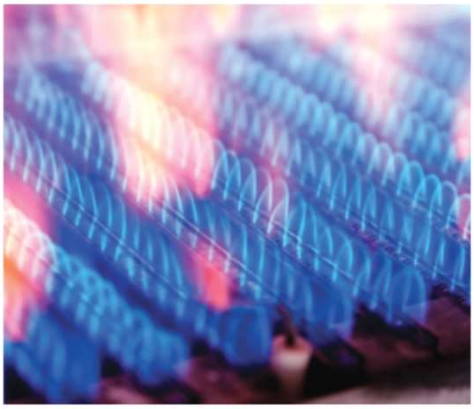
PROPOSED AMENDED RULES 1147 AND 1100 WORKING GROUP MEETING #10

09/08/2021
SOUTH COAST AQMD
DIAMOND BAR, CA

Zoom Meeting:	https://scaqmd.zoom.us/j/92645748612
Webinar ID:	**926 4574 8612**
Conference Call:	**(669) 900-6833**

AGENDA

- Summary of Previous Working Group
- Stakeholder Comments
- Status of BARCT Assessment
- Update to BARCT Assessment
  - Other (Singeing Machines)
- Technology and Cost-Effectiveness Assessment of Tunnel Dryers
- Next Steps



2

PREVIOUS WORKING GROUP RECAP

Working Group #9

- Provided updates on progress of BARCT assessment for remaining categories
  - Introduced tunnel dryers as a new equipment category in PAR 1147
- Presented results of cost-effective analysis for Autoclaves and provided staff recommendation of 30 ppm
- Introduced interim emission limit of 102 ppm NOx for facilities designated as Former RECLAIM facilities that are not at BARCT

3

STAKEHOLDER COMMENTS

Comment:

- Autoclave burners operate most of the time during the initial heating period to achieve a specified temperature and much less time during the "soaking" period when burner activity is minimal
- Source testing autoclaves during the "soaking" periods would not be representative of the burner emissions

Response:

- Current Rule 1147 (paragraph (d)(2)) requires units to demonstrate compliance in the maximum heat input range at which the unit normally operates
- Staff seeking to provide further clarification for autoclaves in the source test protocol and PAR 1147 staff report

4

STAKEHOLDER COMMENTS

Comment:

- Some processes included in the proposed rule operate in oxygen rich environments resulting in high percentage of oxygen at the exhaust which would interfere with correcting NOx emissions to 3% O_2.

Response:

- For processes with high exhaust oxygen content (near ambient levels), the South Coast AQMD offers the ability to correct to carbon dioxide (CO_2) in lieu of oxygen with the following formula[1]:

$$Pollutant\ @\ 3\%\ O_2 = \mathrm{P}\left(\frac{10.23}{CO_2\ Stack - CO_2\ Ambient}\right)$$

Where:

P = the pollutant concentration measured in the stack (ppm);

CO_2 Stack = the dry CO2 concentration measured in the stack (%); and

CO_2 Ambient = the dry background/ ambient CO2 concentration (%);

[1] South Coast AQMD Source Test Protocol For Determining Oxygen Corrected Pollutant Concentrations From Combustion Sources With High Stack Oxygen Content Based On Carbon Dioxide Emissions: http://www.aqmd.gov/docs/default-source/laboratory-procedures/methods-procedures/higho2protoco.pdf

5

BARCT ASSESSMENT UPDATE FOR MICROTURBINES

6

BARCT ASSESSMENT UPDATE MICROTURBINES

- Staff presented initial BARCT recommendation during Working Group #8 on March 10, 2021 (corrected to 15% O_2)
  - Natural Gas: 9 ppm
  - Distillate Fuel: 77 ppm
- In addition to the permit concentration limit, existing distillate fueled microturbines are currently limited to an annual fuel usage limit of 13,769 gal/year
- PAR 1147 require that existing distillate fueled turbines:
  - Must have a permit condition that limit the NOx concentration of 77 ppm with fuel usage limit of 13,800 gallons per year
- All other microturbines will be subject to NOx limit of 9 ppm
- Revised Microturbine (Natural Gas) category to Microturbine (All Other) to reflect change

7

STATUS OF BARCT ASSESSMENT

8

UPDATED STATUS SUMMARY OF BARCT ASSESSMENT

Equipment Category	Equipment Size	Operating Temperature	Current Rule Limit^	Initial BARCT Limit^	Cost-Effectiveness	Proposed BARCT Limit	
Oven, Dehydrator, Dryer, Heater, Kiln, Calciner, Cooker, Roaster, Furnace, or Heated Storage Tank	All	<1,200°F	30 ppm	20 ppm	**$12,700/Ton**	**20 ppm**	
		≥1,200°F	60 ppm	30 ppm	**$5,600/Ton**	**30 ppm**	
Tunnel Dryers	≥40 MMBtu/hr	All	30 to 60 ppm	Pending	**Pending**		Today's Topic
	<40 MMBtu/hr	All	30 to 60 ppm	Pending	**Pending**		
Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer or Vapor Incinerator	All	All	60 ppm	20 ppm	**$12,300/Ton**	**20 ppm**	
Evaporator, Fryer, Heated Process Tank, and Parts Washer	All	All	60 ppm	30 ppm	**$31,300/Ton**	**60 ppm**	
Burn-off Furnace, Burnout Oven, Incinerator, Crematory with or without Integrated Afterburner	All	All	60 ppm	30 ppm	**$25,800/Ton**	**30 ppm**	
Tenter Frame, Fabric or Carpet Dryer	All	All	30 ppm	20 ppm	**$23,600/Ton**	**20 ppm**	
Other Unit and Process Temperature	All	<1,200°F	30 ppm	30 ppm	**Pending Singeing Machines**		Today's Topic
	All	≥1,200°F	60 ppm	60 ppm			

^ *NOx concentrations are corrected to 3% O_2 dry*

9

UPDATED STATUS SUMMARY OF BARCT ASSESSMENT (CONT'D)

Equipment Category	Equipment Size	Operating Temperature	Current Rule Limit^	Initial BARCT Limit^	Cost-Effectiveness	Proposed BARCT Limit^
Absorption Chillers	All	All	30 ppm	20 ppm	**No Additional Costs[1]**	**20 ppm**
Micro-Turbines (All Other)	All	All	N/A	9 ppm*	**No Additional Costs[1]**	**9 ppm**
Micro-Turbines (In-Use Distillate Fuel)	All	All	40 ppm	77 ppm*	**No Additional Costs[1]**	**77 ppm[3]**
Auto-Claves	All	All	30 ppm	30 ppm	**$49,000**	**30 ppm**
All Liquid Fuel-Fired Units	All	<1,200°F	40 ppm	40 ppm	**No Additional Costs[2]**	**40 ppm**
	All	≥1,200°F	60 ppm	60 ppm	**No Additional Costs[2]**	**60 ppm**

^ *NOx concentrations are corrected to 3% O_2 dry*
* *NOx concentrations for micro-turbines are corrected to 15% O_2 dry*
[1] *Proposed BARCT limit is at existing equipment permit limit, no further action required*
[2] *Evaluated equipment is low use and not subject to proposed rule limits. Assessment resulted in no change to existing rule limits*
[3] *Proposed emission limit applies for in-use equipment with annual fuel usage of less than 13,800 gal/year*

10

Technology Assessment

Cost-Effectiveness Analysis

TECHNOLOGY ASSESSMENT AND COST EFFECTIVENESS UPDATE

Other (Singeing Machines)

11

TECHNOLOGY ASSESSMENT UPDATE
SINGEING MACHINES

Technology Assessment

- Since the previous Working Group meeting, the only facility operating singeing machines within South Coast AQMD jurisdiction has conducted source tests to determine NOx emissions from their two permitted singeing machines
- Process temperature for singers exceed 1,200°F and would be subject to the existing limit of 60 ppm^
- Engineering test NOx and CO results^ :
  - Singeing Machine #1 – 74 ppm NOx and 720 ppm CO
  - Singeing Machine #2 – 55 ppm NOx and 362 ppm CO
- According to the facility, it is unclear why Machine #1 is performing at a higher NOx and CO concentration level and that further engineering analysis is needed to determine how to lower NOx and CO concentrations
- Source test results demonstrate feasibility for units to meet 60 ppm^ NOx limits

^ NOx and CO concentrations are corrected to 3% O_2 dry

12

PROPOSED BARCT NOX LIMIT
OTHER CATEGORY

Cost-Effectiveness Analysis

Operating Temp	Existing Units*^		Rule 1147 Limit^	Existing Permit Limits	BARCT Technology Review^	Initial BARCT Analysis
	Source Test Results	Units Meeting 30 ppm Limit				
<1,200° F	No Change to Existing Rule Limit					30 ppm
≥1,200° F	55-74 ppm	Two units in RECLAIM	60 ppm	102 ppm^	60 ppm	60 ppm
		No Units Identified in Non-RECLAIM				

Proposed NOx Limit for Other Category: 30 to 60 ppm
No Additional Cost

Incremental cost-effectiveness not conducted since only one proposed control option

* *Emissions data collected from source test results*
^ *NOx concentrations are corrected to 3% O_2 dry*

13

Technology Assessment

TECHNOLOGY ASSESSMENT

Tunnel Dryers

14

TECHNOLOGY ASSESSMENT
TUNNEL DRYERS

Technology Assessment

- Rule 1147 currently categorizes tunnel dryers under the "Oven, Dehydrator, Dryer, Heater, Kiln, Calciner, Cooker, Roaster, Furnace, or Heated Storage Tank" category
- Current Rule 1147 limit for tunnel dryers is 30 to 60 ppm depending on process temperature
  - Identified tunnel dryers in the South Coast AQMD all operate at temperatures >1,200°F
- Staff is proposing to move tunnel dryers into a separate equipment category in PAR 1147
  - Combine emission limit applicable for all process temperature ranges

^ *NOx concentrations are corrected to 3% O_2 dry*

15

TECHNOLOGY ASSESSMENT
TUNNEL DRYERS

Technology Assessment

- Identified six active tunnel dryers located within the South Coast AQMD jurisdiction
  - Five located in two non-RECLAIM facilities
  - One located in a RECLAIM facility
- Heat input for identified equipment range between 14 to 84 MMBTU/hr
- Permit limits range between 60 to 102 ppm NOx^
- Source test results available for all six identified equipment and range between 21 ppm to 53 ppm NOx^
- One burner manufacturer identified with low-NOx burners available for retrofitting existing equipment to meet 30 ppm NOx^

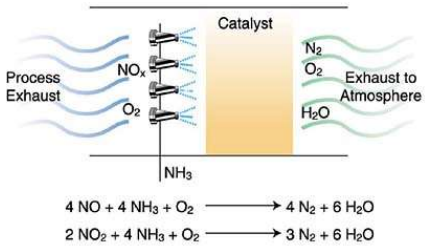
^ *NOx concentrations are corrected to 3% O_2 dry*

16

ADDITIONAL CONSIDERATIONS
TUNNEL DRYERS

Technology Assessment

- Post combustion controls such as Selective Catalytic Reduction (SCR) systems are not cost-effective due to requirement of additional duct burner
- Staff evaluated post combustion controls such as SCR systems for tunnel dryers in addition to combustion technologies
- SCR systems generally need exhaust temperatures to be above 500° F in order for the reaction to take place
- Process temperatures of tunnel dryers are ≥1,200° F, but exhaust temperature at the exhaust stack is between 400 to 500° F
  - Low exhaust temperatures could be due to high oxygen dilution
- Addition of duct burners will be needed upstream of SCR systems in this application



^ *NOx concentrations are corrected to 3% O_2 dry*

INITIAL STAFF RECOMMENDATION
TUNNEL DRYERS

Technology Assessment

Operating Temp	Existing Units+^		Rule 1147 Limit^	Existing Permit Limits	BARCT Technology Review^	Initial BARCT Analysis
	Source Test Results	Units Meeting 30 ppm Limit				
<1,200° F	N/A	No Units Identified in RECLAIM or non-RECLAIM	30 ppm	N/A	N/A	N/A
≥1,200° F	21 to 54 ppm	One unit in RECLAIM	60 ppm	60 to 102 ppm^	30 ppm	30 ppm
		No Units Identified in Non-RECLAIM				
			Applicable rule limit from existing Rule 1147	Permit limit of existing units	Based on existing equipment permit limits and burner technology	Pending Cost-Effectiveness Analysis

+ *Emissions data collected from source test results*
^ *NOx concentrations are corrected to 3% O_2 dry*

Cost-Effectiveness Analysis

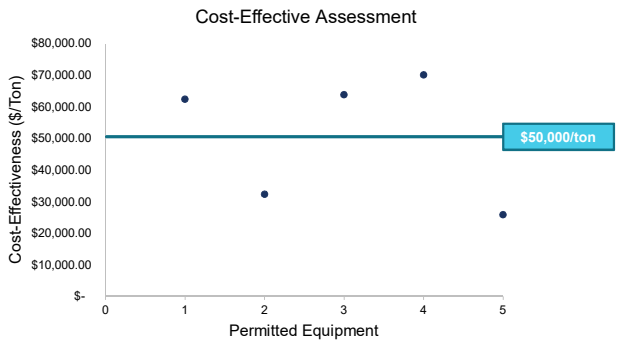
COST-EFFECTIVENESS ANALYSIS

Tunnel Dryers

19

COST-EFFECTIVENESS
TUNNEL DRYERS

Cost-Effectiveness Analysis



- Identified six active permitted tunnel dryers
- One unit with source test result below 30 ppm excluded from graph
- Cost-effectiveness calculated from:
  - Manufacturer provided cost estimates
  - Facility provided cost estimates
  - Equipment usage if available (AER Reported usage from 2018)
  - Proposed emission limit of 30 ppm

Category Average Cost-Effectiveness: $49,200/ton

20

PROPOSED BARCT NOX LIMIT
TUNNEL DRYERS

Cost-Effectiveness Analysis

Operating Temp	Existing Units*^		Rule 1147 Limit^	Existing Permit Limits	BARCT Technology Review^	Initial BARCT Analysis
	Source Test Results	Units Meeting 30 ppm Limit				
<1,200° F	N/A	No Units Identified in RECLAIM or non-RECLAIM	30 ppm	30 to 102 ppm^	N/A	N/A
≥1,200° F	21 to 54 ppm	One unit in RECLAIM	60 ppm	60 to 102 ppm^	30 ppm	30 ppm
		No Units Identified in Non-RECLAIM				

Proposed NOx Limit for Tunnel Dryers: 30 ppm
Category Average Cost-Effectiveness: $49,200/ton

Staff determined that post combustion controls such as selective catalytic reduction (SCR) systems are not cost-effective for tunnel dryers due to low exhaust temperature

Incremental cost-effectiveness not conducted since only one proposed control option of 30 ppm

* *Emissions data collected from source test results*
^ *NOx concentrations are corrected to 3% O_2 dry*

21

SUMMARY OF PROPOSED BARCT ASSESSMENT

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		≥1,200°F	60 ppm	30 ppm	**$5,600/Ton**	**30 ppm**	
Tunnel Dryers	≥40 MMBtu/hr	<1,200°F	30 ppm	30 ppm	**$49,200/Ton**	**30 ppm**	Updated
	<40 MMBtu/hr	≥1,200°F	60 ppm				
Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer or Vapor Incinerator	All	All	60 ppm	20 ppm	**$12,300/Ton**	**20 ppm**	
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Other Unit and Process Temperature	All	<1,200°F	30 ppm	30 ppm	**No Additional Cost**	**30 ppm**	Updated
	All	≥1,200°F	60 ppm	60 ppm		**60 ppm**	

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22

SUMMARY OF PROPOSED BARCT ASSESSMENT (CONT'D)

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23

UPDATE TO RULE IMPLEMENTATION SCHEDULE

Facilities with Multiple Units

24

SUMMARY OF IMPLEMENTATION APPROACH

- Staff is proposing an implementation approach for RECLAIM and non-RECLAIM facilities, that is generally modeled after existing Rule 1147
- Two implementation schedules
  - All units, except low-emitting or near-limit units, must submit permit applications to meet the proposed NOx and CO limits when the burner reaches 12 years
  - Low-emitting or near-limit units must submit permit applications to meet the proposed NOx and CO limits when the burner reaches 32 years
- Regardless of the implementation schedule, the proposed NOx and CO limits must be met if there is a combustion system modification, combustion system or burner replacement, unit relocation, or unit replacement
- Units that meet the proposed NOx and CO limits through a source test will not be required to replace their burner; however, operators may need to modify their permit to reflect the proposed BARCT limit

25

COMPLIANCE FOR FACILITIES WITH MULTIPLE UNITS

- Concerns have been raised that some facilities operating multiple units of similar age will be required to submit permit applications at the same time
- To address this concerns, staff is proposing a staggered permit submittal approach
- A staggered permitting schedule will be based on the total number of applicable equipment located at the facility
  - Equipment that will be permanently shut down can be used to meet implementation schedule quota

26

IMPLEMENTATION SCHEDULE FOR MULTIPLE UNITS

- Implementation schedule will be based on total number of applicable equipment located at the facility as of July 1, 2022 and total facility heat input
- Operators would need to submit a compliance plan by December 31, 2022 that identifies all units that meets age criteria and in accordance to application submittal dates in the table below:

Application Submittal Date	5 to 9 units (% of Total Heat Input)	10 to 19 units (% of Total Heat Input)	20+ units (% of Total Heat Input)
January 1, 2023	50%	50%	50%
January 1, 2024	100%		
January 1, 2025	Not Applicable	100%	100%
January 1, 2026		Not Applicable	

27

NEXT STEPS

- Release Draft Staff Report and Draft Rule Language
- Continue to hold stakeholder meetings
- Public Workshop - Late October
- Stationary Source Committee - October

28

CONTACTS

General RECLAIM Questions	Proposed Amended Rules 1147 and 1100	Proposed Amended Rules 1147, 1100 and Proposed Rule 1147.2
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29