Assembly Bill 617: BARCT – Gas Turbines & Duct Burners

Community Advisory Council
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
November 2, 2023

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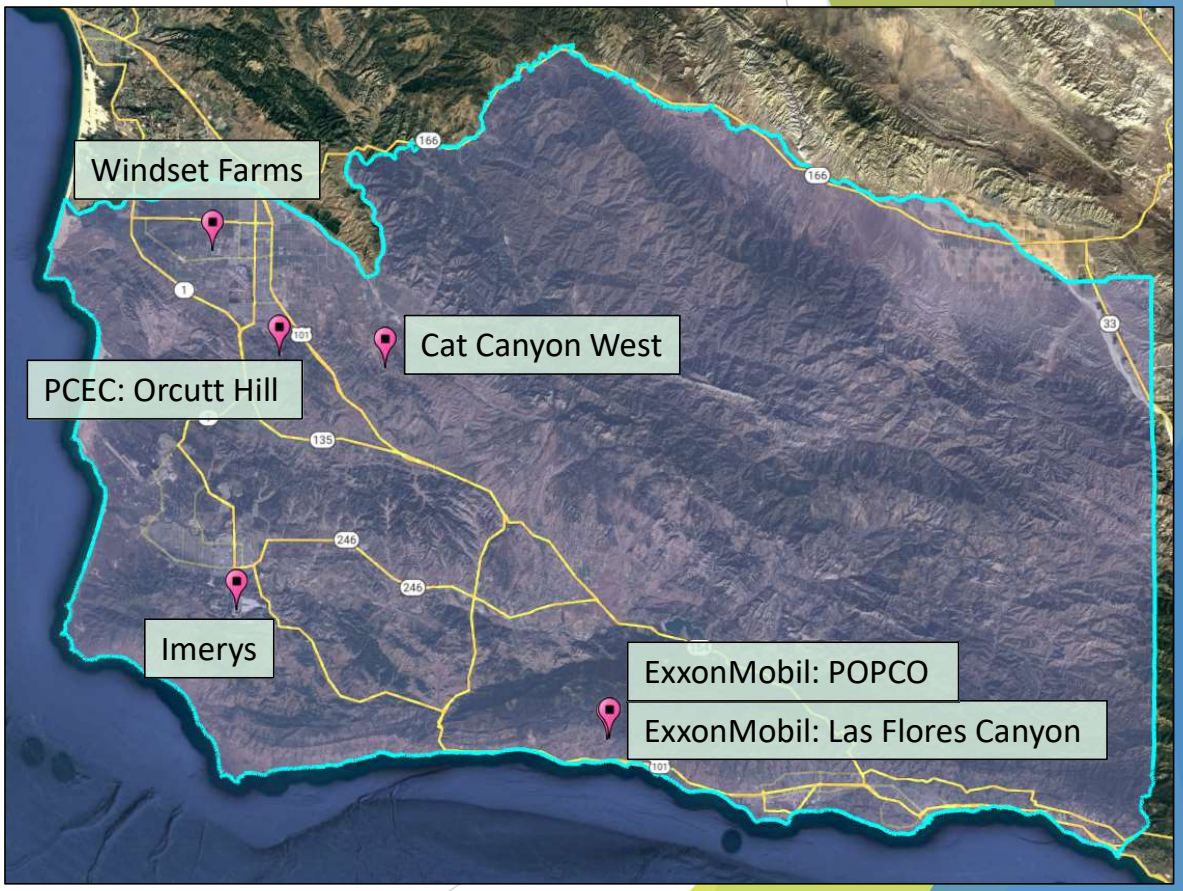
Presentation Topics

1) **Background Information**
   - Assembly Bill 617 – Best Available Retrofit Control Technology (BARCT)
   - Las Flores Canyon Oil & Gas Plant
   - Equipment Diagrams and Terminology

2) **BARCT Analysis for Gas Turbines and Associated Duct Burners**
   - Emission Standards and Control Technologies
   - Cost-Effectiveness
   - Implementation of BARCT

Background: Assembly Bill (AB) 617

- Enacted in 2017 for Community Air Protection.
- AB 617 BARCT only applies to large industrial facilities subject to Cap-and-Trade.
  - Six industrial facilities within Santa Barbara County.
  - >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

#	Equipment Category	Status	Method
1)	Boilers, Steam Generators, and Process Heaters (5 MMBtu/hr and greater)	*Completed June 2019*	Amended Rule 342
2)	Boilers, Steam Generators, and Process Heaters (2 - 5 MMBtu/hr)	*Completed June 2019*	Amended Rule 361
3)	Particulate Matter Control Devices	*Completed June 2022*	Incorporated into Permit
4)	Reciprocating Internal Combustion Engines	*Completed March 2023*	Incorporated into Permit
5)	Miscellaneous Combustion Units	*Completed October 2023*	Incorporated into Permit
6)	Stationary Gas Turbines and Associated Duct Burners	Focus of CAC Meeting	

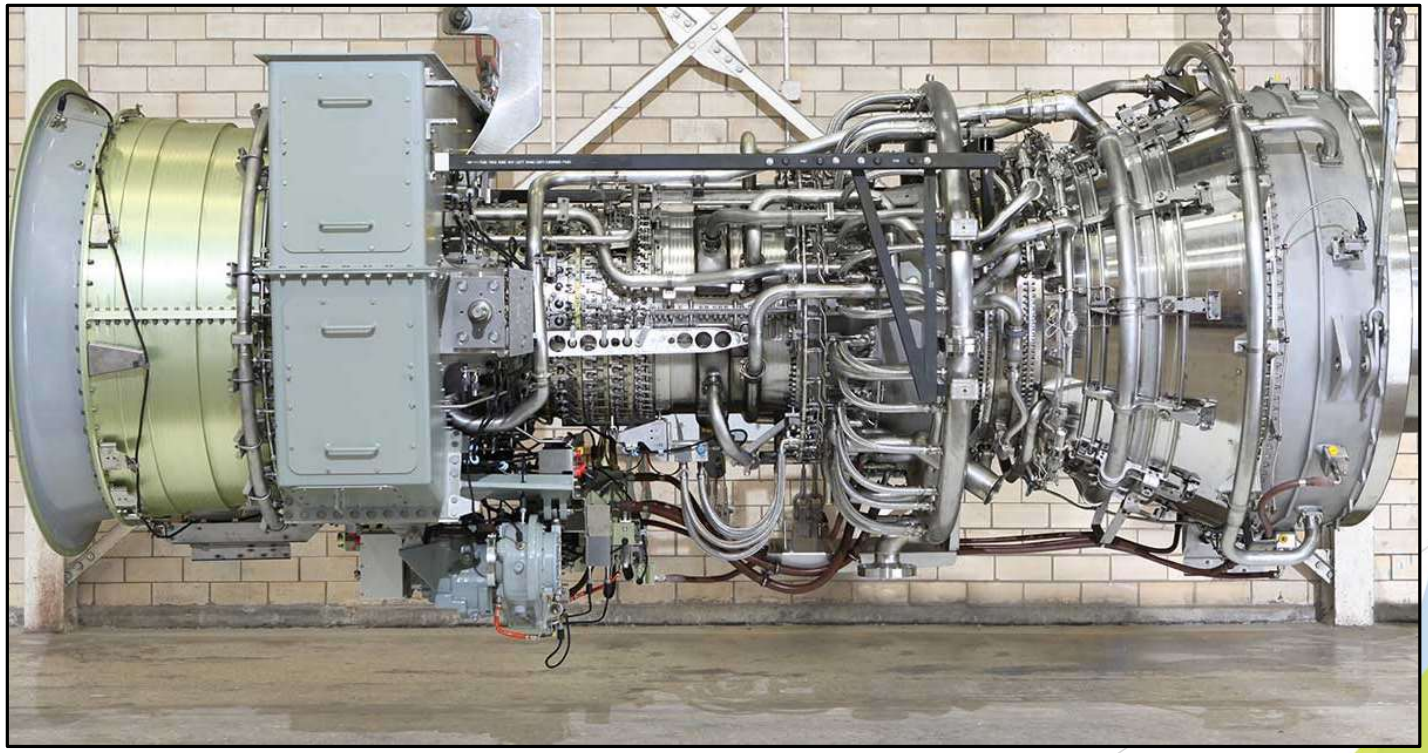
Las Flores Canyon Oil & Gas Plant

- 49 megawatt (MW) Combined-cycle, Cogeneration Power Plant;
  - Gas Turbine rated at 465 MMBtu/hr, and
  - Duct Burner rated at 345 MMBtu/hr.
- Originally permitted in 1987. Unit fully installed by 1993.
- Evaluated for Best Available Control Technology (BACT) during initial permitting.
  - Selective Catalytic Reduction (SCR) and steam injection used to reduce NOx.
- Equipment is shut-in and maintained in a preserved state due to the 2015 rupture of the Plains All American Pipeline.

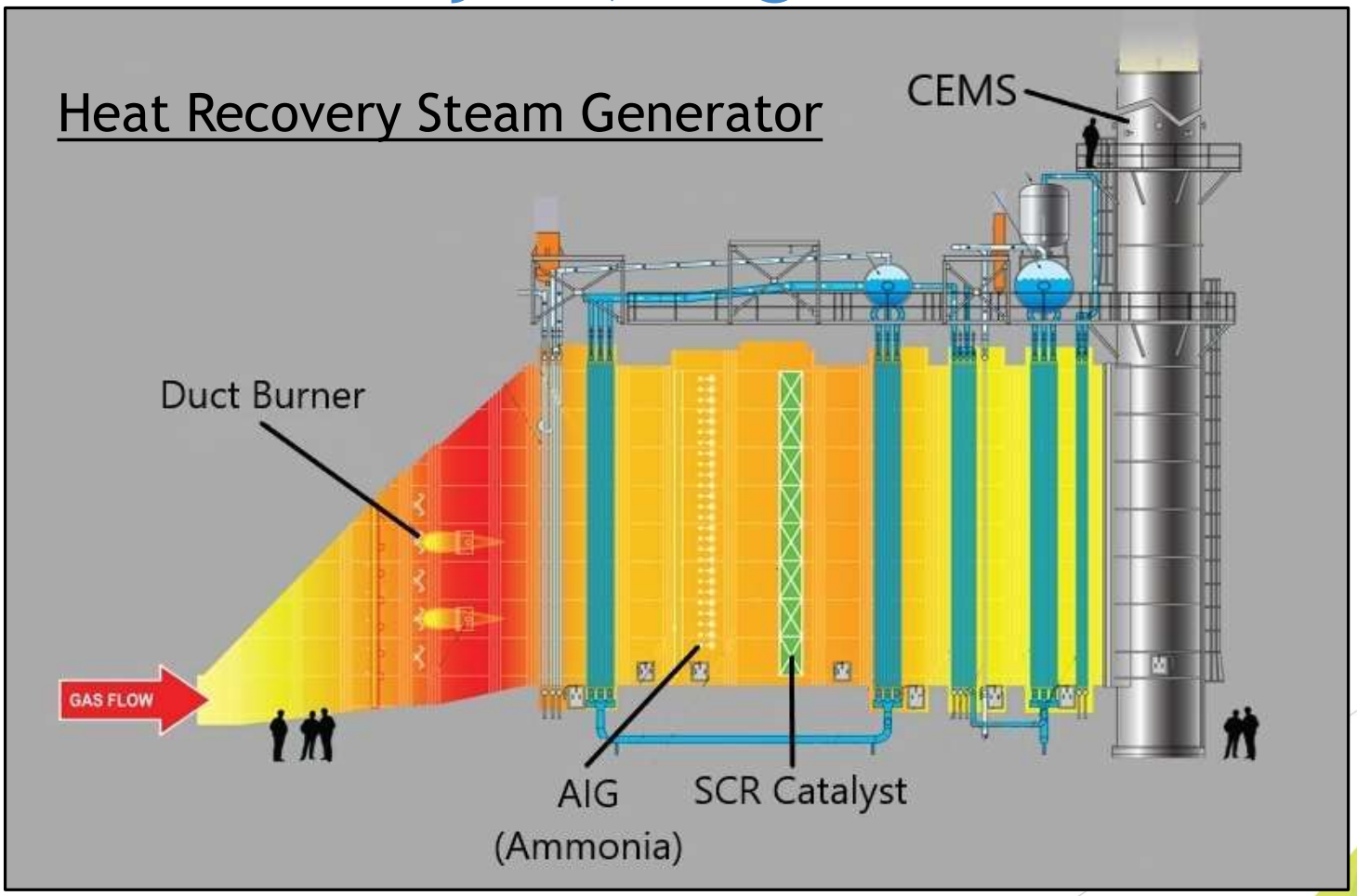
Stationary Gas Turbine

3 Major Components

Compressor - Combustor - Power Turbine



Combined-cycle, Cogeneration Plant



Simple-cycle:
Gas Turbine

Combined-cycle:
Gas Turbine +
Steam Turbine

Cogeneration:
Uses waste heat for other processes

BARCT Standards – Gas Turbines

Year	Agencies	BARCT - NOx (ppmv)	Typical Control Technology
1992	CARB	9	**1)** Steam Injection **2)** SCR
Mid 2000s	Bay Area AQMD San Joaquin Valley APCD	3 - 5	**1)** Steam Injection or Dry Low NOx Combustors **2)** SCR
2019	South Coast AQMD Ventura County APCD	**Combined-cycle:** 2.0 **Simple-cycle:** 2.5	**1)** Steam Injection or Dry Low NOx Combustors **2)** SCR

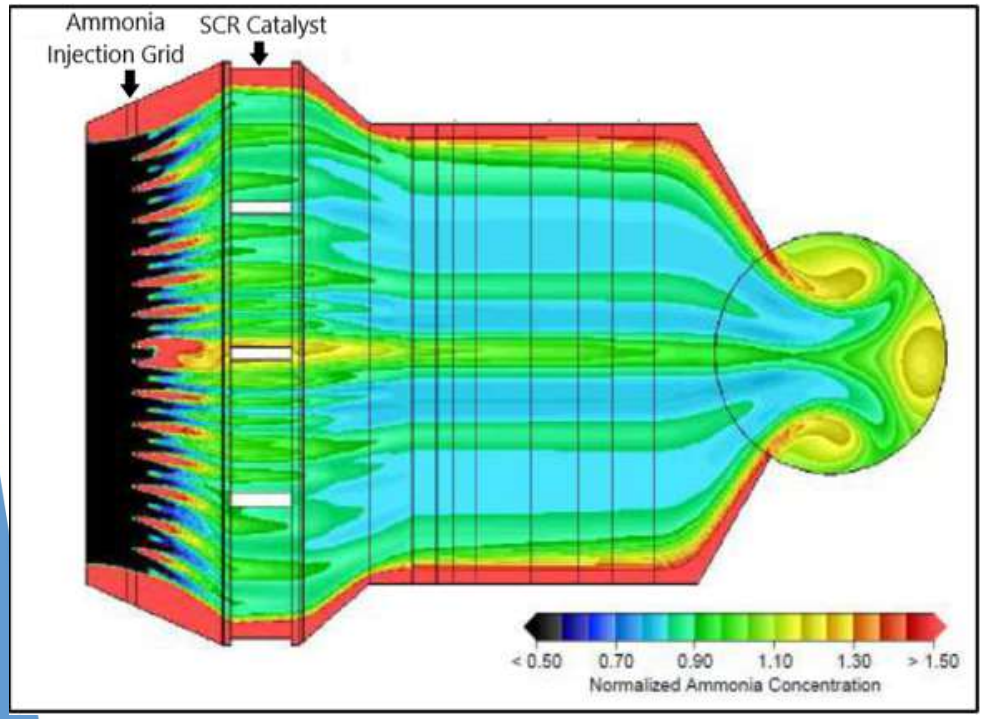
- Staff proposes BARCT to be 2.0 ppm NOx for Combined-cycle units within Santa Barbara County.

NOx Control Technologies

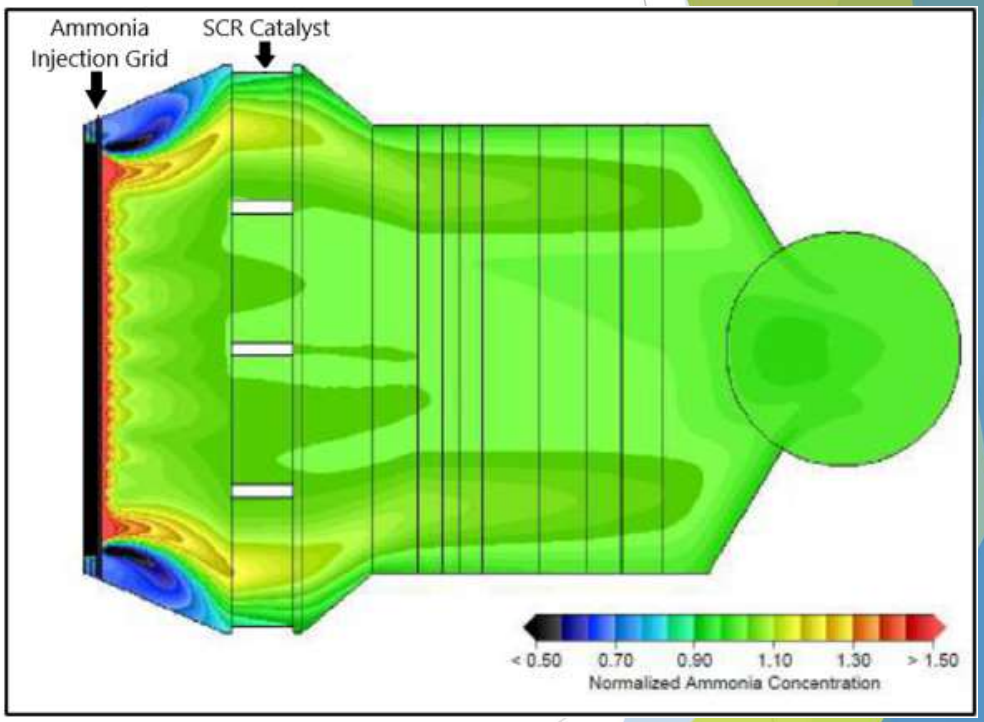
Scenario	Emissions		Total Control
LFC - Permit Limits	7 - 8	ppmv NOx	≈ 95%
LFC - Typical Values	4 - 5	ppmv NOx	≈ 97%
BARCT	2.0	ppmv NOx	≈ 98%

Technology	Description	Technology Control Range	Currently Used at LFC
Steam Injection	• Steam is injected into the gas turbine. • Lowers the combustion temperature.	60 - 80%	**Yes**
Selective Catalytic Reduction (SCR):	• Ammonia is injected into the exhaust. • Reduces NOx → N_2 & H_20 vapor.	80 - 95+%	**Yes**

SCR Modelling Examples



Poor Ammonia Distribution



Good Ammonia Distribution

Cost-Effectiveness

	Scenario #1 SCR upgrades + Increase Steam
Emission Limit:	**2.0 ppmv NOx**
Capital and Installation Costs:	**$3.6 million**
Annual Operating Costs:	**$0.25 million/yr**
Utility Costs: (Increase Steam Injection)	**$0 - 0.50 million/yr**
Emission Reductions:	**19 tpy NOx**
Cost-Effectiveness: *(20 year project life, 6% interest)*	**$30,000 - $56,000 per ton of NOx**

BARCT Implementation

- ExxonMobil submitted two permit applications to incorporate the BARCT emission standards directly into their operating permit.
  - The Authority to Construct (ATC) permit will allow modifications to the turbine system to implement the BARCT requirements.
  - The PTO-Modification/Part 70 Minor Modification will incorporate the BARCT emission standards into the Part 70 operating permit.
  - Permits result in enforceable conditions no later than 12/31/2023.
  - Equipment modifications required to be installed and implemented prior to the facility recommencing operations.

"AB 617 BARCT" vs "BACT"

Facility	AB 617 BARCT		BACT
	Existing Equipment	New Equipment	New/Modified Equipment
Las Flores Canyon	X	X	X
Remaining 5 AB 617 facilities	---	X	X
New Facility	---	---	X

- BARCT is an **emission standard** that is not limited to just "retrofits".
  - A facility may need to fully replace the equipment to satisfy BARCT.
- BACT is evaluated for all new/modified projects per Reg VIII – NSR.
  - BACT is equal to or more stringent than BARCT.

Staff Assessment

- Creating a new rule for Gas Turbines is no longer necessary.
  - The BARCT Analysis will be presented to the District Board & forwarded to CARB.

BARCT Timeline for Turbines

- **Dec 2018:** BARCT Schedule adopted by District Board
- **Aug 2022:** Draft BARCT analysis sent to ExxonMobil for review
- **Oct 2023:** Permit applications submitted by ExxonMobil
- **Nov 2023:** CAC Meeting to receive update on BARCT Analysis
- **Dec 2023:** District works on and issues the permits
- **Jan 2024:** **1)** District Board Hearing to receive BARCT Analysis
  2) Forward Analysis to CARB

Contact Information

Tim Mitro

Air Quality Engineer

(805) 979-8329

MitroT@sbcapcd.org

@OurAirSBC