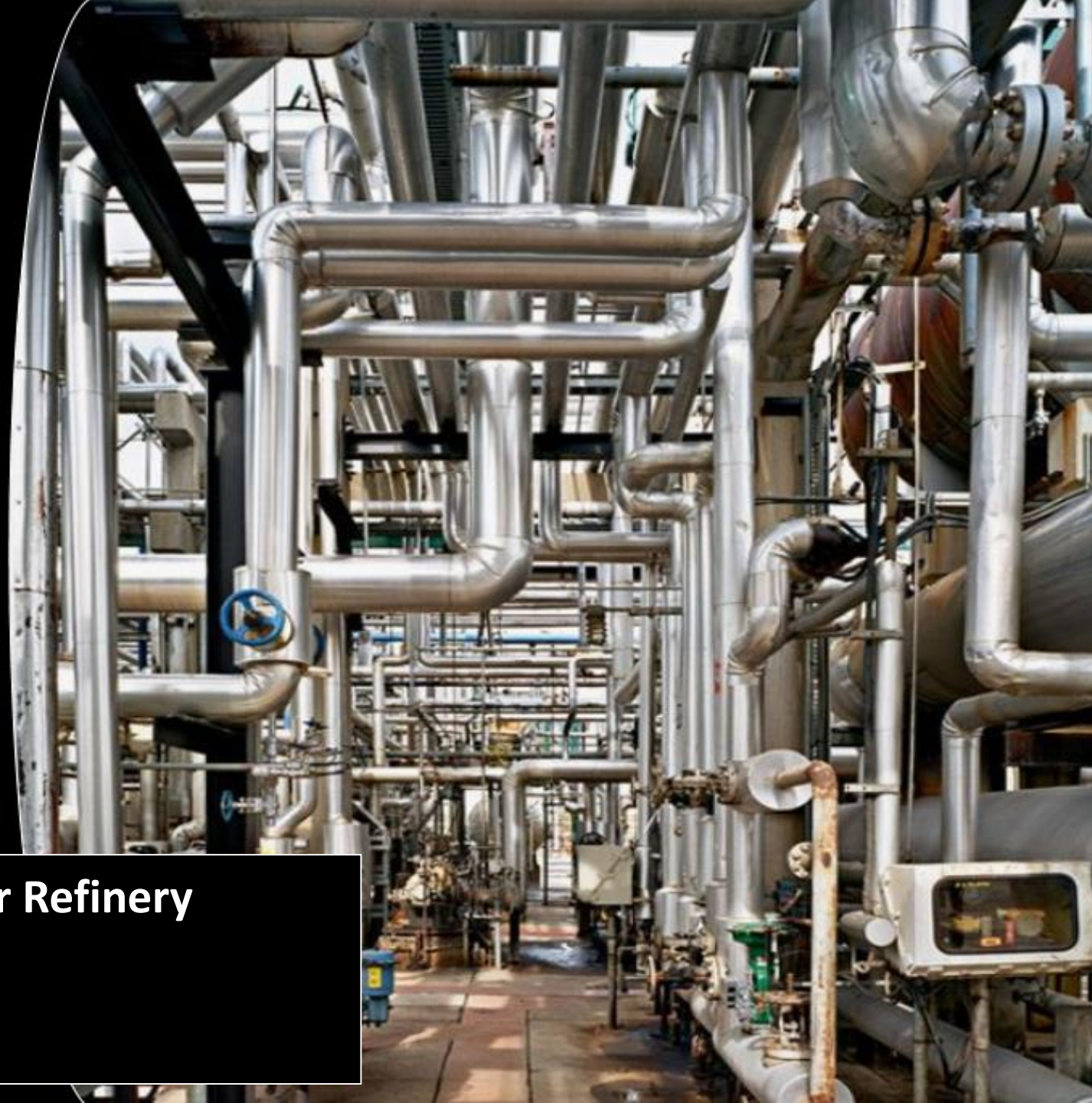


Join Zoom Meeting
https://scaqmd.zoom.us/j/94265489542
Meeting ID: 942 6548 9542
Password: 846999
Teleconference Dial-In: 1-669-900-6833

Rule 1109.1 – NOx Emission Reduction for Refinery Equipment and Related Industries

Working Group Meeting #16

December 10, 2020

Agenda

- Carbon Monoxide Requirements Follow-Up
- Continuous Emissions Monitoring System (CEMS) Discussion
- FERCo Presentation and Staff Response
- Norton Presentation and Staff Response
- TORC Refinery Company Comment Letter and Staff Response
- Revised Compliance Schedule
- Rule Development Schedule

Progress of Rule Development

Summary of Working Group # 15 (11/4/20)

- Provided response to stakeholder comments
- Updated assessment for units with existing SCRs
- Revised Proposed BARCT Limits for Sulfuric Acid Plants
- Presented general concepts for BARCT Compliance Alternative Plan (B-CAP)

Since Last Working Group Meeting

- Stakeholder meetings and follow-ups
- Distributed draft rule language with B-CAP updates
- Received comments from stakeholders
- Distributed Final Assessment Report from Consultants
- Received comment letter from Torrance Refining Company

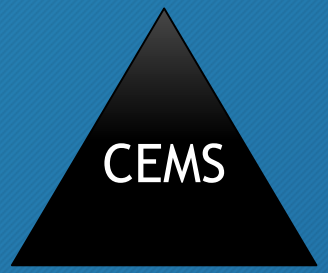
Carbon Monoxide (CO) Follow-Up

Stakeholders Comments on Carbon Monoxide Limit

CO

Stakeholders expressed concern over CO limits in the initial rule language

- No technical analysis was conducted to justify the limits
- Some of the existing permit limits conflict with the proposed CO limits



Requiring a CO CEMS will be burdensome

- Large facilities will require CEMS on many units
- Costs of CO CEMS not included in BARCT assessment

Staff's Response Regarding CO Limit

Response

- South Coast AQMD is in attainment for CO but is seeking to prevent an increase in emissions
- CO emissions can increase when NOx emissions are controlled
- Most NOx rules include CO limits that range from 400 ppm to 2,000 ppm
- The intent of the proposed CO limits in PR 1109.1 was not to impose more stringent CO requirements, but maintain the existing requirements and corresponding emissions
- Based on stakeholder comments, staff reevaluated existing facilities' permits and found several class and categories of equipment that have higher CO limits than initially proposed
- Staff is proposing to add a provision that allows facilities with existing CO permit limits at time of rule adoption, to keep their permit limit
  - Those with a lower CO permit limit must maintain the lower limit
  - Those with no CO permit limit will be subject to the limit in the rule

Staff's Response Regarding CO CEMS

Response

- Staff's prior understanding was most units at PR 1109.1 facilities currently had CO CEMS installed
- Based on stakeholder feedback and reevaluation of permit requirements, CO CEMS are not installed on all class and category of equipment
- Staff will remove the requirement to install CO CEMS but will require units that have CO CEMS installed prior to rule adoption to maintain those CEMS
- To ensure compliance with the CO limits, emissions will have to be measured during the Source Test or annual Relative Accuracy Test Audit (RATA)

Continuous Emissions Monitoring System (CEMS)

Continuous Emissions Monitoring System Background

- Refinery emissions have been and will continue to be measured through the use of Continuous Emissions Monitoring Systems (CEMS)
  - Emissions continuously monitored but data is generally required to be averaged over 15 minute intervals
  - Verified and audited by certified technicians and provided to South Coast AQMD staff upon request
  - Operated at all times
- CEMS are expensive, complex analytical tools for measuring emissions and therefore are only required for larger units
- Requirements for RECLAIM facilities are included in Rule 2012
  - Requires a facility permit holder of a major source (≥40 MMBtu/hr) to install, calibrate, maintain, and operate an ***approved*** CEMS to measure and record NOx, oxygen, and stack gas volumetric flow rate
  - Requires annual Relative Accuracy Test Audits (RATA) to ensure CEMS is performing properly

Engineering Consultants

Engineering Consultants Background

- The Governing Board approved two contracts with third party engineering consultants to assist staff's BARCT assessment

FERCo
FOSSIL ENERGY RESEARCH CORPORATION

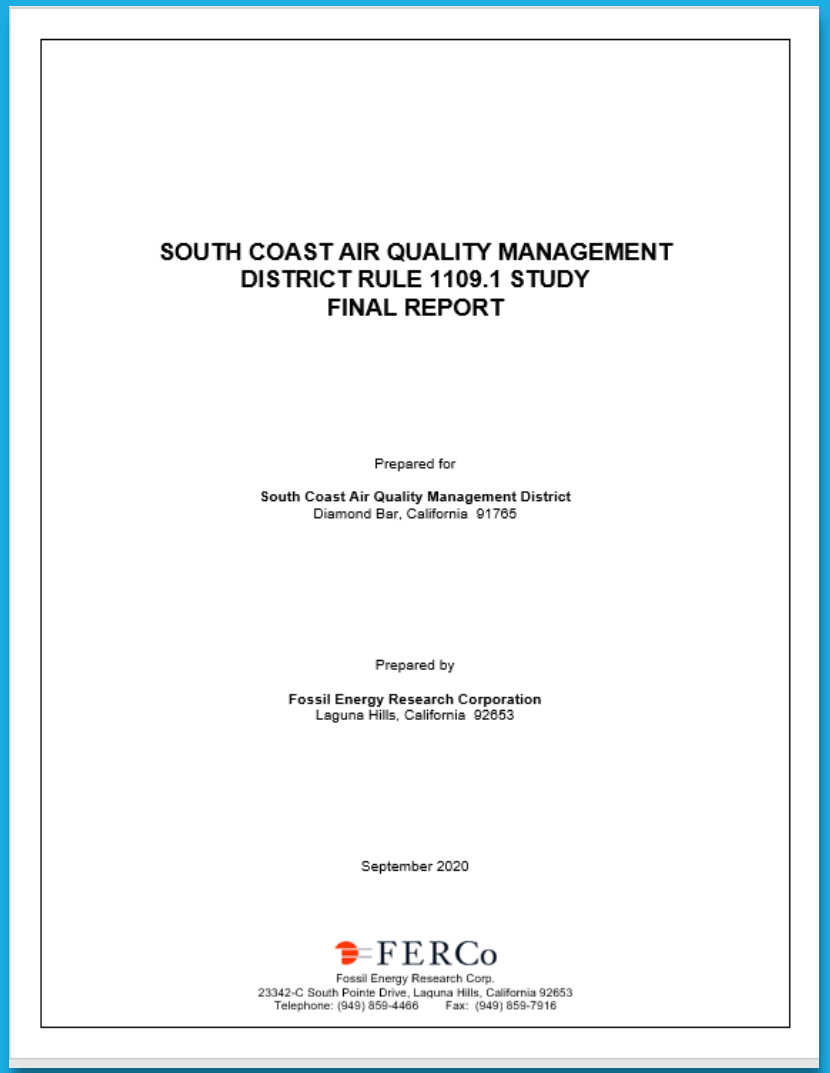
- Conducted site visits to major facilities
- Evaluated space constraints challenges and potential NOx reductions through SCR upgrades and tuning
- Assisted in the reviewing of cost data

NORTON
engineering

- Evaluated staff's BARCT assessment and provided critical technical assistance
- Meet with technology vendors to understand current state of NOx controls

- Consultants will present their findings followed by staff's response

FERCo Presentation



SOUTH COAST AIR QUALITY MANAGEMENT
DISTRICT RULE 1109.1 STUDY
FINAL REPORT

Prepared for

South Coast Air Quality Management District
Diamond Bar, California 91765

Prepared by

Fossil Energy Research Corporation
Laguna Hills, California 92653

September 2020

FERCo
Fossil Energy Research Corp.
23342-C South Pointe Drive, Laguna Hills, California 92653
Telephone: (949) 859-4466 Fax: (949) 859-7916

Staff's Response to FERCo's Report

- Site visits confirmed space challenges which resulted in the higher installation costs used in the BARCT assessment
- FERCo contributed to and reviewed staff's changes to the U.S. EPA Cost Spreadsheet, which was modified to better reflect costs at petroleum refineries
- Staff has been adjusting cost in the BARCT assessment based on FERCo feedback and report

Cost Impacts based on FERCo Report

- FERCo's commented that additional costs should be included when the U.S. EPA Spreadsheet was used:
  - Adjustments for catalyst volume (minor cost impacts, within margin error of the calculation)
  - Annual tuning costs should be included in the cost-effectiveness calculation
- Staff adjusted cost estimates, but did not change any conclusions
- Below is an example of the cost impact

	Original Cost-Effectiveness	Revised Cost-Effectiveness
Process heaters 40 – 110 MMBtu/hr	$35,000	$40,000

Norton Engineering Presentation

NORTON
engineering

NOx BARCT Analysis Review

South Coast AQMD

South Coast Air Quality Management District (SCAQMD)

Document No.: 19-9009-016
Project No.: AQMD-19-9009
Prepared by: R. S. Todd, E. Lin, J. Zhang, C. A. Steves, J. P. Norton
Date: 12/4/2020
Revision: 4

Staff's Response to Norton's Report

- Staff worked closely with Norton throughout the BARCT assessment
- Norton's Report concurs that most of the proposed NOx limits are technically feasible, but will be challenging
- Staff made several changes to the BARCT assessment based on the Norton report (summarized in the next slides)

Staff's Response to Cost for SMR Heater SCR Upgrade

- Norton stated the cost were underestimated for SCR upgrades on SMR heaters
  - Staff assumed costs between $ 4 – 7.1 million
  - Norton recommends $7.5 – 10 million
- Staff adjusted cost estimates, but did not change any conclusions

	Original Cost-Effectiveness	Revised Cost-Effectiveness
SMR heaters	$15,000	$18,000

Staff's Response to Averaging Times

- Staff proposed longer averaging times than most NOx rules due to Norton's feedback during staff's BARCT assessment
  - Norton stated short averaging times (e.g., 8-hour) does not allow the operator enough time to take corrective action to comply with a 2 ppm NOx limit
    - Recommended increasing averaging time to 24 hours
  - Staff is proposing to include a 24-hour averaging times for the following units to ensure proposed NOx limits

	Original Averaging Time	Revised Averaging Time
Boilers/Heaters ≥40 MMBtu/hr	8 hours	24 hours
SMR Heaters & SMR Heaters with Gas Turbine		
Gas Turbines		
Sulfur Recovery Unit/Tail Gas Treatment Units		

Staff's Response to Heaters 20 – 40 MMBtu/hr

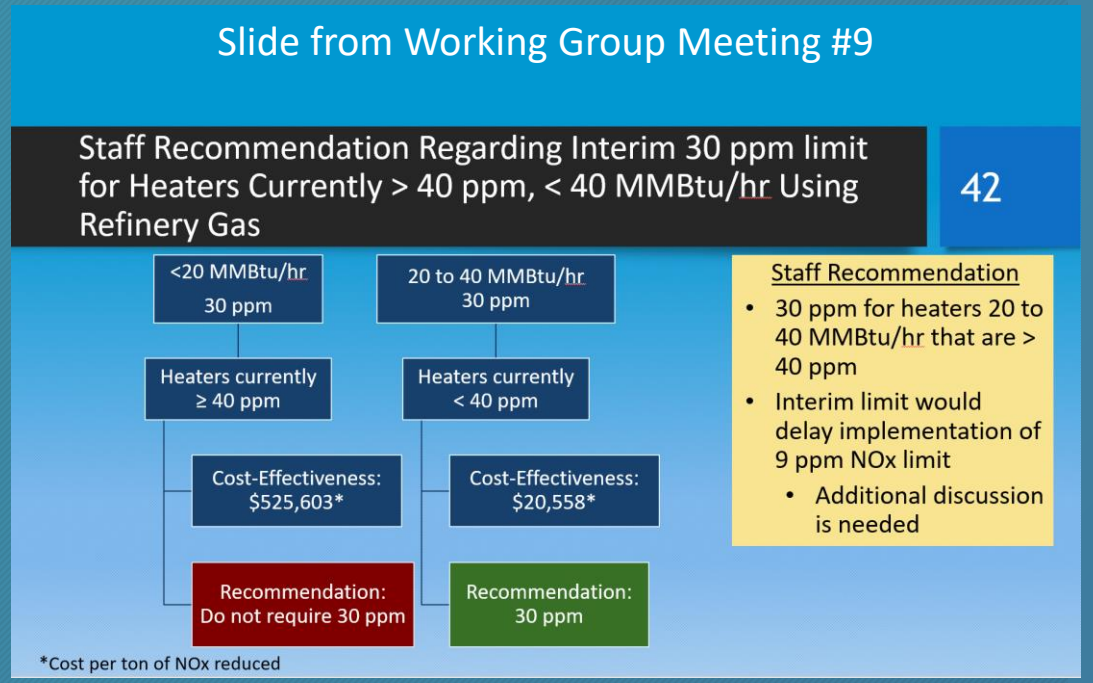
- Norton did not concur with the proposed 30 ppm NOx limit for heaters between 20 – 40 MMBtu/hour
  - "Heaters with sub-optimal spacing are expected to be in the high-30 ppmv range for NOx emissions when retrofitted with ULNBs across all firing rates < 40 MMBtu/hr"
- Staff is proposing a 40 ppm NOx limit for heaters between 20 and 40 MMBtu/hour based on Norton's Report (following slides)

Heaters 20 – 40 MMBtu/hour Follow-up

Background on Heaters 20 – 40 MMBtu/hour

- Staff initially proposed a 30 ppm NOx limit for heaters between 20 – 40 MMBtu/hour with NOx concentrations above 40 ppm
  - Cost-effective and technically feasible according to staff's research at that time
  - 30 ppm was an interim limit - 9 ppm will be required at a future effective date when 50% or more burners are replaced
- Norton concluded 30 ppm is not achievable
  - Low-NOx burners for these unit typically perform in the high 30 ppm range

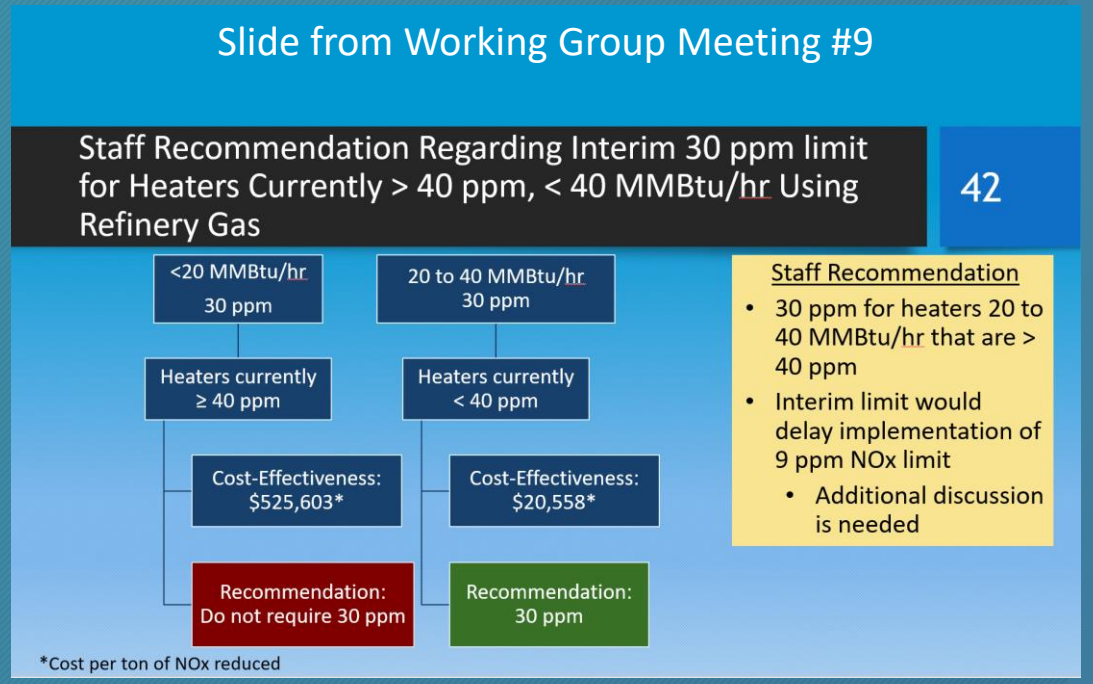
Slide from Working Group Meeting #9



Staff Recommendation for Heaters 20 – 40 MMBtu/hour

- Staff is proposing to change the NOx limit for heaters between 20 – 40 MMBtu/hour to 40 ppm
  - Impacts three heaters
  - Delay 0.01 tons/day NOx emission reductions until units have to meet the 9 ppm limit
- 40 ppm limit is consistent NOx limits for boilers <40 MMBtu/hour and heaters <20 MMBtu/hour
- Units < 40 MMBtu/hr will have to meet 9 ppm limit after a future effective date when 50% or more of the burners are replaced
- Total NOx reductions at full implementation: 0.36 ton/day

Slide from Working Group Meeting #9



Torrance Refining Company Comment Letter

Torrance Refining Company (TORC) Comment Letter

- November 20, 2020, staff received a comment letter from TORC on PR 1109.1
  - Letter is posted on PR 1109.1 webpage (http://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/proposed-rule-1109-1)
- Key points
  - Recommended to pause or slow down the rulemaking - moving too quickly
  - BARCT levels have not been proven to be technologically feasible and cost-effective
  - Programmatic CEQA analysis must be conducted
  - NSR and permitting issues need to be addressed in PR 1109.1 rulemaking
  - Proposed phase compliance schedule is infeasible
- Provided comments on the initial draft rule language
- Rule process is moving too fast, concerned about March public hearing (addressed later in presentation)

TORC's Comment – BARCT Levels Not Proven to be Technically Feasible or Cost-Effective

- *Staff Response*:
  - Technical feasibility and cost-effectiveness assessments has been conducted for each class and category of equipment subject to PR 1109.1
  - Details of the assessments were presented during Working Group Meetings and stakeholders were invited to provide input on staff's conclusions
  - NOx limits are technically feasible through SCR, LNB, or a combination of both
  - Proposed NOx limits seek the highest level of NOx reductions that were demonstrated to be cost-effective
    - Staff relied on stakeholder feedback and the U.S. EPA SCR spreadsheet to estimate costs
  - NOx limits are supported by Norton and FERCo
    - Staff modified proposal based on comments from Norton and FERCo

TORC's Comment – Programmatic CEQA Must be Conducted

- *Staff Response*:
  - Programmatic Environmental Impact Report for 2016 AQMP evaluated all potential landing rules under CMB-05
  - The programmatic Environmental Assessment for 2015 NOx RECLAIM shave evaluated impacts from control technologies to lower NOx
  - A Supplemental Environmental Assessment is being prepared for PR 1109.1
    - Comprehensive analysis of all affected facilities and equipment
    - Evaluating all direct and indirect impacts
    - Tiers off previous programmatic documents since shave projects overlap with PR 1109.1 projects
  - Staff has reached out to all facilities to incorporate site specific information

TORC's Comment – NSR and Permitting Issues Need to be Addressed in PR 1109.1 Rulemaking

- *Staff Response*:
  - NSR and permitting is being addressed by the RECLAIM transition team
    - RECLAIM Transition Plan (version two) will be released soon, it discusses NSR and permitting issue
  - Staff intends to have clear path forward on the NSR and permitting issues prior to the Public Hearing on PR 1109.1

TORC's Comment – Proposed Compliance Schedule Infeasible

- *Staff Response*:
  - Staff understands the concerns over the proposed compliance deadlines
  - The proposed schedule was an initial proposal for discussion purposes
  - Based on stakeholder feedback, staff is proposing to a longer implementation schedule summarized in later slides

TORC's Comments on Initial Rule Language

Staff is working to address TORC's comments in the next version of PR 1109.1 but will highlight a few key comments in the following slides

TORC's Comment – Cost-Effectiveness of Heaters 40 to 110 MMBtu/hr

- <u>TORC Comment:</u>
  - Heaters in the 40 – 110 MMBtu/hr category were not cost-effective at a BARCT NOx limit of 2 ppmv since the cost per ton of NOx controlled exceeded $50,000/ton
  - BARCT limit of not less than 5 ppmv NOx should be used for this category of process heaters
- *Staff Response:*
  - The $50,000 cost-effectiveness is a guideline based on the 2016 AQMP
  - At the Working Group Meeting #14 (August 27, 2020) staff presented the revised cost-effectiveness which addressed outliers and units with SCR
    - The revised cost-effectiveness was $35,000
  - PR 1109.1 collapsed categories with the same NOx limits
  - Process Heaters ≥ 40 MMBtu/hr all have a NOx limit of 2 ppm

TORC's Comment – Start-up, Shutdown, and Malfunction (SSM) Provisions

- *Staff Response*
  - Staff is working with the U.S. EPA on the initial language and will include revisions in the next version of PR 1109.1, including:
    - Removing provision requiring facilities to submit schedules of all planned start-up and shutdowns and limiting occurrences
    - Specifically excluding emissions during start-up, shutdown, and malfunctions from rolling average emission calculations
  - Staff is working to further clarify start-up, shutdown, and malfunction definitions

TORC's Comment – Source Test Requirements for Units with Averaging Times > 3 Hours are Infeasible

- *Staff Response:*
  - Longer averaging times only apply to units required to maintain CEMS
    - Units with CEMS will require Relative Accuracy Test Audits (RATA) and not will not be subject to the source test requirements
    - RATA tests do not need to conducted for the entire averaging period
    - RATA requirements will be included in the Rule 218 series, not PR 1109.1

TORC's Comment – Staff Should Meet with Each Facility Regarding the Implementation Schedule

- *Staff Response:*
  - Staff agrees and will be scheduling meetings with all facilities with 6 or more units that require retrofit to discussion the compliance schedule and emission targets

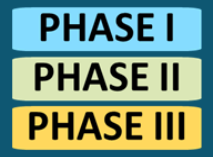
TORC's Comment – Future Effective NOx limits

- <u>TORC's comment</u>
  - District staff cannot bypass its statutory obligation and predetermine in PR 1109.1 a different or future BARCT limit until such time that a new BARCT analysis demonstrates that such a limit is technologically feasible and cost-effective through the appropriate rulemaking process, allowing for stakeholder involvement and public comment and hearing
- *Staff Response:*
  - The California Supreme Court upheld South Coast AQMD's authority to propose technology forcing emission limits
    - American Coatings Assn. v. South Coast AQMD, 54 Cal 4th 446, 467 (2012)
  - BARCT can rely on emerging technology that is achievable in the future, provided the technology is available by the future effective date
  - The future effective limits will be required at time of burner replacement
    - Cost will already be incurred at the facility

BARCT Compliance Alternative Plan (B-CAP)

B-CAP Recap

Proposed Implementation Approach for Facilities with 6 or More Units

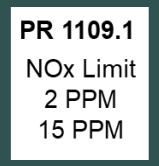


Three-phased implementation approach

Selection of the equipment in each phase must meet target NOx emission reductions

Operator can select units that will be in each of the three phases

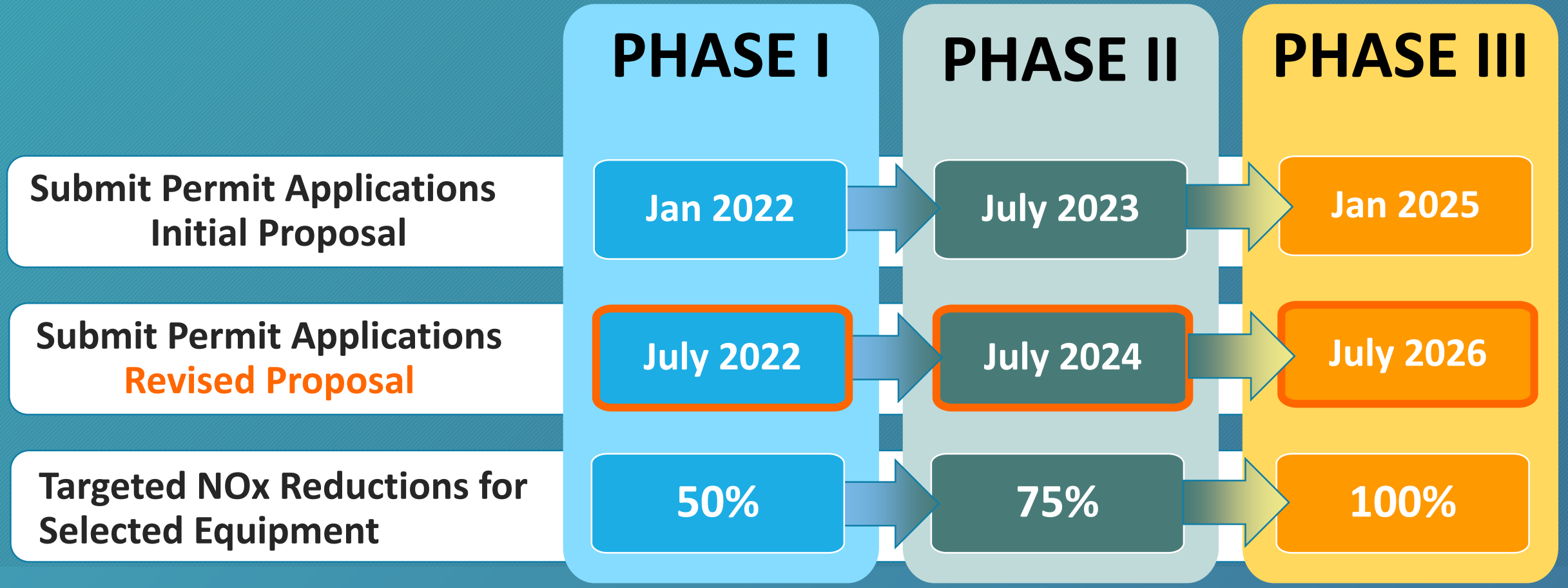
Each phase has compliance dates that operators must meet NOx emission limits for specific groups of equipment



Each piece of equipment must meet the Proposed Rule 1109.1 NOx and CO emission limits

Three Phase Implementation Approach

PHASE I
PHASE II
PHASE III



Proposed Implementation Schedule

	Date	Jan 2022	July 2022	Jan 2023	July 2023	Jan 2024	July 2024	Jan 2025	July 2025	Jan 2026	July 2026	Jan 2027	July 2027	Jan 2028	July 2028	Jan 2029	July 2029
Phase I	Permit Submittal for Phase I Units	★															
	South Coast AQMD Permit Review								↓								
	Implementation & Final Compliance																
Phase II	Permit Submittal for Phase II Units					★											
	South Coast AQMD Permit Review											↓					
	Implementation & Final Compliance																
Phase III	Permit Submittal for Phase III Units									★							
	South Coast AQMD Permit Review															↓	
	Implementation & Final Compliance																

↓ Must meet PR 1109.1 NOx and CO emission limits

Time extension provided meets specified criteria

Note: Schedule assumes permit applications will be approved in 18 months, actual times may vary

Rule Development Schedule

Proposed Rule 1109.1 Development

- Staff distributed first version of rule language on October 23rd
- Second version with BARCT Compliance Alterative Plan (B-CAP) was distributed on November 20th
  - Maintained initial rule language but included the B-CAP subdivision
  - Staff seeking feedback and is amending several provisions in the initial version of the rule language based on feedback
- Staff will schedule meetings with each facility that has 6 or more units to discuss the facility baseline and B-CAP Targets
- Staff will release a second version of draft rule language this month
- South Coast AQMD Governing Board moved the Public Hearing from March to June 2021

Next Steps

- Discuss Facility-Specific B-CAP information with Facilities
- Continue Meetings with Stakeholders
- Release Preliminary Draft Staff Report and Rule Language
- Public Workshop
- Public Hearing

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