



PROPOSED AMENDED RULE 1135

Emissions of Oxides of Nitrogen from Electric Power Generating Systems

Working Group Meeting #1
January 24, 2018

Background

■ 2016 Air Quality Management Plan

- *Control Measure CMB-05 called for further NOx reductions from an assessment of the RECLAIM program, including:*
 - A 5 ton per day NOx reduction to be achieved no later than 2025; and
 - Sunsetting the RECLAIM program and transitioning to a command-and-control regulatory structure that requires Best Available Retrofit Control Technology (BARCT) level controls

■ 2017 – AB 617

- *Expedited BARCT schedule for largest emitters*
- *Implementation schedule to be developed by 1/1/2019*
- *Full BARCT implementation by 12/31/2023*

Regulatory Background for EGFs

- 1989 – Adoption of Rule 1135
 - *Applicable to electric power generating systems*
- 1993 – Adoption of RECLAIM
 - *Most Electricity Generating Facilities (EGFs) entered into RECLAIM*
- 2001 – Adoption of Rule 2009 – Compliance Plan for Power Producing Facilities
 - *Required installation of Best Available Retrofit Control Technology (BARCT) through compliance plans*

Rule 2009

- Adopted in 2001 in response to California energy issues and required RECLAIM EGFs to install pollution controls to help stabilize RTC prices
- Key Requirement
 - *Submittal of a compliance plan demonstrating that all RECLAIM NOx emitting equipment (excluding Rule 219 equipment) achieve BARCT emission levels*
- A case-by-case technical and cost-effectiveness evaluation was performed for to determine BARCT
 - *Permit information shows that BARCT for the majority of equipment under Rule 2009 ranges from 5 to 9 ppm*
 - The weighted average for all utility boilers, including those higher than 9 ppm, after the Rule 2009 retrofits is 7 ppm
 - 7 ppm was selected to represent the average emission rate for the entire source category in calculating RECLAIM annual emissions
- Overall Result
 - *EGFs in RECLAIM have installed BARCT controls, committed to repower or retire equipment, or replaced equipment with more efficient equipment*
 - *Some units were not able to attain 7 ppm due to space constraints for SCR installations*
 - Units which could not cost effectively control to a low ppm concentration were given permit limits at a higher concentration

Electricity Generating Facilities

■ Currently, 29 RECLAIM EGFs

FID	NAME
4477	SO CAL EDISON CO
14502	CITY OF VERNON, VERNON GAS & ELECTRIC
25638	BURBANK CITY, BURBANK WATER & POWER
56940	CITY OF ANAHEIM/COMB TURBINE GEN STATION
115314	LONG BEACH GENERATION, LLC
115315	NRG CALIFORNIA SOUTH LP, ETIWANDA GEN ST
115389	AES HUNTINGTON BEACH, LLC
115394	AES ALAMITOS, LLC
115536	AES REDONDO BEACH, LLC
115663	EL SEGUNDO POWER, LLC
127299	WILDFLOWER ENERGY LP/INDIGO GEN., LLC
128243	BURBANK CITY,BURBANK WATER & POWER,SCPPA
129810	CITY OF RIVERSIDE PUBLIC UTILITIES DEPT
129816	INLAND EMPIRE ENERGY CENTER, LLC
139796	CITY OF RIVERSIDE PUBLIC UTILITIES DEPT

FID	NAME
146536	WALNUT CREEK ENERGY, LLC
152707	SENTINEL ENERGY CENTER LLC
153992	CANYON POWER PLANT
155474	BICENT (CALIFORNIA) MALBURG LLC
160437	SOUTHERN CALIFORNIA EDISON
164204	CITY OF RIVERSIDE, PUBLIC UTILITIES DEPT
172077	CITY OF COLTON
182561	COLTON POWER, LP
182563	COLTON POWER, LP
800074	LA CITY, DWP HAYNES GENERATING STATION
800075	LA CITY, DWP SCATTERGOOD GENERATING STN
800168	PASADENA CITY, DWP
800170	LA CITY, DWP HARBOR GENERATING STATION
800193	LA CITY, DWP VALLEY GENERATING STATION

Electricity Generating Facilities (*continued*)

- Currently, 1 EGF that did not opt into RECLAIM and is subject to Rule 1135

FID	NAME
800327	GLENDALE CITY, GLENDALE WATER & POWER

- Currently, 4 smaller EGFs, outside of RECLAIM
 - *Excludes co-generating facilities*

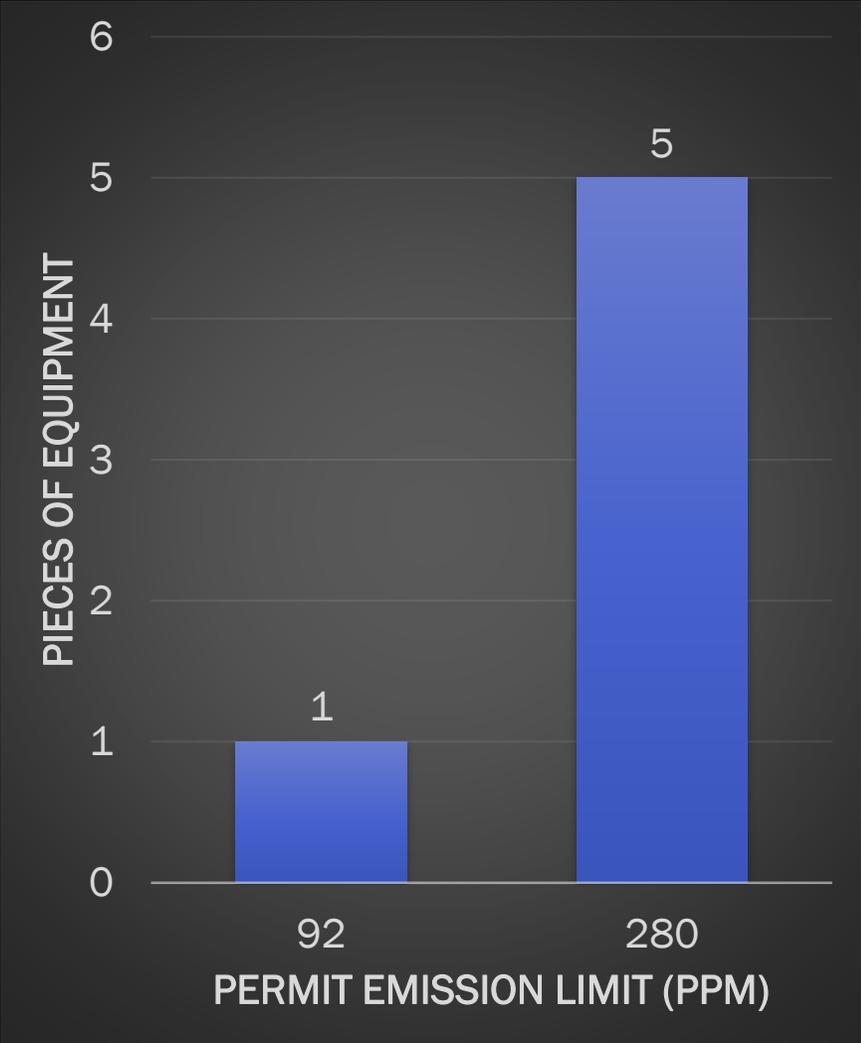
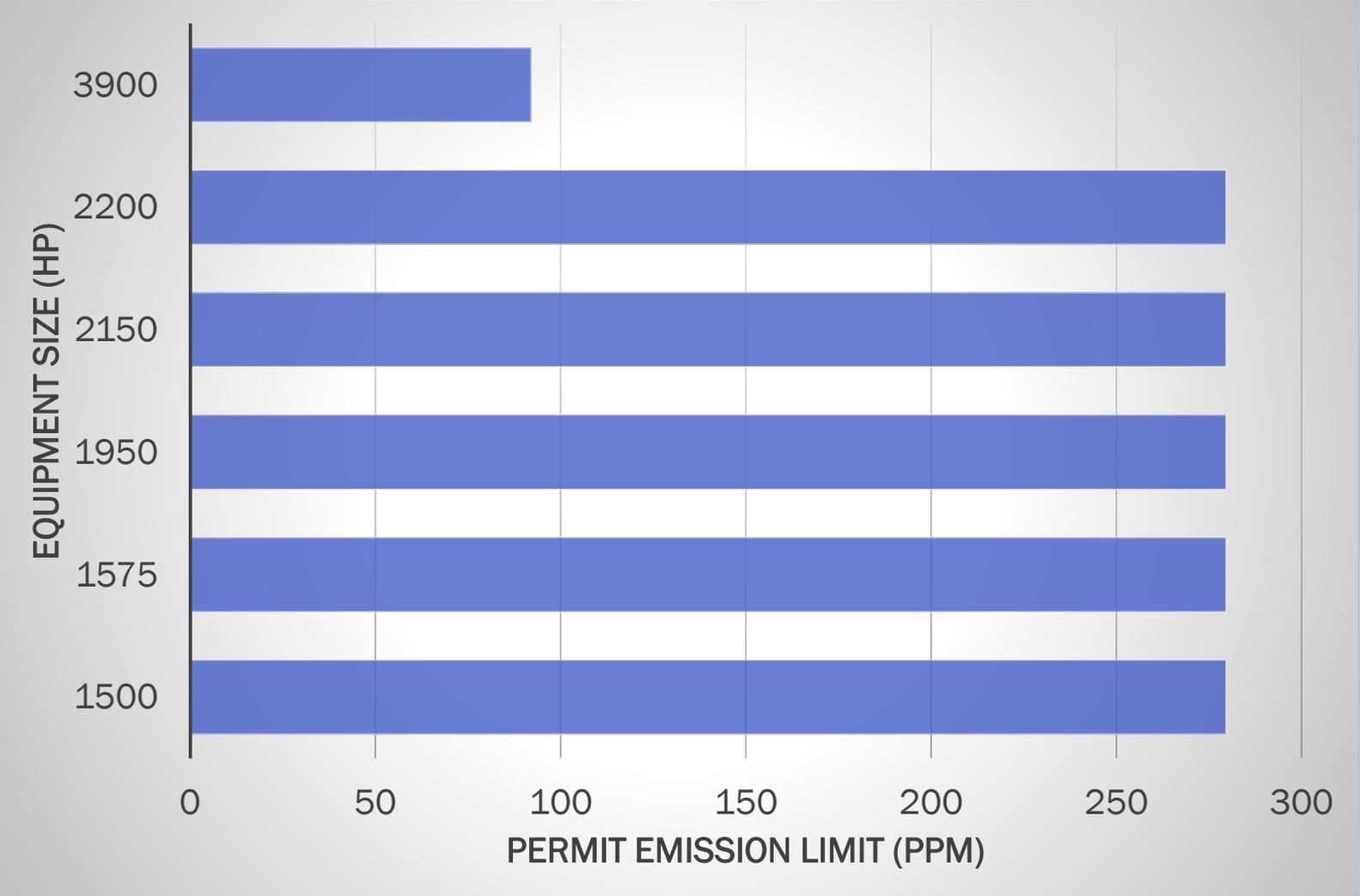
FID	NAME
149620	SOUTHERN CALIFORNIA EDISON, RANCHO CUCAMONGA
51003	SOUTHERN CALIFORNIA EDISON, ONTARIO
17104	SOUTHERN CALIFORNIA EDISON, NORWALK
51475	SOUTHERN CALIFORNIA EDISON, STANTON

Equipment at EGFs

- Approximately 150 pieces of equipment
 - 6 *non-emergency internal combustion engines*
 - 1 facility
 - 27 *boilers*
 - 10 facilities
 - 119 *turbines/duct burners*
 - 32 facilities



Non-Emergency Internal Combustion Engines

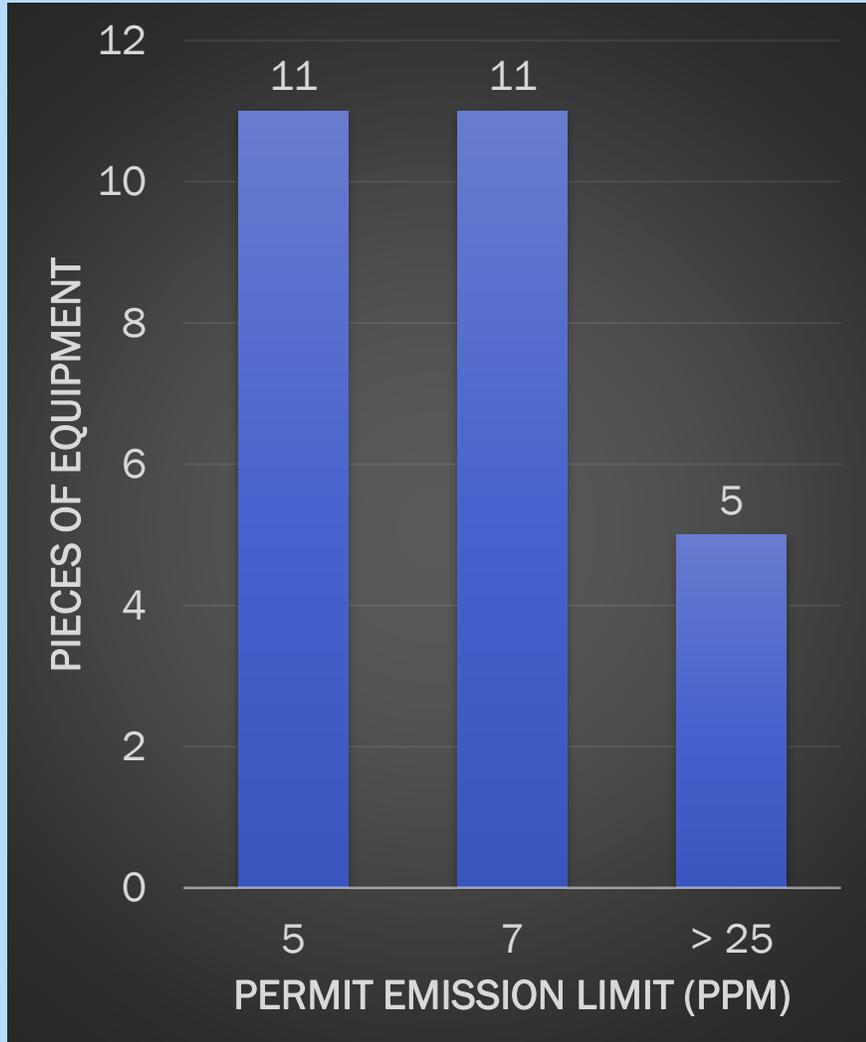
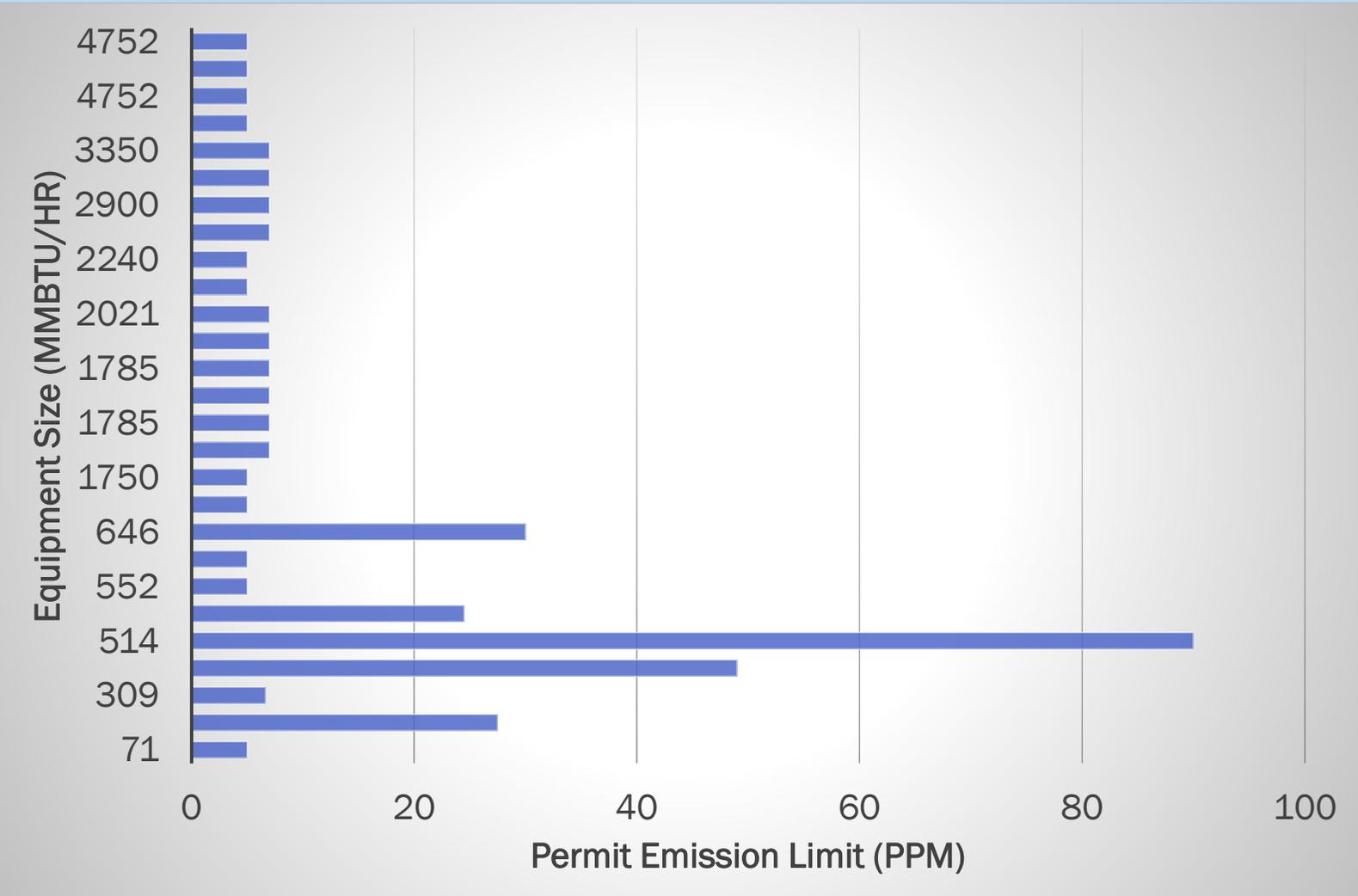




Non-Emergency Internal Combustion Engines

- 6 diesel units
 - *Sizes: 1,500 – 3,900 HP*
 - *NOx Permit Emission Limits: 2.13 – 6.5 LBS/NET MWH (~92 – 280 ppm)*

Utility Boilers

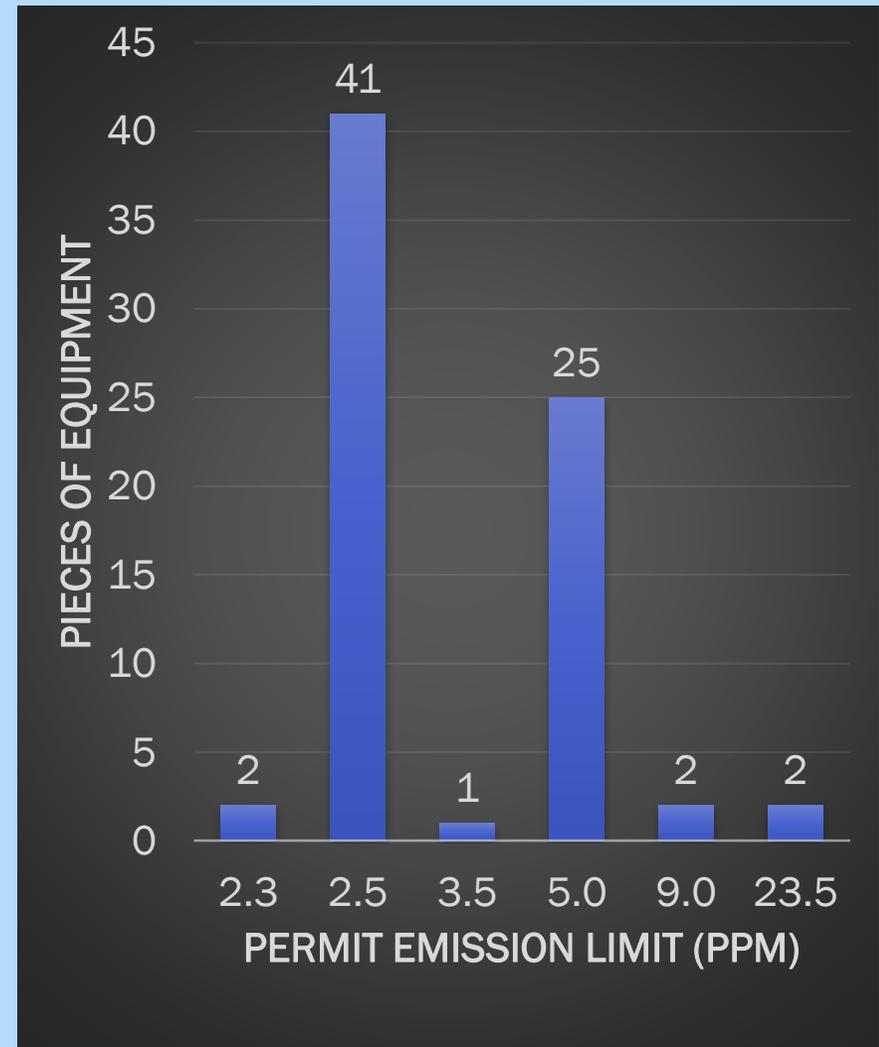
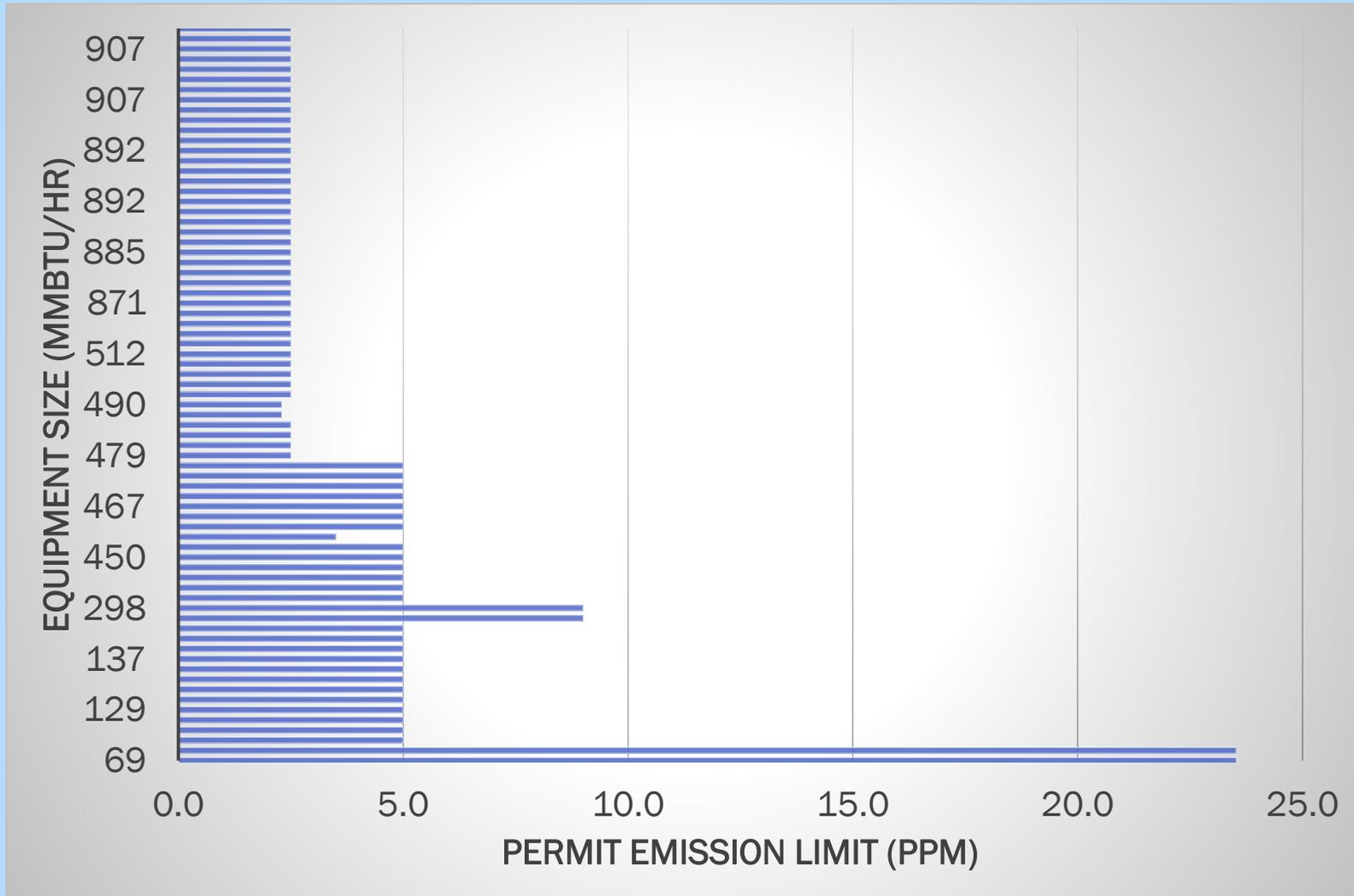




Boilers

- 27 units
 - 24 *natural gas fired*
 - 3 *landfill gas fired*
- Sizes: 70 – 4753 MMBtu/HR
- NOx Permit Emission Limits: 5 – 90 ppm
- Outliers
 - 3 *landfill gas fired units*
 - 527 MMBtu/HR boiler with 25 PPM emission limit
 - 260 MMBtu/HR boiler with 28 PPM emission limit
 - 492 MMBtu/HR boiler with 49 PPM emission limit
 - 646 MMBtu/HR boiler with 30 PPM emission limit
 - De-commissioned
 - 514 MMBtu/HR boiler with 90 PPM emission limit
 - Limited to 600 hours of operation per year

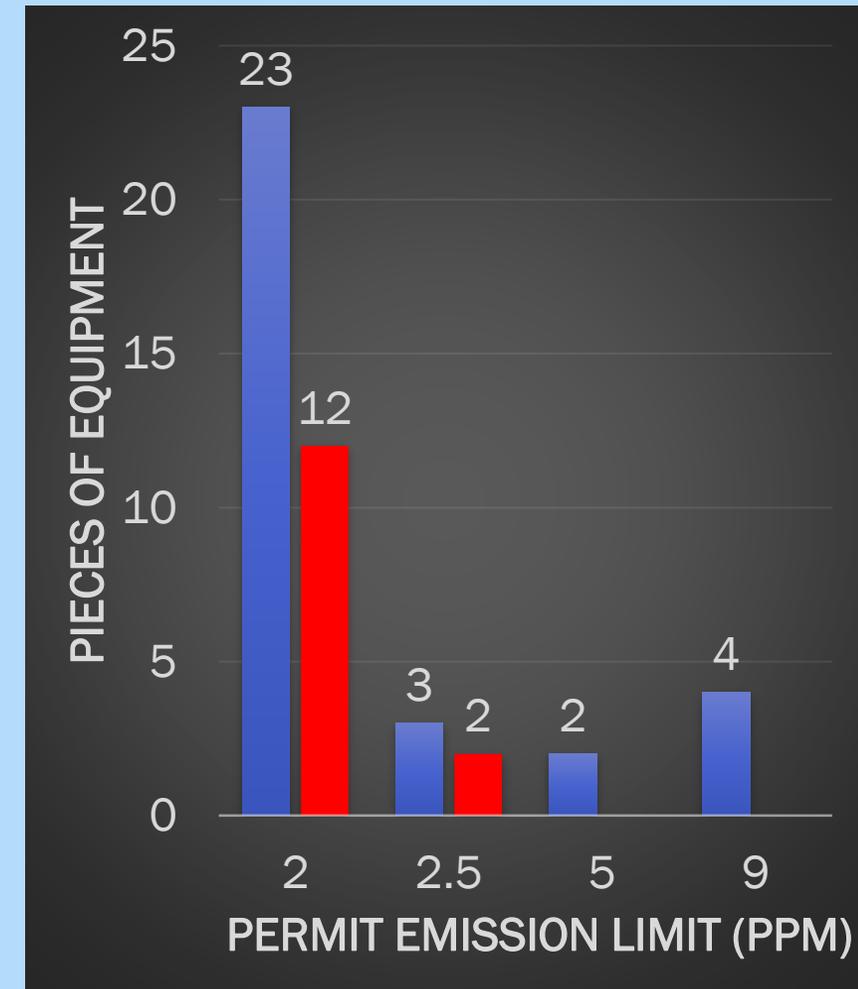
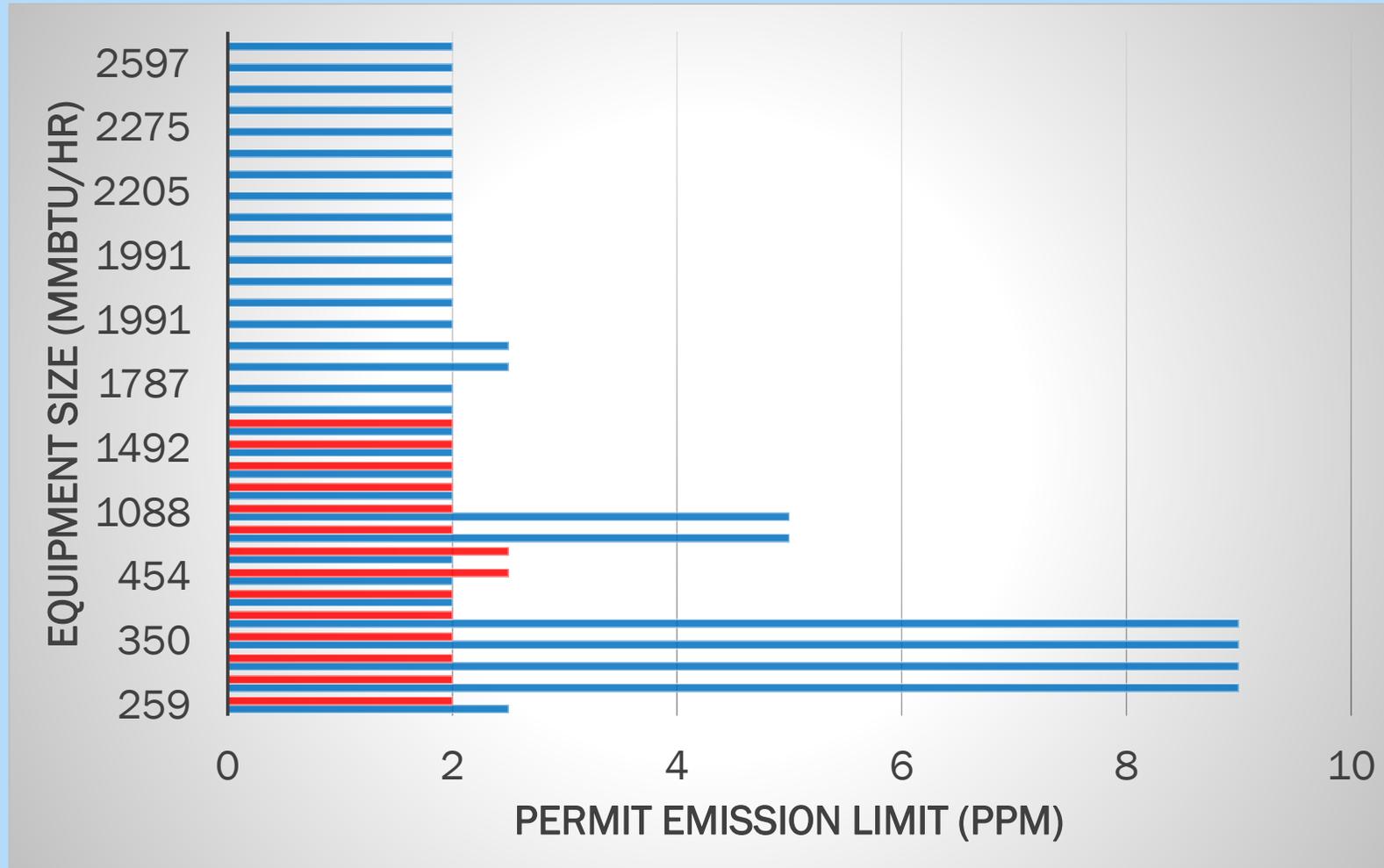
Simple Cycle Gas Turbines



Simple Cycle Gas Turbines

- 73 units
- Sizes: 69 – 959 MMBtu/HR
- NOx Permit Emission Limits: 2.3 – 24 ppm
- 2 outliers
 - *2 units – 69.12 MMBtu/HR with 24 PPM emission limit, permitted in 1990, low use*

EGF Combined Cycle Gas Turbines/Duct Burners



■ Combined Cycle Turbines ■ Duct Burners

Combined Cycle Gas Turbines/Duct Burners

- 46 units
 - *32 combined cycle gas turbines*
 - *14 combined with duct burners*
- Sizes: 81 – 2597 MMBtu/HR
- NOx Permit Emission Limits: 2 – 9 ppm
- 4 outliers
 - *1 unit – 442 MMBtu/HR with 9 PPM emission limit, 15 minute rolling average*
 - *3 units – 335 MMBtu/HR with 9 PPM emission limit, Rule 1134 emission limit*

BARCT for Non-Emergency Internal Combustion Engines

- Existing Rule 1110.2 Limits (2011)
 - *New Non-Emergency Electrical Generators*
 - 0.07 LBS/NET MWH, 15 minute average (~3 ppm at 15% O₂)
 - *Existing Non-Emergency Electrical Generators*
 - 11 ppm @ 15% O₂, 15 minute average
- Currently, no EGF units meet these limits
 - *Permit emission limits range from ~92 – 280 ppm*

BARCT for Boilers

- 2005 BARCT Limit
 - *7 PPM at 3% O₂*
 - *92% at 2005 BARCT limit*
- 2005 Rule 2009 Compliance Plans
 - *46% at 5 PPM at 3% O₂*
- 2015 BARCT Requirement for Refineries
 - *2 ppm at 3% O₂*
 - *Currently, no EGF units meet this limit*

Regulatory Limits for Simple Cycle Gas Turbines

- 2004 SCAQMD LAER (major sources)
 - *3.5 ppm @ 15% O₂, 3-hour rolling average*
- 2016 BACT Guidelines Part D (minor source)
 - *Gas Turbines, Natural Gas Fired, ≥ 3 MWe and < 50 MWe*
 - *[2.5 ppm @ 15% O₂] x [efficiency (%)/34%]*
 - *Gas Turbines, Natural Gas Fired, ≥ 50 MWe*
 - *2.5 ppm @ 15% O₂, 1-hour rolling avg; OR*
 - *[2.0 ppm @ 15 % O₂, 3-hour rolling avg.] x [efficiency (%)/34%]*
- Current EGF Units
 - *2 units at 2.3 ppm @ 15% O₂*
 - *57% at 2.5 ppm @ 15% O₂*

Regulatory Limits for Combined Cycle Gas Turbines/Duct Burners

Year	Regulation			Limit
2003	Federal LAER		Combined Cycle Gas Turbine	1.5 ppm @ 15% O ₂ (can be up to 2.0 up for to 10% of operation, based on 12-mo. rolling avg.)
2004	SCAQMD LAER	(major sources)	Combined Cycle Gas Turbine	2.0 ppm @ 15% O ₂ , 1-hour rolling average
2015	BARCT Limit	SCAQMD Rule 2002	Non-EGF Turbine	2 ppm
2016	BACT Guidelines	Part D (minor source)	Gas Turbines, Natural Gas Fired ≥ 3 MWe and < 50 MWe	[2.5 ppm @ 15% O ₂] x [efficiency (%) / 34%]
2016	BACT Guidelines	Part D (minor source)	Gas Turbines, Natural Gas Fired ≥ 50 MWe	2.5 ppm @ 15% O ₂ , 1-hour rolling avg; OR [2.0 ppm @ 15 % O ₂ , 3-hour rolling avg.] x [efficiency (%) / 34%]

- Currently, 76% EGF units at 2.0 ppm

Initial Concepts – NO_x Limits

■ Establish New NO_x Limits

– *Units*

- Existing 1135: lbs/net MWH and lb/day
- PAR 1135: ppm

– *Varying limits and averaging times, dependent on:*

- Size (power output in MW)
- Simple or combined cycle unit



Initial Concepts – NO_x Limit Recommendations

■ Non-Emergency Internal Combustion Engines

- *Current Rule 1110.2 Limits (2011)*
 - New Non-Emergency Electrical Generators: 0.07 LBS/NET MWH (~3 ppm at 15% O₂)
 - Existing Non-Emergency Electrical Generators: 11 ppm @ 15% O₂
- *PAR 1135 Recommendation*
 - Existing Units: 11 ppm @ 15% O₂

■ Utility Boilers

- *2015 BARCT Requirement for Refineries: 2 ppm at 3% O₂*
- *PAR 1135 Recommendation*
 - 2 ppm at 3% O₂

■ Gas Turbines

- *2015 BARCT Requirement for non-EGFs: 2 ppm at 15% O₂*
- *PAR 1135 Recommendation*
 - Simple Cycle Gas Turbines: 2.5 ppm at 15% O₂
 - Combined Cycle Gas Turbines and Duct Burners: 2 ppm at 15% O₂

Initial Concepts – Implementation Timeline

- NOx to newly established BARCT limits
 - *X% of equipment each year*
 - *(i.e. 25% in 2020, 50% in 2021, 75% by 2022, 100% by 2023)*
- Consideration for once through cooling facility repowering schedules



Monitoring, Reporting, and Recordkeeping (MRR)

Requirement	Current Rule 1135	RECLAIM
Continuous Emission Monitoring System (CEMS) Plan	✓	✓
CEMS and Remote Terminal Unit (RTU)	<ul style="list-style-type: none"> - CEMS data gathered once per minute (90% valid data) - Missing data procedures for up to 72 hours in any one calendar month - Each RTU requires a backup data gathering and storage system 	<ul style="list-style-type: none"> - CEMS data gathered once every 15 minutes - Missing data procedures required for each invalid hour - Requires RTU and strip chart recorder or electronic recorder
Relative Accuracy Requirements	<ul style="list-style-type: none"> - Volumetric flow measurement system, <20% - Emission rate measurement, <20% - Accuracy Test Audit (RATA), once a quarter 	<ul style="list-style-type: none"> - Volumetric flow measurement system, <15% - Emission rate measurement, <20% - Nitrogen oxide gas analyzer, <20%
Source Tests	None	Annual or semi-annual certification of Relative Accuracy Test Audits (RATA) including source testing
Reporting	<ul style="list-style-type: none"> - RTU constitutes reporting requirements 	<ul style="list-style-type: none"> - Monthly Emissions Reports - Annual Permit Emissions Program (APEP) - RTU to electronically report daily mass emissions of NOx and status codes

Initial Concepts – MRR

- Option 1: Facilities maintain their current MRR approach until adoption of Proposed Rule 113 – Monitoring, Reporting, and Recordkeeping (MRR) Requirements for NO_x and SO_x Sources
 - *RECLAIM MRR approach for RECLAIM EGFs*
 - *Rule 1135 MRR approach for Rule 1135 facility*
 - *Facility permit MRR approach for others*
- Option 2: PAR 1135 has interim MRR requirements until adoption of Proposed Rule 113

Potential Issues

- Achieving equivalency outside of RECLAIM
- Specialty equipment (engines at Catalina)
- Equipment needed for peak power generation
 - *Emission limits during startup and shutdowns*
- Equipment needed in emergencies

Schedule

Additional Working Groups	TBD
Public Workshop	3 rd Quarter 2018
Stationary Source Committee	September 21, 2018
Set Hearing	October 5, 2018
Public Hearing	November 2, 2018

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