Proposed Rule 1435 – Control of Toxic Air Contaminant Emissions from Metal Heating Operations

WORKING GROUP MEETING #4

November 16, 2023
1:30 PM
South Coast AQMD
Diamond Bar, CA

Join Zoom Webinar Meeting

https://scaqmd.zoom.us/j/96825066787

Zoom Webinar ID: 968 2506 6787
Teleconference Dial In: +1 669 900 6833

Agenda

- Summary of Working Group Meeting #3
- Responses to Comments
- Preliminary Rule Concepts
- Next Steps

Summary of Working Group Meeting #3

- Responded to comments from Working Group Meeting #2
- Described hexavalent chromium sources and potential control strategies
- Provided a summary of information observed at site visits

Stakeholder Comments from Working Group Meeting #3

Comment #1

What is the difference between emission concentration and mass emission rate?

Comment #2

Is there recent ambient air monitoring data that can be provided for the Paramount area?

Comment #3

Is there ambient monitoring data that shows that emissions from furnaces are a health risk to neighboring areas?

Comment #4

Due to limitations of the methodology, the CE-CERT study findings should not be used to establish a temperature threshold

Comment #5

What are the implementation challenges that were referred to in Working Group Meeting #3?

What is the difference between emission concentration and mass emission rate?

	Mass Emission Rate	Emission Concentration
Definition	Amount of pollutant over a time interval	Amount of a pollutant in a volume
Units	Grams per hour or pounds per hour	Grams per cubic meter or cubic feet, parts per million, or a percentage
Other Considerations	• Value remains the same despite changes to dilution air • Can be used to quantify the amount pollutant discharged from a source	• Value can change ◦ Dependent on changes to amount of dilution air
Limitations		Does not express quantity of pollutants emitted

Example 1.	Mass Emission Rate = 60 g/hr	Flow = 100 ft^3/minute	Concentration = 10 mg/dscf
Example 2.	Mass Emission Rate = 60 g/hr	Flow = 1,000 ft^3/minute	Concentration = 1 mg/dscf

Comment #2

Is there recent ambient air monitoring data that can be provided for the Paramount area?

- Beginning in 2016, monitoring was conducted in City of Paramount industrialized areas to assess hexavalent chromium levels
- Elevated levels were detected and ongoing efforts to improve air quality include inspections and compliance actions, voluntary actions by facilities and new rule requirements
- Air monitoring data (2016-2023) shows improvements in the study area
  - However, monitoring locations with long term data are limited and not intended to quantify impacts from metal heating furnaces*
  - Not located near fenceline of metal heating facilities*

**Except for one, which has installed controls*

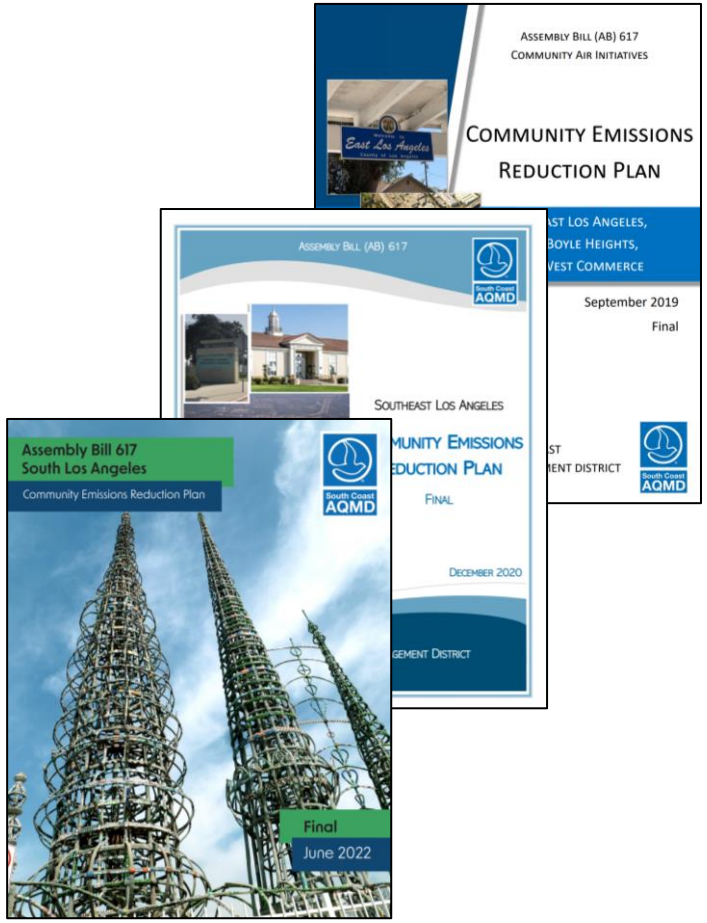
- South Coast AQMD monitoring
  - October 2016 – Sept. 2021
    - http://www.aqmd.gov/docs/default-source/compliance/Paramount/expanded-monitoring-data-and-map.pdf?sfvrsn=1805

- City of Paramount monitoring
  - Nov. 2021 – Dec. 2022
    - https://tbsysclient.com/paramount/paramounthexchrometbsys2022.pdf
  - 2023
    - https://tbsysclient.com/paramount/paramounthexchrometbsys.pdf

Comment #2 cont'd

Is there recent ambient air monitoring data that can be provided for the Paramount area?

- Approximately 120 potential PR 1435 facilities are outside of Paramount study area
- Hexavalent chromium is highly toxic and toxics emissions remain a key concern for disadvantaged communities



Comment #3

Is there ambient monitoring data that shows that emissions from furnaces are a health risk to neighboring areas?

- Ambient monitoring is the systematic assessment of pollutant levels by measuring the quantity and types of certain pollutants in the surrounding, outdoor air
  - Could help identify potential sources of emissions
  - Typically not used to quantify risk impacts from an emission source
- Health risk assessment is a technical study involving identification of toxic air contaminant emissions released from a facility, exposure assessment, dose response assessment and risk characterization
  - Health risk is determined by established risk assessment procedures

➢ Under proposed concepts, facilities have the option to conduct emissions testing to quantify emissions and the associated risk impacts (to be presented in later slides)

Comment #4

Due to limitations of the methodology, the CE-CERT study findings should not be used to establish a temperature threshold

Study Design

- CE-CERT study is qualitative
- Designed to explore formation of hexavalent chromium from metal heating furnaces

Clear and Consistent Results

- Showed hexavalent chromium emissions from metal heating
- Correlation between increasing emissions and increasing furnace temperatures

Other Findings

- Simultaneous upstream and downstream samples taken in the ducting showed consistent results, demonstrating that hexavalent chromium is not being reduced in the ducting

Comment #4 cont'd

Due to limitations of the methodology, the CE-CERT study findings should not be used to establish a temperature threshold

- Initially, samples were tested at highest temperature, however, study was not designed to develop an emission factor
- Due to concerns over the testing sequence, staff intends to evaluate other sources of information to establish a temperature threshold
  - Source test conducted at a heat treating facility found elevated hexavalent chromium emissions during a furnace operating temperature as low as 1250°F
  - Staff is proposing a minimum temperature threshold based on the source test results (in line with CE-CERT study and other screening source tests)

What are the implementation challenges that were referred to in Working Group Meeting #3?

- In Working Group Meeting #3, staff discussed control strategies including permanent total enclosures (PTEs) venting to HEPA, or better, filtration systems
- During facility site visits, stakeholders described challenges to installing air pollution controls, including:
  - Large building sizes would necessitate extensive electrical power to achieve required negative air flow levels for PTEs
  - Limited space to install multiple control devices
  - Difficult to section off areas for PTEs due to large equipment moving large heated metal workpieces within building
  - Equipment and materials above furnaces and could interfere with the necessary ducting for individual furnace capture devices
- Staff will take into consideration these implementation challenges and work with stakeholders to develop innovative methods and solutions

➢ Under proposed concepts, multiple compliance options are available (to be presented in later slides)

Preliminary Rule Concepts

- Rule Applicability
- Control Strategies for Fugitive Emissions
- Control Strategies for Point Sources

Summary of Information Sources

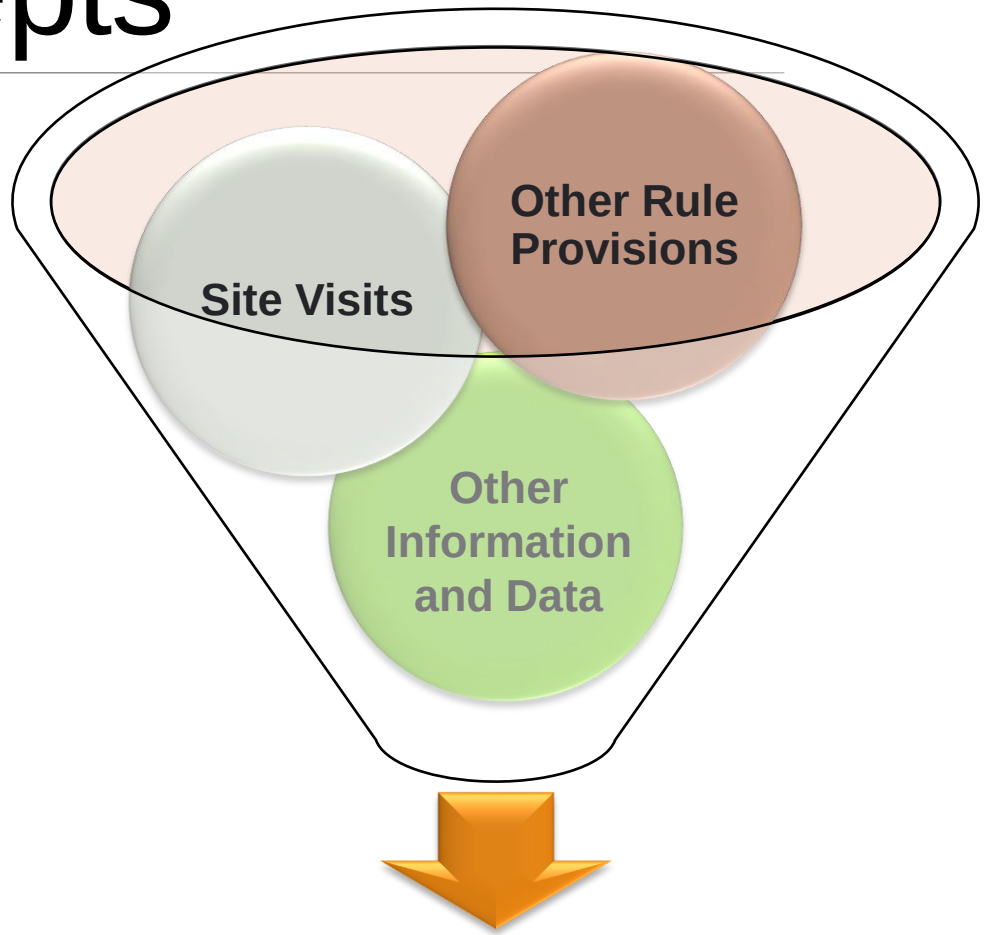
- Ambient monitoring identified elevated hexavalent chromium levels in Paramount in 2016-2017
- Subsequent studies conducted to identify sources and to better characterize emissions from metal heating
  - Screening source tests of furnaces and measurements at accompanying metal heating processes (quench tanks, metal dust build-up, etc.)
  - Full source test evaluations to quantify furnace emissions
  - Health Risk Assessment to quantify risk from a heat treating facility
  - CE-CERT study to better understand hexavalent chromium formation
- Each study has limitations but further identify metal heating as a hexavalent chromium emissions source
- Staff will summarize findings in relation to PR 1435 in the next slide

Summary of Key Findings

	Source Tests	Screening Source Tests	Other Tests	CE-CERT Study	Health Risk Assessment
Key Findings	• Significant hexavalent chromium emissions when heating chromium alloy at temperature of 1250°F and higher • Emissions ranged from non-detected to significant when heating titanium	• Concentrations of hexavalent chromium detected in furnace exhaust streams at temperature as low as 1725°F • Emissions can be attributed to support metals in furnace (e.g., racks)	• Metal dust can contain hexavalent chromium • Hexavalent chromium present in quench water • Hexavalent chromium emissions from quench tank cooling tower	• Hexavalent chromium emission rates vary as a function of temperature and amount of chrome in alloy • Emissions can be generated from support racks and other metal furnace components • Hexavalent chromium is not being reduced in the ducting • Emissions detected in empty furnaces due to contamination	• Emissions from facility posed a significant risk at receptors • Hexavalent chromium emissions from furnaces identified as a primary driver of risk • Nickel was driver of certain hazard indices
Limitations	Mass emissions data specific to operating conditions at the facility	Mass emissions not measured	Data specific to operating conditions at the facility	• Laboratory setting • Not suitable to establish emission factor	Health risk analysis specific to subject facility
Use for PR 1435	• Demonstrated furnace is a significant source of hexavalent chromium • Establish temperature applicability threshold	• Demonstrated support racks and other metal furnace components can be sources of hexavalent chromium • Results support temperature applicability threshold	• Demonstrated recirculating water quench tanks could be a significant source • Establish need for fugitive emission controls	• Demonstrated metal heating operations are sources of hexavalent chromium • Demonstrated mechanism of furnace contamination and potential mitigation strategies	• Demonstrated furnace is a significant source of hexavalent chromium • Emissions from multiple furnaces could pose significant health risks to receptors

Preliminary Rule Concepts

- Rule concepts are initial thoughts for proposed provisions and consider:
  - Provisions in other toxic metal particulate rules
  - Information gathered from facilities during site visits
  - Other information and data
- Stakeholder input on rule concepts helps shape Proposed Rule Language



Rule Applicability

- PR 1435 would apply to metal heating operations with furnaces with maximum operating temperatures of 1250°F and above
  - Temperature based on source test results, which showed hexavalent chromium emissions at 1250°F
- Staff is open to discussing other methods of setting a threshold

Control Strategies for Fugitive Sources

Sources of Fugitive Emissions

- Strategies to reduce fugitive emissions would be implemented by all applicable metal heating facilities

Housekeeping – Background

- In recent years, a number of toxic metal particulate rules have been amended or adopted
  - Housekeeping requirements were strengthened to minimize fugitive emissions from operations involving toxic metal particulates
- Requirements are generally similar across the rules
- PR 1435 housekeeping concepts address accumulation of metal particulate dust

Housekeeping Concepts

- Routine cleaning of areas using approved cleaning methods where heating, cooling, quenching, or workpiece storage occur
  - Clean at least once a day during days when metal heating occurs
- Approved cleaning methods are cleaning methods that do not re-entrain dust into the air (e.g., mopping, wet cleaning, HEPA vacuum)
- Routine cleaning of furnace chambers using a HEPA vacuum
  - Once a month if furnace was operated one or more days in that month

Best Management Practices – Background

- Best management practices (BMPs) include a suite of different types of requirements that when implemented can ensure:
  - Fugitive emissions from metal heating operations are minimized
  - Proper operation of pollution controls
- Requirements for BMPs are present in all toxic metal rules

Best Management Practices – Concepts

Disposal of Waste

- Dispose of metal particulates, as well as used refractory and other materials potentially contaminated with hexavalent chromium, in closed containers

Control Equipment Parameter Monitoring

- Conduct control equipment parameter monitoring and replace as needed (e.g., baghouse and HEPA filters)

Buildings – Concepts

- Building openings can increase cross drafts and the chances of emissions leaving the facility

Proposal

- Close building openings:
  - Located within 20 feet of furnace door or exhaust
  - On one end for each pair of opposing ends of the building
- Conduct all workpiece cooling within a building
- All furnaces must be located within a building
  - Within 2 years of rule adoption

A **building** is a type of enclosure that is a structure, enclosed with a floor, walls, and a roof to prevent exposure to the elements (e.g., precipitation or wind)

Prohibitions – Concepts

- Screening source tests and CE-CERT study has shown that presence of material containing chromium in a furnace (e.g. racks) can lead to hexavalent chromium emissions

Potential Concepts

- Discontinue the use of racks or stands with chromium content over 0.5% by weight if emissions are not controlled
  - Within one year of rule adoption
- Prohibit the use of furnace refractory material containing chromium if emissions are not controlled
  - Within one year of rule adoption

Control Strategies for Point Sources

Point Sources

- Furnaces and water quench tanks have been identified as point sources of hexavalent chromium emissions
- Proposed rule concepts would control both emission sources

Control Strategies for Water Quench Tanks

- Testing and sampling conducted at water quench tank showed elevated levels of hexavalent chromium
  - Present in quench water
  - Emitted from the quench tank's direct circulating cooling tower
- Proposal:
  - Discontinue use of direct circulating cooling towers within 3 months of rule adoption
  - Periodically monitor hexavalent chromium levels in the tank and treat or replace water

Example of Feasibility

- A heat treating facility removed their direct cooling tower serving the water quench tank and doses water with ferrous sulfate monthly
  - Shown to be effective at reducing hexavalent chromium levels in water

Furnace Emissions Controls – Background

- Furnaces were identified as sources of hexavalent chromium emissions
  - Identified via source tests, screening source tests, and CE-CERT study
- Proposed rule concepts:
  - Prioritize larger facilities with high emissions potential
  - Require smaller facilities to gather and submit information for a future phase of the rule

Examples of Emissions Controls Feasibility

- A heat treating facility operates furnaces within PTEs vented to ULPA filters
- Metal melting furnaces:
  - Rule 1407.1 requires furnaces that melt chromium alloys to be controlled using capture and control systems vented to HEPA filters

Furnace Emissions Controls – Proposal

- Staff recognizes:
  - Need to reduce emissions from furnaces
  - It may be challenging for some facilities to install PTEs
  - Facilities vary in size, number of furnaces, and operational workflows
  - Risk potential is not quantified for most metal heating facilities
    - Except for one heat treating facility that submitted a Health Risk Assessment
    - Specific emission factors not available
- PR 1435 proposes multiple compliance pathways, using a tiered approach to classifying facilities
  - Dependent on facility's emissions potential

Tiered Approach

- Facilities with more furnaces and/or larger furnaces have higher potential to emit
- Facilities processing metal with higher percentage of toxics have higher potential to emit
- Facilities with higher potential to emit would be required to control furnace emissions or quantify risk impacts to nearby receptors
  - Other facilities would be required to submit information to South Coast AQMD and to conduct source tests to determine their emissions profile

Proposing to categorize facilities into two tiers:

Tier 2 – Facilities with higher emission potential

Capture and control emissions or quantify risk impacts

Tier 1 – Facilities with lower emission potential

Submit information and require source testing

Facility Tiers

Tier 2 facilities would be determined based on:

- Total number of furnaces
- Total furnace rating facility-wide (e.g. total Btu/hr)
- Types of alloy present in furnaces (e.g. percentage of chromium in alloy)
  - Includes workpieces and support metals (e.g. metal racks)

Tier 1 facilities would be metal heating facilities that do not meet Tier 2 criteria

Potential Tier 2 Compliance Pathways

- Considering multiple compliance pathways for Tier 2 facilities:
  - Option 1 – Install PTEs and HEPA controls for metal heating operations
  - Option 2 – Capture and control emissions above all furnace exhaust vents
  - Option 3 – Demonstrate health risk is below certain risk thresholds at nearest receptor
- Options are provided in consideration of challenges to installing air pollution controls
- Additional compliance pathways may be explored

Option 1: Install PTEs and HEPA controls

Background

- PTEs meet requirements in EPA Method 204 – Criteria for and Verification of a Permanent or Temporary Total Enclosure
  - Ensures that 100% of emissions are captured
- Controlling heat treating operations with PTEs, venting emissions to HEPA (or better) filtration has proven to be possible
  - PTEs and filtration installed and operated at one heat treating facility
- Due to large building footprints, tall ceilings, and location of furnaces within buildings, PTEs may not be feasible for all facilities

Overview of EPA Method 204 Criteria for PTEs

- Structure completely surrounding the source of emissions with a roof that is free of gaps or openings
- Air within the PTE is directed to an air pollution control device
- Openings of the PTE (e.g., doorways) have a specified inward face velocity of 200 feet per minute
- Assumes an emissions capture efficiency of 100 percent

Option 1: Install PTEs and HEPA controls

Potential Requirements

- Metal heating operations, including furnaces and workpiece cooling activities, would be required to take place within permanent total enclosures (PTEs) that are vented to HEPA filters
- Submit permit applications and install and operate controls within specified timeframe of rule adoption

Option 2: Capture and Control Emissions Above All Furnace Exhaust Vents

Background

- Potentially more feasible option for facilities that cannot install PTEs
- Recently adopted or amended metal toxic rules require that collection efficiency be based on the applicable standards of the Industrial Ventilation: A Manual of Recommended Practice for Design published by the American Conference of Governmental Industrial Hygienists (ACGIH)
- Industrial Ventilation Manual provides recommended practices for the design and operation of:
  - Hood type and proximity
  - Capture velocity
  - Face velocity
  - Slot velocity
  - Duct velocity
  - Flow rate
  - Hood entry loss

Option 2: Capture and Control Emissions Above All Furnace Exhaust Vents

Potential Requirements

- Install exhaust hoods to capture emissions from furnace exhaust vents
  - Must meet standards of Industrial Ventilation Manual
- Exhaust hoods must be vented to HEPA
- Submit permit applications and install and operate controls within specified timeframe of rule adoption

Option 3: Demonstrate health risk is below certain risk thresholds at nearest receptor

Background

- Health risk could be determined by established risk assessment procedures
- Option 3 allows facilities to demonstrate that their operations pose a low health risk to nearby receptors
- May be viable for facilities that:
  - Are located further away from receptors (e.g., other workplaces, residences, schools, hospitals, etc.)
  - Process lower amounts of chromium alloys
  - Have limited operating schedules

Option 3: Demonstrate health risk is below certain risk thresholds at nearest receptor

Potential Steps

1. Conduct source tests on furnaces to determine mass emissions and establish emission factors
   - May source test subset of furnaces that is representative or provides a more conservative estimate (no less than 20% of furnaces)
     - Based on BTU rating, operating schedule, type of alloys processed
   - Submit source test protocol within 90 days of rule adoption
2. Submit furnace emission report based on emission factors from Step 1
   - Estimate annual emissions based on highest throughput from last five years or permitted throughput

Potential Steps *(continued)*

3. Determine risks and compare against certain risk thresholds
   - Based on established risk assessment procedures

4a. If risk is **equal to or greater than** certain risk thresholds:
   - Install and operate point source controls

4b. If risk is **under** certain risk thresholds:
   - Not required to install controls
   - Conduct periodic source testing

Tier 1 Facilities

- Tier 1 facilities are metal heating facilities that do not meet Tier 2 criteria
- Facilities with less potential to emit

Tier 1 Compliance Requirements

- All Tier 1 facilities must comply with one of following options:

Option 1

- Submit information (e.g., furnace inventory, alloys processed, throughput, temperature)
- Conduct source tests
  - May source test subset of furnaces that is representative or provides a more conservative estimate (no less than 20% of furnaces)
- After source tests are conducted, submit facility-wide furnace emissions report
  - Estimate annual emissions based on highest throughput from last five years or permitted throughput

➢ *Staff is open to possibility of a potential low use exemption from source testing*

Gathered information would be used to in preparation for second phase of rule

Option 2

Comply with one of the Tier 2 options

WGM #4 Recap

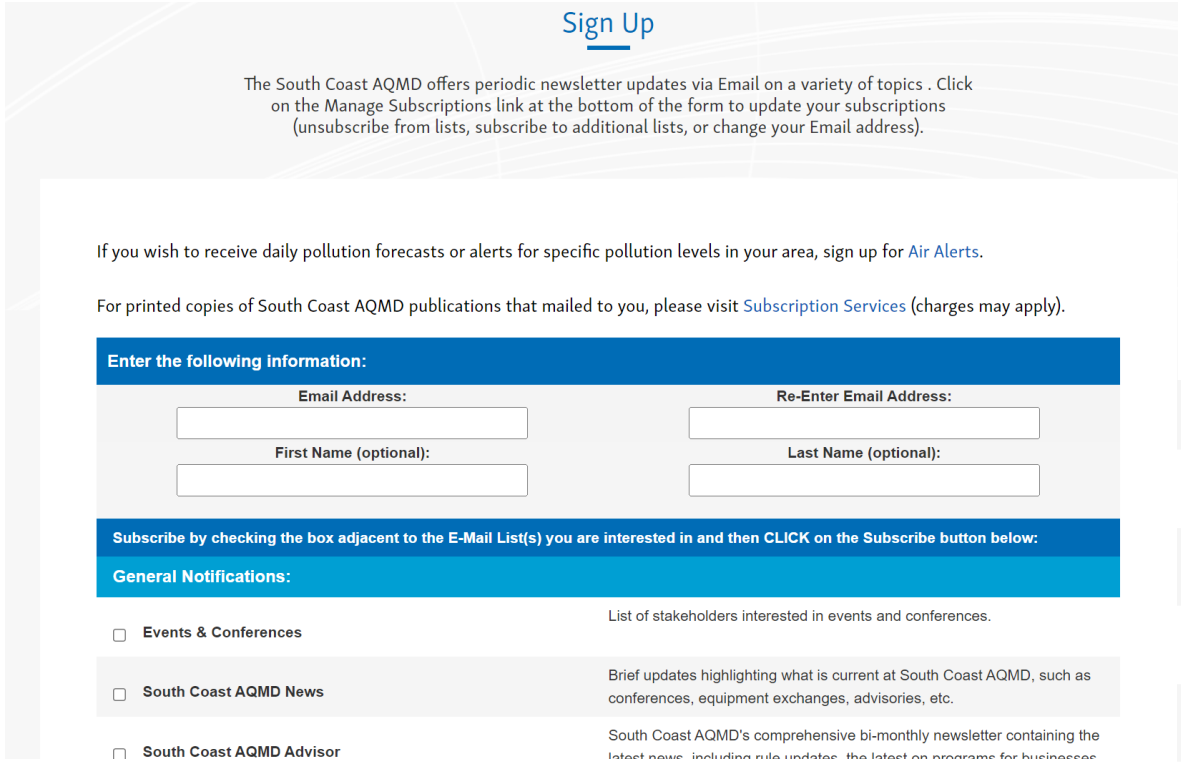
- Discussed Preliminary Rule Concepts for:
  - Rule applicability
  - Housekeeping
  - Best management practices
  - Building enclosures
  - Prohibitions
  - Emissions controls

Next Steps

- Continuing discussions with stakeholders
- Additional site visits
- Discussions with vendors
- Working Group Meeting #5
  - Initial preliminary draft rule language

Staying Updated

- Sign up to receive e-mail updates via http://www.aqmd.gov/sign-up



Sign Up

The South Coast AQMD offers periodic newsletter updates via Email on a variety of topics . Click on the Manage Subscriptions link at the bottom of the form to update your subscriptions (unsubscribe from lists, subscribe to additional lists, or change your Email address).

If you wish to receive daily pollution forecasts or alerts for specific pollution levels in your area, sign up for Air Alerts.

For printed copies of South Coast AQMD publications that mailed to you, please visit Subscription Services (charges may apply).

Enter the following information:

Email Address: | Re-Enter Email Address:

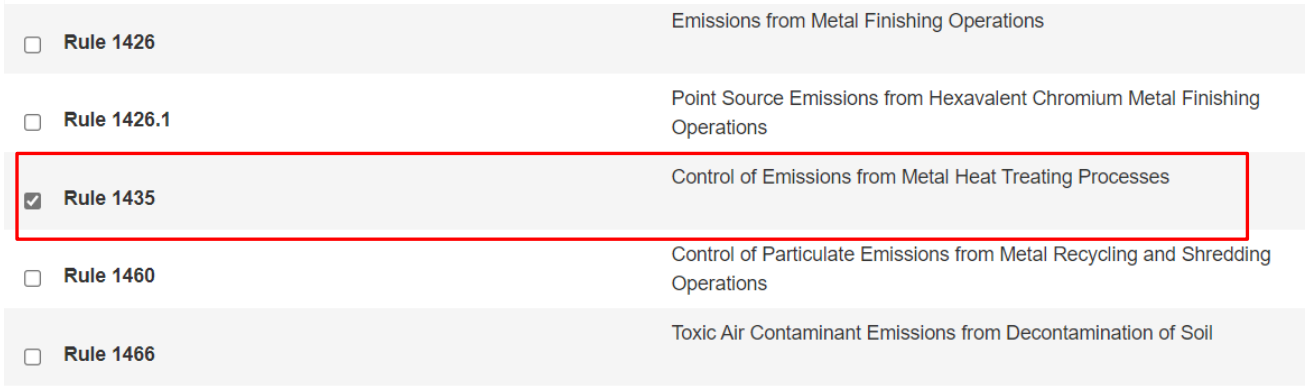
First Name (optional): | Last Name (optional):

Subscribe by checking the box adjacent to the E-Mail List(s) you are interested in and then CLICK on the Subscribe button below:

General Notifications:

☐ Events & Conferences	List of stakeholders interested in events and conferences.
☐ South Coast AQMD News	Brief updates highlighting what is current at South Coast AQMD, such as conferences, equipment exchanges, advisories, etc.
☐ South Coast AQMD Advisor	South Coast AQMD's comprehensive bi-monthly newsletter containing the latest news, including rule updates, the latest on programs for businesses

Subscribe by scrolling down the page and checking the box for Proposed Rule 1435 to receive future meeting notices and links to documents



☐ Rule 1426	Emissions from Metal Finishing Operations
☐ Rule 1426.1	Point Source Emissions from Hexavalent Chromium Metal Finishing Operations
☑ Rule 1435	Control of Emissions from Metal Heat Treating Processes
☐ Rule 1460	Control of Particulate Emissions from Metal Recycling and Shredding Operations
☐ Rule 1466	Toxic Air Contaminant Emissions from Decontamination of Soil

PR 1435 Staff Contacts

Yunnie Osias
Air Quality Specialist
(909) 396-3219
yosias@aqmd.gov

Michael Laybourn
Program Supervisor
(909) 396-3066
mlaybourn@aqmd.gov

Kalam Cheung, Ph.D.
Planning & Rules Manager
(909) 396-3281
kcheung@aqmd.gov

Michael Krause
Assistant Deputy Executive Officer
(909) 396-2706
mkrause@aqmd.gov