

# Assembly Bill 617: BARCT Analysis - Reciprocating Internal Combustion Engines

Board of Directors  
Santa Barbara County  
Air Pollution Control District

Our Mission: To protect the people and the environment  
of Santa Barbara County from the effects of air pollution.

Aeron Arlin Genet  
Executive Director / APCO

Tim Mitro  
Air Quality Engineer

March 16, 2023

@OurAirSBC  



# Background: Assembly Bill (AB) 617

- ▶ Enacted in 2017 for Community Air Protection.
- ▶ BARCT applies to large industrial facilities subject to Cap-and-Trade.
  - ▶ >25,000 metric tons/yr of GHGs as of 1/1/2017.
  - ▶ Requires maximum emission reduction achievable, taking into account environmental and economic impacts.
- ▶ BARCT Rule Development Schedule adopted by Board in 2018.



# Background: District Rule 333

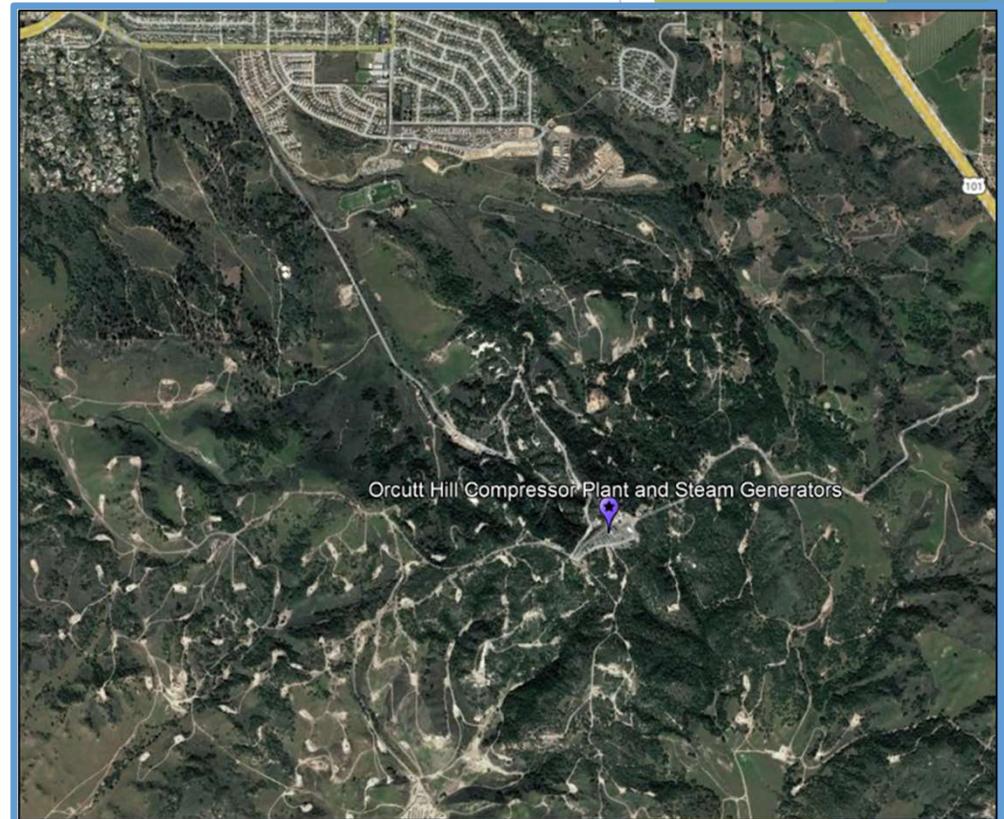
- ▶ Rule 333 was initially adopted in 1991.
  - ▶ Applies to engines with a max rated horsepower of 50 or greater.
  - ▶ Requires periodic emission testing.
- ▶ **“Non-cyclical” engines:**
  - ▶ 50 ppm NOx emission standard. *(90% NOx control)*
  - ▶ Can comply by using a 3-way catalyst.
- ▶ **“Cyclical” engines:**
  - ▶ Operating load fluctuates over a 5-10 second cycle.
  - ▶ 300 ppm NOx emission standard. *(40% NOx control)*
  - ▶ Can comply by adjusting the air-fuel ratio.



Cyclical Oil Well Pump

# PCEC - Orcutt Hill

- ▶ 27 large, prime engines remaining:
  - ▶ Manufacture Year: 1970s and 1980s
  - ▶ Original Max Horsepower: 130 - 200 hp
  - ▶ Derated Max Horsepower: 42 - 49.9 hp



# BARCT Analysis

- 1) Engines need to comply with the BARCT standards regardless of derating.
- 2) Lower BARCT standards are achievable:
  - ▶ Based on South Coast AQMD Rule 1110.2 and San Joaquin Valley APCD Rule 4702;
  - ▶ 95-98% NO<sub>x</sub> control by using a larger catalyst and a more precise Air/Fuel Ratio Controller;

<b>Rich-burn, Spark-Ignited Engine</b>	<b>Uncontrolled NO<sub>x</sub> EF (ppmv)</b>	<b>Rule 333 NO<sub>x</sub> Limits (ppmv)</b>	<b>NO<sub>x</sub> BARCT (ppmv)</b>
Non-cyclical	500	50	11
Cyclical		300	11
Derated, Cyclical		N/A	25

# Technology Trials

- ▶ PCEC initiated control technology trials on a few engines.
  - ▶ Installed catalysts and Air-Fuel Ratio Controllers.
  - ▶ NOx analyzer tests show that the lower limits are feasible.
- ▶ Decision to pursue controls on engines.

PCEC  
0100957 #1

HENRY LEASING & MANUFACTURING  
GAS ENGINES  
3737 Gilmore Avenue  
Bakersfield, CA 93308  
Phone: 661-395-3027 Fax: 661-395-3053

EMISSION READINGS

AND INSTRUMENTS INT.  
BOILER TEST  
ON MAIN SITE  
12809163  
Version No.: V1.10

Date: 11-30-21  
Inspection Date: 11-30-21  
Inspectors Name: Victor A. Pappalardo

Limits	Measured Values					Within Limits? (yes or no)	Corrective Action Taken (When limits are exceeded)
	Log the Time Readings Are Taken (5 Readings Within 15 Minutes)						
Time	6:57pm	6:56pm	6:59pm	7:02pm	7:05pm		
11 ppmv	0.2	0.3	0.7	0.3	0.3	Yes	
4000 ppmv	674.2	587.1	672.9	549.5	574.8	Yes	
< 4%	0.16	0.16	0.16	0.15	0.14	Yes	
Temp Inlet (°F)	883°F	885°F	+ 2°F		Comments / Corrective Actions Taken		

PORTABLE EXHAUST GAS ANALYZER DATA

Model: LANGOM III Date Last Calibrated: 6-22-21

634.2 ppm  
0.16 %  
0.1 ppm  
0.1 ppm  
11.8 %  
0.2 ppm

31.4 %  
68.6 %  
0.7 %  
0.0 %  
15.0 %

LINE ON UNIT No. 01  
MORE INFORMATION  
01246 417691

## Cost-Effectiveness

	Per Engine Retrofit	Total (27 engines)
<b>Capital Costs:</b>	<b>\$60,000</b>	<b>\$1.62 million</b>
Catalyst and AFRC installation	\$30,000	
Powerpole extensions for AFRC	\$30,000	
<b>On-Going Costs:</b>	<b>\$12,000/yr</b>	<b>\$324,000/yr</b>
Catalyst and O <sub>2</sub> Sensor Replacement	\$4,000/yr	
Biennial Source Testing	\$4,000/yr	
Quarterly NOx Analyzer Testing	\$2,000/yr	
Added Maintenance & Recordkeeping	\$2,000/yr	
<b>Emission Reductions:</b>	<b>2.6 - 2.7 tpy NOx</b>	<b>73 tpy NOx</b>
<b>Cost-Effectiveness:</b>	<b>\$6,600 - \$6,800 per ton of NOx (15 year project life, 6% interest)</b>	

# BARCT Implementation

- ▶ PCEC submitted an Authority to Construct (ATC) application to incorporate BARCT directly into their operating permit.
  - ▶ ATC permit issued on March 8, 2023.
  - ▶ Control equipment installed no later than December 31, 2023.
- ▶ Amendments to District Rule 333 are no longer necessary to satisfy AB 617 BARCT requirements.
  - ▶ The BARCT analysis will continue to apply to the existing and new units at the six AB 617 industrial facilities.

# BARCT Timeline for IC Engines

- ▶ **December 2018:** BARCT Schedule adopted by District Board
- ▶ **2019 - 2022:** Technology Trials at PCEC
- ▶ **October 2022:** ATC application submitted by PCEC
- ▶ **February 22, 2023:** CAC Meeting to receive update on BARCT Analysis
- ▶ **March 8, 2023:** ATC Permit issued
- ▶ **March 16, 2023:** District Board Hearing to receive BARCT Analysis  
*(Upon approval, forward BARCT Analysis to CARB)*
- ▶ **December 31, 2023:** Implementation of BARCT

## Recommendation

- ▶ Adopt the resolution, concluding that amendments to District Rule 333 are no longer necessary to satisfy the AB 617 BARCT requirements.

# Timothy Mitro

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