Proposed Rule 1109.1 – Emissions of Oxides of Nitrogen for Petroleum Refineries and Related Operations

Working Group Meeting #24

July 28, 2021

Join Zoom Webinar
https://scaqmd.zoom.us/j/95665083938
Webinar ID: 956 6508 3938
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Agenda

- Progress and Status Since Working Group Meeting #23
- BARCT Reassessment for Vapor Incinerators: Non-Refinery Flare
- Rule Language Updates Released 7/21/21

Progress and Status Since WGM #23

Status and Progress Since Last WGM

- Completed BARCT reassessment for all categories
- Continued meetings with stakeholders, WSPA, and environmental representatives
- Released third version of rule language with updated alternative compliance options

Stakeholder Meetings in 2021

5

Chevron

- February 19
- February 26
- April 1
- May 20
- June 16
- July 14

Marathon

- January 27
- February 17
- February 24
- March 9
- March 23
- May 13
- July 27

Phillips 66

- February 16
- March 4
- March 31
- July 15
- July 23

Torrance

- January 29
- February 12
- February 26
- March 12
- March 24
- April 9
- April 28
- May 18
- June 1
- June 16
- July 1
- July 20
- July 27

Valero

- January 29
- February 24
- April 16
- May 5
- May 19
- June 2
- July 27

Stakeholder Meetings in 2021 (*cont.*)

Environmental Groups[1]

- February 26
- March 17
- April 2
- April 16
- April 30
- May 14
- May 28
- June 11
- June 25
- July 16
- July 23

WSPA

- May 20
- June 18
- June 24
- July 1
- July 8
- July 16
- July 23

AltAir

- March 10
- May 11
- May 25

World Oil

- January 13
- April 28

Eco Services

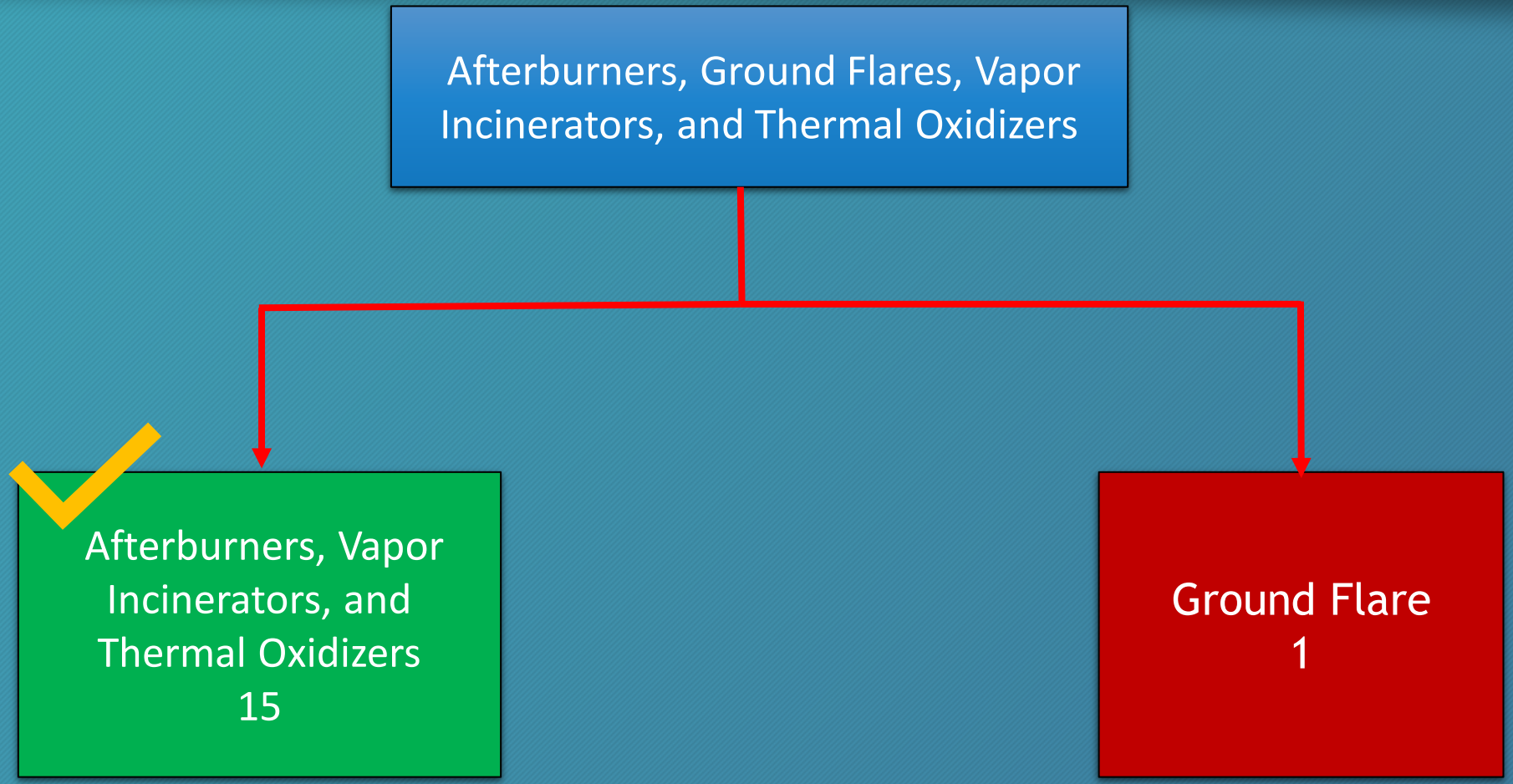
- June 11

[1] Biological Diversity, Coalition for Clean Air, Earth Justice, Communities for a Better Environment, Natural Resources Defense Council and East Yard Communities for Environmental Justice

Non-Refinery Flare Follow-Up

7

Vapor Incinerators



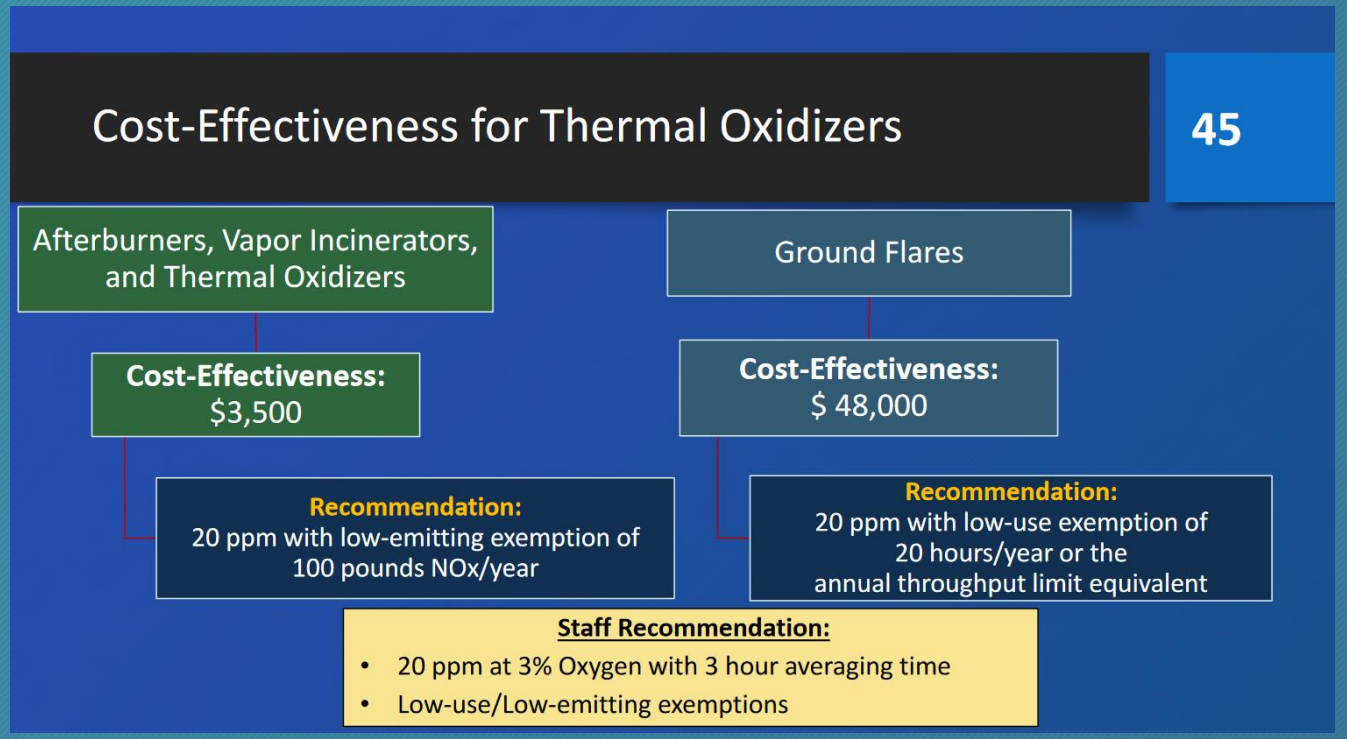
Flares Subject to PR 1109.1 - Background

- Refinery flares are subject to Rule 1118 - Control of Emissions From Refinery Flares and are **not** subject to Rule 1109.1
- One non-refinery flare (not subject to Rule 1118) will be subject to PR 1109.1 that is used for liquid unloading and tank degassing
- Staff further refined the definition of the flare to make it clearer that Rule 1118 refinery flares are not subject to PR 1109.1

FLARE means, for the purpose of this rule, a combustion device that oxidizes combustible gases or vapors from tank farms or liquid unloading, where the combustible gases or vapors being destroyed are routed directly into the burner without energy recovery, and it is not subject to Rule 1118 – Control of Emissions from Refinery Flares.

Flares Subject to PR 1109.1 – Background (*cont.*)

- At WGM #12, staff proposed a BARCT NOx limit of 20 ppm at 3% O_2 with burner control with low-use exemption of 20 hours/year
  - Only 1 small open flare in category
  - Used for air pollution control device for truck unloading and tank de-gassing
- Staff received updated cost for flare replacement
  - Flare replacement was already determined not to be cost-effective but low use threshold was set based on original cost estimates



Flares Subject to PR 1109.1 – Background on Technical Feasibility

- Staff presented the technical feasibility of emission control technology for flares in WGM #12
  - Low-NOx flares can achieve 20 ppm (0.025 pounds per MMBtu)
    - Achieved in practice
    - Consistent with NOx limits in Rule 1118.1 - Control of Emissions From Non-refinery Flares

Flare – Low-Use Exemption Re-Assessment

- Staff originally proposed a low-use limit of 20-hour/year based on original cost assumptions
  - After 20 hours, it was cost effective to replace unit
- Based on updated costs, cost-effectiveness for a flare replacement is ~$500,000 per ton of NOx reduced
- Existing unit is a 20-year-old open flare that cannot be source tested
  - Most open flares have been phased out in our jurisdiction
    - Rule 1150.1 phased out most open flares by January 1, 2018
    - Rule 1118.1 requires flare replacement if an open flare operates at more than 5% capacity
- Considering a low-emitting exemption of no more than one pound NOx per day, if unit exceeds threshold for two consecutive years, flare replacement will be required

Flare – Staff Recommendations

PR 1109.1 Flares

BARCT Limit
20 ppm

Recommendation:
Low-emitting exemption of less than one lb/day, a unit that exceeds one lb/day for two consecutive years will require replacement

Staff Comment:

- No anticipated emission reductions

Rule Language Updates Released on 7/21/21

Rule Structure

- (a) Purpose
- (b) Applicability
- (c) Definitions
- (d) Emission Limits
- (e) Compliance Schedule
- (f) B-Plan Requirements
- (g) B-Cap Requirements
- (h) Additional Provisions for Compliance Plans
- (i) CEMS Requirements
- (j) Source Test Requirements
- (k) Diagnostics Emission Checks
- (l) Monitoring, Recordkeeping, and Reporting Requirements
- (m) Exemptions

Rule Attachments

- (A) Supplemental Requirements
- (B) I-Plan Requirements
- (C) B-Plan Requirements
- (D) B-Cap Requirements
- (E) Facilities Emissions – Baseline and Targets

Subdivisions (a) and (b)

- **Subdivision (a) – Purpose**

  The purpose of this rule is to reduce emissions of oxides of nitrogen (NOx), while not increasing carbon monoxide (CO) emissions, from units at petroleum refineries and facilities with related operations to petroleum refineries

- **Subdivision (b) – Applicability**

  The provisions of this rule apply to an owner or operator of units at petroleum refineries and facilities with related operations to petroleum refineries

  - include asphalt plants, biofuel plants, hydrogen production plants, petroleum coke calcining facilities, sulfuric acid plants, and sulfur recovery plants

Subdivision (c) – Definitions

- Most of the new definitions describe aspects of the compliance plans
- New definitions also include:
  - Former RECLAIM Facility which was added to clarify when certain requirements will take effect
  - Natural gas and refinery fuel gas because gas turbines have different NOx limits depending on fuel
  - Units with combined stacks to clarify the applicable requirements

Subdivision (d) – Emission Limits

- Subdivision (d) contains the emission limits, including:
  - Table 1: NOx and CO Emission Limits that represent BARCT
  - Table 2: NOx Emission Limits Near Table 1 NOx Limits
  - Table 3: Interim NOx and CO Emission Limits which are the bridge limits
- Tables were streamlined and compliance dates were moved to subdivision (e)

PR 1109.1 Table 1

- Table 1 lists NOx and CO limits, averaging times, and oxygen correction

TABLE 1: NOx AND CO EMISSION LIMITS

Unit	NOx (ppmv)	CO (ppmv)	Percent O_2	Rolling Averaging Time
Boilers <40 MMBtu/hour	Pursuant to paragraph (d)(2)	400	3	2-hour
Boilers ≥40 MMBtu/hour	5	400	3	24-hour
Flares	20	400	3	2-hour
FCCU	2	500	3	365-day
	5			7-day
Gas Turbines fueled with Natural Gas	2	130	15	24-hour
Gas Turbines fueled with Refinery Fuel Gas	3	130	15	24-hour
Petroleum Coke Calciner	5	2,000	3	365-day
	10			7-day
Process Heaters <40 MMBtu/hour	Pursuant to paragraph (d)(3)	400	3	2-hour
Process Heaters ≥40 MMBtu/hour	5	400	3	24-hour
SRU/TG Incinerators	30	400	3	24-hour
SMR Heaters	5	400	3	24-hour
SMR Heaters with Gas Turbine	5	130	15	24-hour
Sulfuric Acid Furnaces	30	400	3	365-day
Vapor Incinerators	30	400	3	2-hour

Subdivision (d) – Emission Limits for Boilers and Process Heaters <40 MMBtu/hr

- NOx limits for boilers <40MMBtu/hour
  - Units will be required to meet a 40 ppmv limit as established in a permit to operate issued on or before January 1, 2023
  - Will be required to meet 5 ppmv when 50% or more of the burners or 50% or more of the heat input are replaced
- NOx limits for process heaters <40MMBtu/hour
  - Units will be required to meet a 40 ppmv limit as established in a permit to operate issued on or before January 1, 2023
  - Ten years after rule adoption, units will be required to meet 9 ppmv when 50% or more of the burners or 50% or more of the heat input are replaced
    - Ten-year timeframe because the 9 ppmv limit relies on emerging technology

PR 1109.1 Table 2

Table 2 lists units with the near limits

TABLE 2: NOx EMISSION LIMITS NEAR TABLE 1 NOx LIMITS

Unit	NOx (ppmv)	CO (ppmv)	Percent O_2	Rolling Averaging Time
FCCU	8	500	3	365-day
	16			7-day
Gas Turbines fueled with Natural Gas	2.5	130	15	24-hour
Process Heaters 40 – 110 MMBtu/hour	18	400	3	24-hour
Process Heaters >110 MMBtu/hour	22	400	3	24-hour
SMR Heaters	7.5	400	3	24-hour
Vapor Incinerators	40	400	3	2-hour

PR 1109.1 Table 3

Table 3 lists the interim bridge limits

TABLE 3: INTERIM NOx AND CO EMISSION LIMITS

Unit	NOx (ppmv)	CO (ppmv)	Percent O2	Rolling Averaging Time[1]
Boilers and Process Heaters <40 MMBtu/hour	40	400	3	365-day
Boilers and Process Heaters ≥40 MMBtu/hour	Pursuant to paragraph (d)(13)	400	3	365-day
FCCU	40	500	3	365-day
Gas Turbines fueled with Natural Gas or Refinery Fuel Gas	20	130	15	365-day
Petroleum Coke Calciner	70	2,000	3	365-day
SRU/TG Incinerators	100	400	3	365-day
SMR Heaters	20[1]	400	3	365-day
	60[2]			365-day
SMR Heaters with Gas Turbine	5	130	15	365-day
Sulfuric Acid Furnaces	30	400	3	365-day
Vapor Incinerators	105	400	3	365-day

[1] SMR Heaters with post-combustion air pollution control equipment installed before [DATE OF RULE ADOPTION].

[2] SMR Heaters without post-combustion air pollution control equipment installed before [DATE OF RULE ADOPTION].

Subdivision (d) – Interim Limit for boilers and process heaters ≥40 MMBtu/hr

- Interim Limit for boilers and process heaters ≥40 MMBtu/hr in paragraph (d)(13)
  - Interim facility-wide NOx emission rate of 0.03 pound per million BTU of heat input is applicable for all boilers and process heaters ≥40 MMBtu/hr based on the maximum rated capacity until other NOx Rule 1109.1 Emission Limits are effective
  - For units firing at less than the maximum rated capacity, mass emissions shall be less than or equal to the quantity that would occur at maximum rated capacity

Subdivision (d) – Other Provisions

- Allowing for higher NOx limit (5 ppmv) for gas turbines during periods of natural gas curtailment:
  - Natural gas curtailment is a shortage in the supply of natural gas due to supply limitations or restrictions
- If CO limit in permit is higher than Table 1, operators can retain the higher CO limit
- Allowing 365-day averaging times for initial 18 months of complying with limits to help with the transition from annual compliance in RECLAIM program NOx concentration limits
- For units with 365-day averaging time, allowing 14 months for the unit to comply with rolling average

Subdivision (e) – Compliance Schedule

- Subdivision (e) establishes two compliance schedules
- Operators with less than six units must:
  - Submit permit applications by July 1, 2023 and meet the NOx and CO emission limits in Table 1 no later than 36 months after a Permit to Construct is issued
- Compliance schedule for operators with six or more units complying with Table 1 /Table 2, a B-Plan, or a B-Cap shall be based on either:
  - Submitting permit applications by July 1, 2023 and meeting the NOx and CO limits no later than 36 months after a Permit to Construct is issued; or
  - Submit an I-Plan and meet the NOx and CO limits based on the schedule established in this subdivision

Subdivision (e) – I-Plan Compliance Schedule

- I-Plan is an alternative compliance schedule for facilities with six or more units
- I-Plan can be used for facilities complying with Table 1 limits, an approved B-Plan, or an approved B-Cap
- Compliance schedule and percent reductions listed in Table 4
- I-Plan must be submitted for approval by July 1, 2022:
  - Identify unit(s) to meet at least the Percent Reduction Targets for each Phase
  - Submit turnaround schedule for each unit
  - Specify I-Plan Option 1 or I-Plan Option 2

TABLE 4: I-PLAN PERCENT REDUCTION TARGETS AND SCHEDULE[1]

		Phase I	Phase II	Phase III
I-Plan Option 1	**Percent Reduction Targets**	**70**	**100**	**N/A**
	Permit Application Submittal Date	July 1, 2023	January 1, 2027	N/A
	Compliance Date	No later than 36 months after a Permit to Construct is issued	No later than 36 months after a Permit to Construct is issued	NA
I-Plan Option 2	**Percent Reduction Targets**	**60**	**80**	**100**
	Permit Application Submittal Date	July 1, 2023	January 1, 2025	January 1, 2028
	Compliance Date	No later than 36 months after a Permit to Construct is issued	No later than 36 months after a Permit to Construct is issued	No later than 36 months after a Permit to Construct is issued

[1] Percent reduction targets represent refinery-wide emission reductions including refineries under common ownership pursuant to Attachment E.

Subdivision (e) – I-Plan Provisions

- I-Plan Review
  - Rule 1109.1 considers a 30-day period to resubmit a corrected I-Plan if the Executive Officer disapproves the initial I-Plan
  - Upon second disapproval of the I-Plan by the Executive Officer, the owner or operator will be required to comply with the implementation schedule in paragraph (e)(1)
- I-Plan Extension
  - Under an approved I-Plan, one 12-month extension may be requested for each unit from the Compliance Date in Table 4
    - The request shall be made in writing no later than 90 days prior to the compliance date
  - If disapproved, the applicable emission limits must be met within 60 calendar days after notification of disapproval is received

Subdivision (e) – Other Compliance Schedule Provisions

- A unit complying with a near limit will be required to meet Table 1 limits if the NOx control equipment is replaced
- A unit meeting a low-use or low-emitting exemption that exceeds the exemption limits will have 6 months to submit a permit to comply with the Table 1 limits and 36 months to meet the limits after the permit to operate is issued

Subdivision (f) – B-Plan Provisions

- The following are the requirements for a facility complying with a B-Plan:
  - B-Plan must be submitted no later than July 1, 2022
  - B-Plan may include all or part of the units in the corresponding facility
    - Common ownership is acknowledged
  - Alternative BARCT NOx limits for each unit to be identified by the owner or operator
  - Included units in the B-Plan cumulatively meet the Facility BARCT Emission Target
  - Equivalent Mass Emissions ≤ Facility BARCT Emission Target
  - Sum of the Alternative Unit Share ≥ I-Plan Percent Reduction Targets for each Phase in Table 4

Subdivision (f) – B-Plan Provisions (*cont.*)

- If the B-Plan is disapproved, the owner or operator must resubmit the corrected B-Plan for approval within 30 days
- Upon the second disapproval of the B-Plan, the owner or operator is subject to comply with the emission limits in Table 1 or Table 2
- If the B-Plan is approved, all included units must acquire an enforceable South Coast AQMD permit condition, limiting:
  - NOx to the Alternative BARCT NOx limits for each unit in the B-Plan based on the applicable percent O2 and averaging time in Table 1
  - CO to the Table 1 CO limits for each unit in the B-Plan based on the applicable percent O2 and averaging time in Table 1

Subdivision (g) – B-Cap Provisions

- Pre-preliminary draft rule contained some requirements, but provisions are still in development
- B-Cap is a mass cap alternative option
- Staff is proposing Maximum Alternative BARCT NOx to ensure all units will have a minimum level of control

TABLE 5: Maximum Alternative BARCT NOx Limits

Unit	Alternative NOx Limit (ppmv)	Percent Oxygen
Boilers and Process Heaters <40 MMBtu/hour	TBD	3
Boilers and Process Heaters ≥40 MMBtu/hour	TBD	3
FCCU	TBD	3
Gas Turbines	TBD	15
Petroleum Coke Calciner	TBD	3
SRU/TG Incinerator	TBD	3
Vapor Incinerator	TBD	3

Subdivision (h) – Additional Provisions for Compliance Plans

- Modification to B-Plan and B-Cap
  - Modifications to B-Plan or B-Cap must be submitted to the Executive Officer no later than 90 days before the Permit Application Submittal Deadline in Table 4 (I-Plan)
  - Percent Reduction Targets in Table 4 and Facility BARCT Emission Targets must be met
- Turnaround Provision:

  An owner or operator complying with an approved I-Plan can request a time extension from the Compliance Date in Table 4 if a permit to construct is issued more than 24 months after the date the permit application is deemed complete, provided:
  - The permit to construct is issued after the units scheduled turnaround
  - The subsequent scheduled turnaround for that unit does not occur until 12 months after the Compliance Date in Table 4; which could be accommodated through “time extension provision”

Subdivision (i) – CEMS Provisions

- CEMS will be required for all units ≥40 MMBtu/hour
- Once facilities exit RECLAIM, they will have to comply with:
  - Rule 218.2 – Continuous Emission Monitoring System: General Provisions; and
  - Rule 218.3 – Continuous Emission Monitoring System: Performance Specifications
- CO CEMS will not be required on all units but units with an existing CO CEMS will be required to maintain it

Subdivision (j) – Source Test Provisions

- For a unit with no CEMS requirement, compliance will be demonstrated by conducting a source test according to the schedule in Table 6
- A former RECLAIM Facility with a unit that has not conducted a source test within the schedule in Table 6 shall conduct a source test within:
  - 6 months from receiving a final determination notification for units 20 to <40 MMBtu/hour
  - 12 months from receiving a final determination notification for units <20 MMBtu/hour

TABLE 6: SOURCE TESTING SCHEDULE

Combustion Equipment	Source Test Schedule
Vapor Incinerators and Flares <40MMBtu/hr	Within 36 months from previous source test and every 36 months thereafter
All Other Units	Within 12 months from previous source test and every 12 months thereafter

Subdivision (j) – Source Test Provisions (*cont.*)

- For units with air pollution control equipment with ammonia emissions in the exhaust, compliance with the ammonia permit limit shall be demonstrated through:
  - Using an ammonia CEMS
  - Conducting ammonia source testing according to the procedures in District Source Test Method 207.1 – Determination of Ammonia Emissions from Stationary Sources
    - Quarterly during the first 12 months of unit operation and thereafter
    - Annually when 4 consecutive quarterly source tests demonstrate compliance
    - Back to quarterly if an annual test demonstrates emissions exceed permit limit
- Source test must be conducted simultaneously for ammonia, NOx and CO for the units with no NOx and CO CEMS

Subdivision (k) – Diagnostic Emission Checks

- PR 1109.1 requires diagnostic emission checks to be conducted at least:
  - Every 90 days or every 2,000 operating hours, whichever occurs later, for units that require a source test every 12 months
  - Every 365 days or every 8760 operating hours, whichever occurs later, for units that require a source test every 36 months
- Staff is considering removing the diagnostic emission check for units with 12 months source test requirement

Subdivision (i) – Monitoring, Recordkeeping and Reporting (MRR) Requirements

- New MRR requirements for low-emitting and low-use units exempted from PR 1109.1 NOx emissions requirements
- MRR requirements for 0.03 lb/MMBtu interim limit for boilers and process heaters ≥40 MMBtu/hr still in development

Subdivision (m) – Exemptions

- Most of the strikeout language in the exemption section is from reorganizing the provisions
  - Near limits that were include as exemptions moved to subdivision (d)
- New or amended exemptions include:
  - Amended exemption for small boilers or heaters (≤2 MMBtu/hour) used for space or water heating that will be subject to Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters
  - Added a low-use exemption for process heater fired at less than 15 percent of the rated heat input capacity
  - Added an exemption for a FCCU that must bypass the post-combustion air pollution control equipment to conduct boiler inspections required under California Code of Regulations, Title 8, Section 770(b)

PR 1109.1 – Attachments

- Attachment A
  - Contains the approach to calculate rolling average concentrations for units with CEMS
- Attachment B
  - Contains the approach and basis for determination of I-Plan elements (I-Plan Percent Reduction Targets for each phase, Unit Shares, and Alternative Unit Shares)
- Attachment C
  - Provides the method to calculate Facility BARCT Emission Target and Equivalent Mass Emissions under a B-Plan
- Attachment D
  - Provides the method to calculate the deterministic values to demonstrate compliance under a B-Cap
- Attachment E
  - Includes facilities baseline and target emissions as determined by the Executive Officer

Next Steps

Continue Discussions with Stakeholders

Release Preliminary Draft Staff Report and Rule Language

Public Workshop

Public Hearing November 2021

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