5	Landfill Gas
72	1,132	54,245	6.3	Combined	Selective catalytic reduction	25	5	Landfill Gas
72	1,128	53,945	6.3	Combined	Selective catalytic reduction	25	5	Landfill Gas
140	1,898	15,484	14.4	Combined	Selective catalytic reduction/ Water injection	6	20	Landfill Gas– Natural Gas
140	1,856	16,164	14.4	Combined	Selective catalytic reduction/ Water injection	6	20	Landfill Gas– Natural Gas

Updated

Existing Permit Emissions Limits Landfill Gas Non-Emergency Engines

Size (BHP)	Fuel Usage (mmscf)	2017 Actual Emissions (lbs)	Output (MW)	Control	NOx Limit (ppm)	NH3 Limit (ppm)	Fuel Type
1468	Not available	Not available	1.06	Not available	11	10	Landfill Gas
1966	Not available	Not available	1.426	Not available	11	10	Landfill Gas
4235	443	25,920	3.05	Selective catalytic reduction and catalytic oxidizer	11	10	Landfill Gas
4650	375	14,249	3.37	Selective catalytic reduction and catalytic oxidizer	11	5	Landfill Gas
4650	367	7,275	3.37	Selective catalytic reduction and catalytic oxidizer	11	5	Landfill Gas
4650	345	12,177	3.37	Selective catalytic reduction and catalytic oxidizer	11	5	Landfill Gas
4650	371	13,926	3.37	Selective catalytic reduction and catalytic oxidizer	11	5	Landfill Gas
4650	371	5,392	3.37	Selective catalytic reduction and catalytic oxidizer	11	5	Landfill Gas
4650	376	13,087	3.37	Selective catalytic reduction and catalytic oxidizer	11	5	Landfill Gas
4650	345	10,651	3.37	Selective catalytic reduction and catalytic oxidizer	11	5	Landfill Gas

Updated

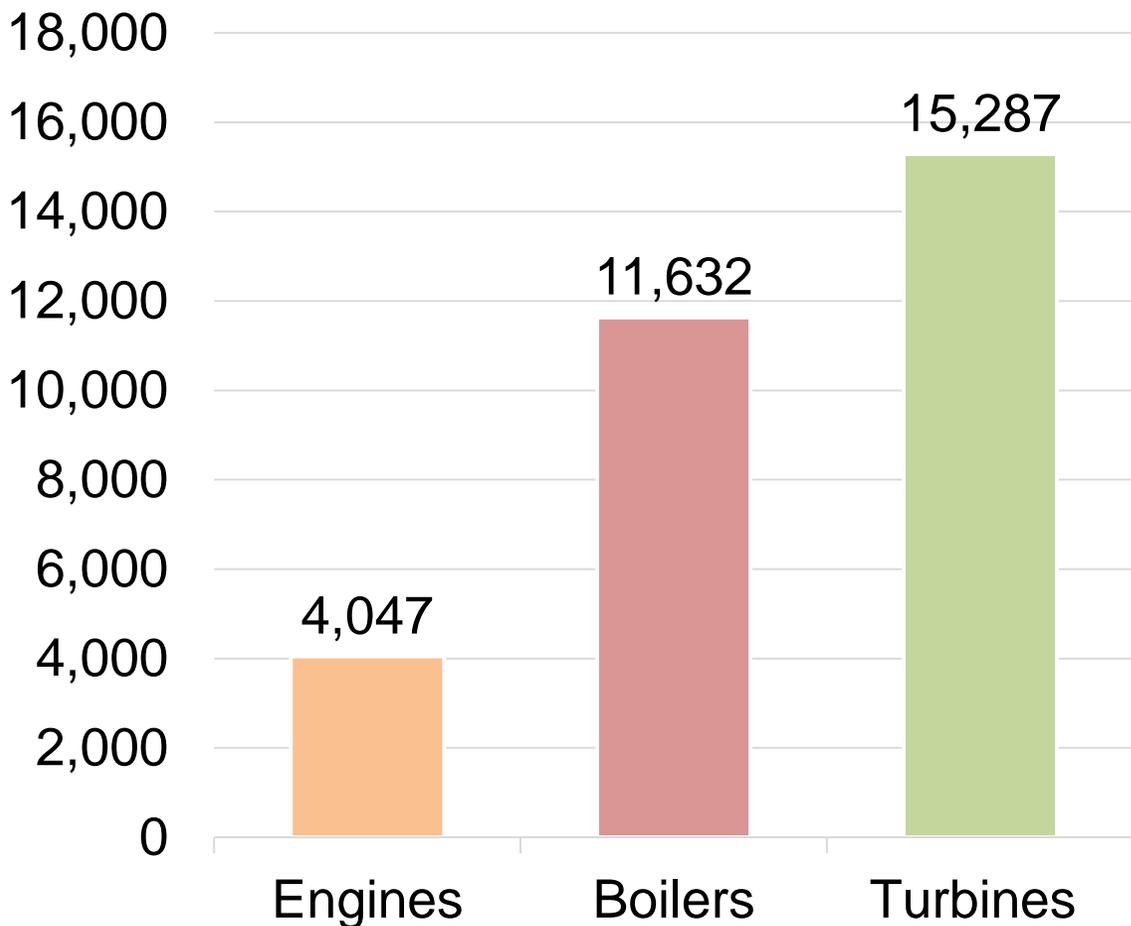
Existing Permit Emissions Limits Landfill Gas Non-Emergency Engines (not subject to Table III-B in Rule 1110.2)

Size (BHP)	Fuel Usage (mmscf)	2017 Actual Emissions (lbs)	Output (MW)	Control	NOx Limit (ppm)	NH3 Limit (ppm)	Fuel Type
2650	0	0	1.875	Catalytic oxidizer	50.8	Not applicable	Landfill Gas
2650	0	0	1.875	Catalytic oxidizer	50.8	Not applicable	Landfill Gas
2650	0	0	1.875	Catalytic oxidizer	50.8	Not applicable	Landfill Gas
4235	529	29,244	3.05	Not available	46	Not applicable	Landfill Gas
4235	525	34,448	3.05	Not available	46	Not applicable	Landfill Gas

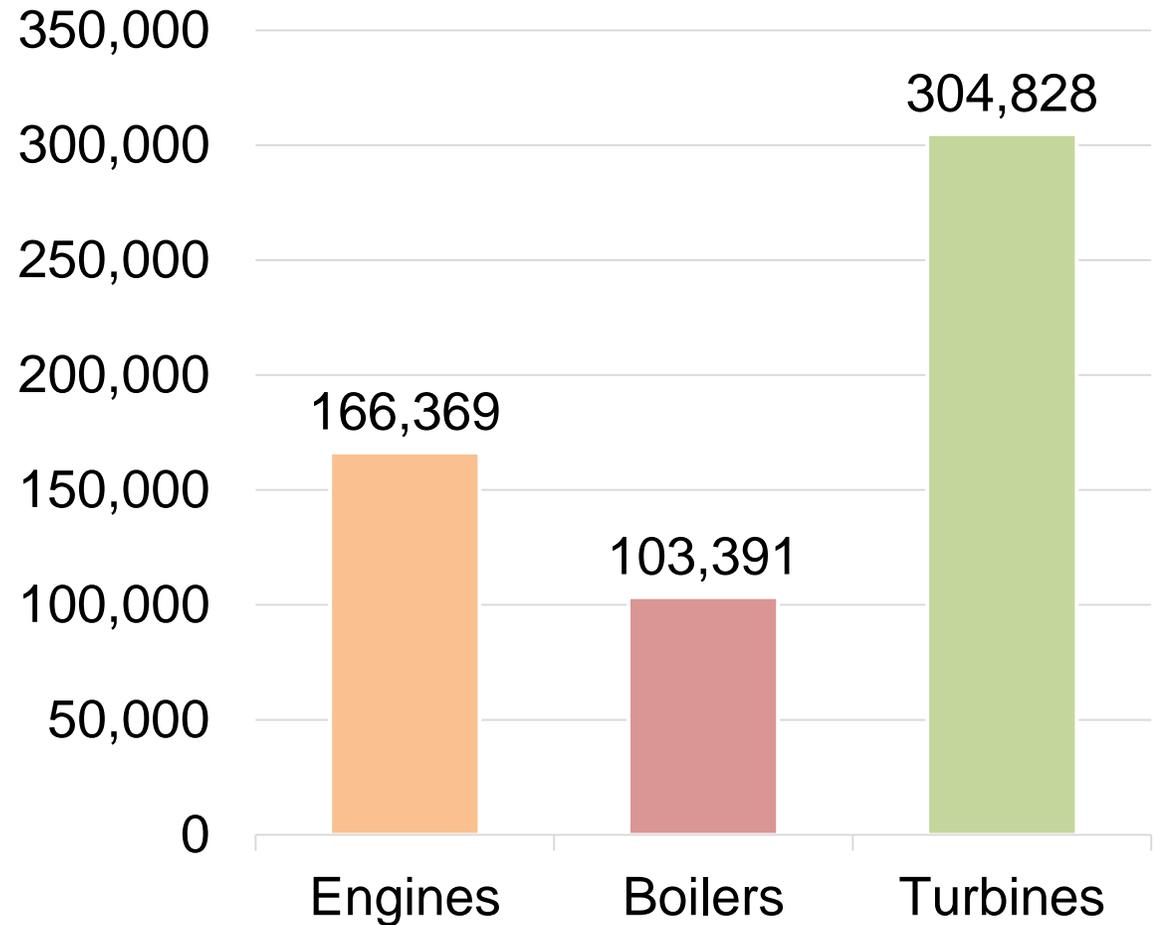
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2017 Annual Emissions Reporting Data

Fuel Usage (mmscf)



Actual NOx Emissions (lbs)



Rule Schedule

Site Visits	Ongoing
Next Working Group Meeting	April 2019
Public Workshop	October 2019
Set Hearing	November 6, 2019
Public Hearing	December 6, 2019

Contacts

PR 1150.3 Development Questions

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