Assembly Bill 617: BARCT – Gas Turbines & Duct Burners

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
January 18, 2024

@OurAirSBC
**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.
<table>
<thead>
<tr>
<th>#</th>
<th>Equipment Category</th>
<th>Status</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Boilers, Steam Generators, and Process Heaters (5 MMBtu/hr and greater)</td>
<td>Completed June 2019</td>
<td>Amended Rule 342</td>
</tr>
<tr>
<td>2)</td>
<td>Boilers, Steam Generators, and Process Heaters (2 - 5 MMBtu/hr)</td>
<td>Completed June 2019</td>
<td>Amended Rule 361</td>
</tr>
<tr>
<td>3)</td>
<td>Particulate Matter Control Devices</td>
<td>Completed June 2022</td>
<td>Incorporated into Permit</td>
</tr>
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<td>4)</td>
<td>Reciprocating Internal Combustion Engines</td>
<td>Completed March 2023</td>
<td>Incorporated into Permit</td>
</tr>
<tr>
<td>5)</td>
<td>Miscellaneous Combustion Units</td>
<td>Completed October 2023</td>
<td>Incorporated into Permit</td>
</tr>
<tr>
<td>6)</td>
<td>Stationary Gas Turbines and Associated Duct Burners</td>
<td>Focus of Board Item Discussion</td>
<td></td>
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</tbody>
</table>
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.
- 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 Turbines

3 Major Components

Compressor - Combustor - Power Turbine
Combined-Cycle, Cogeneration Plant

Heat Recovery Steam Generator

Combined-cycle:
Gas Turbine + Steam Turbine

Cogeneration:
Uses waste heat for other processes
BARCT Emission Standard

Las Flores Canyon Combined-cycle Power Plant:

- Permit Limits: 7 - 8 ppmv NOx
- Typical Values: 4 - 5 ppmv NOx [Verified by CEMS]
- BARCT: 2.0 ppmv NOx [Based on 2019 determination from South Coast AQMD]

<table>
<thead>
<tr>
<th>Technology</th>
<th>Description</th>
<th>Technology Control Range</th>
<th>Currently Used at LFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam Injection</td>
<td>• Steam is injected into the gas turbine.</td>
<td>60 - 80%</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>• Lowers the combustion temperature.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selective Catalytic Reduction (SCR):</td>
<td>• Ammonia is injected into the exhaust.</td>
<td>80 - 95%</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>• Reduces NOx $\rightarrow$ $N_2$ &amp; $H_2O$ vapor.</td>
<td></td>
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</tbody>
</table>
## Cost-Effectiveness

<table>
<thead>
<tr>
<th>Scenario #1</th>
<th>SCR upgrades + Increase Steam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emission Limit:</strong></td>
<td>2.0 ppmv NOx</td>
</tr>
<tr>
<td><strong>Capital and Installation Costs:</strong></td>
<td>$3.6 million</td>
</tr>
<tr>
<td><strong>Annual Operating Costs:</strong></td>
<td>$250,000 per yr</td>
</tr>
<tr>
<td><strong>Utility Costs: (Increase Steam Injection)</strong></td>
<td>$0 – $500,000 per yr</td>
</tr>
<tr>
<td><strong>Emission Reductions:</strong></td>
<td>19 tpy NOx</td>
</tr>
<tr>
<td><strong>Cost-Effectiveness:</strong></td>
<td>$30,000 - $56,000 per ton of NOx</td>
</tr>
</tbody>
</table>

*(20 year project life, 6% interest)*
BARCT Implementation

- ExxonMobil submitted two permit applications to incorporate the BARCT emission standards directly into their operating permit.
  - The Authority to Construct (ATC) permit allows for modifications to the turbine system to implement the BARCT requirements.
  - The PTO-Modification/Part 70 Minor Modification incorporates the BARCT emission standards into the Part 70 operating permit.
- Permits result in enforceable conditions that satisfies AB 617.
- Air pollution control system retrofits required to be implemented prior to the facility recommencing operations.
Recommendation

- Adopt the resolution, concluding that a new rule for Gas Turbines and Associated Duct Burners is no longer necessary to satisfy the AB 617 BARCT requirements.
BARCT Timeline for Gas 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 2, 2023:** CAC Meeting to receive update on BARCT Analysis
- **Jan 10, 2024:** Permits issued
- **Jan 18, 2024:**
  1) District Board Hearing to receive BARCT Analysis
  2) Forward Analysis to CARB
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