SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report
Proposed Rule 1407.1 – Control of Toxic Air Contaminant Emissions from Chromium Alloy Melting Operations

October 2020

Deputy Executive Officer
Planning, Rule Development, and Area Sources
Philip M. Fine, Ph.D.

Assistant Deputy Executive Officer
Planning, Rule Development, and Area Sources
Susan Nakamura

Planning and Rules Manager
Planning, Rule Development, and Area Sources
Michael Morris

Author: Charlene Nguyen – Air Quality Specialist

Contributors:
John Anderson – Air Quality Analysis and Compliance Supervisor
Jason Aspell – Assistant Deputy Executive Officer
Jack Cheng – Senior Enforcement Manager
Kevin Chiu – Air Quality Engineer II
Shah Dabirian – Program Supervisor
Mike Garibay – Source Testing Manager
Yadira DeHaro-Hammock – Senior Air Quality Chemist
Aaron Katzenstein – Laboratory Services and Source Testing Manager
Shannon Lee – Senior Air Quality Engineer
Alisha Lewis – Air Quality Inspector II
Kevin Ni – Air Quality Specialist
Don Nguyen – Senior Air Quality Engineer
Barbara Radlein – Program Supervisor
Amanda Sanders – Supervising Air Quality Inspector
Areio Soltani – Supervising Air Quality Inspector
Brian Speaks – Senior Air Quality Engineer
Mark Von Der Au – Air Quality Analysis and Compliance Supervisor
Brian Vlasich – Air Quality Specialist
Bill Welch – Supervising Air Quality Engineer

Reviewed By:
Barbara Baird – Chief Deputy Counsel
Stacey Pruitt – Senior Deputy District Counsel
Uyên-Uyên Võ – Program Supervisor
William Wong – Principal Deputy District Counsel

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
GOVERNING BOARD

Chairman: DR. WILLIAM A. BURKE
Speaker of the Assembly Appointee

Vice Chairman: BEN BENOIT
Council Member, Wildomar
Cities of Riverside County

MEMBERS:

KATHRYN BARGER
Supervisor, Fifth District
County of Los Angeles

LISA BARTLETT
Supervisor, Fifth District
County of Orange

JOE BUSCAINO
Council Member, 15th District
Cities of Los Angeles Representative

MICHAEL A. CACCIOTTI
Council Member, South Pasadena
Cities of Los Angeles County/Eastern Region

VANESSA DELGADO
Senate Rules Committee Appointee

GIDEON KRACOV
Governor's Appointee

LARRY MCCALLON
Mayor, Highland
Cities of San Bernardino County

JUDITH MITCHELL
Council Member, Rolling Hills Estates
Cities of Los Angeles County/Western Region

V. MANUEL PEREZ
Supervisor, Fourth District
County of Riverside

CARLOS RODRIGUEZ
Council Member, Yorba Linda
Cities of Orange County

JANICE RUTHERFORD
Supervisor, Second District
County of San Bernardino

EXECUTIVE OFFICER:

WAYNE NASTRI

Table of Contents

CHAPTER 1: BACKGROUND

INTRODUCTION

Proposed Rule 1407.1 – Control of Toxic Air Contaminant Emissions from Chromium Alloy Melting Operations (PR 1407.1) establishes requirements to reduce toxic air contaminant emissions from melting operations of metals that contain greater than 0.5 percent chromium content, including, but not limited to alloy steel, stainless steel, superalloys, and chromium alloys. Metal melting operations, such as smelting, tinning, galvanizing, and other miscellaneous processes where metals are processed in molten form, have the potential to emit toxic air contaminants. PR 1407.1 establishes collection efficiency requirements and hexavalent chromium mass emission limits to control point source emissions, housekeeping and building provisions to limit fugitive emissions, and source testing, material testing, parameter monitoring, and recordkeeping requirements. PR 1407.1 is the first source-specific rule to address toxic air contaminant emissions from the melting of metals containing chromium.

REGULATORY HISTORY

Proposed Rule 1407.1 is a new rule and is a companion rule to Rule 1407 – Control of Emissions of Arsenic, Cadmium, and Nickel from Non-Chromium Metal Melting Operations (Rule 1407). Rule 1407 was adopted in July 1994 to implement the California Air Resource Board's (CARB) Non-Ferrous Metal Melting Air Toxics Control Measure (ATCM) adopted in October 1992. Consistent with the ATCM, Rule 1407 requires the reduction of emissions of arsenic, cadmium, and nickel by the installation of air pollution control equipment, parametric monitoring, and housekeeping practices to minimize fugitive particulate emissions. The ATCM did not include ferrous metals since it was beyond the scope of the investigation. CARB intended to evaluate the need for proposed controls for ferrous metal melting operations in the future.

Since both the ATCM and Rule 1407 were only addressing non-ferrous metal melting, there was a regulatory gap that needed to be filled to establish requirements for ferrous metal melting, specifically alloys containing chromium. In November 2015, to fill this regulatory gap, staff initiated the rule development process to amend Rule 1407 to expand the applicability of the rule from non-ferrous metal melting operations to also include ferrous metal melting operations, and update the existing requirements in the rule. After several working group meetings, industry stakeholders recommended that provisions for non-ferrous and ferrous be separated into two separate rules. Industry stakeholders had commented that there was insufficient evidence that hexavalent chromium was emitted from metal melting operations and were concerned that more stringent requirements for ferrous metal melting operations would apply to non-ferrous metal melting operations that may be using metals with little or no metal toxic air contaminants.. In April 2018, staff bifurcated the rulemaking into two rules: Rule 1407, which would address non-chromium metal melting; and Rule 1407.1, which would address chromium alloy melting. The two rules were bifurcated into non-chromium and chromium because it was expected based on the toxicity of hexavalent chromium, the more stringent requirements would apply to alloys containing chromium. In addition, certain ferrous alloys do not contain chromium and some non-ferrous alloys contain chromium. In October 2019, Rule 1407 was amended to update mass emission limits from non-chromium metal melting operations. Additionally, Rule 1407 enhanced parameter monitoring provisions for pollution control equipment, added building enclosure provisions to limit fugitive emissions, and updated housekeeping, source testing, recordkeeping, and reporting requirements.

During the initial PR 1407.1 rule development, staff and industry stakeholders recognized that additional emissions data was needed for chromium alloy melting operations. Staff developed the initial PR 1407.1 as an information-gathering rule, which included requirements for submittal of an operational information survey, emissions testing, metals composition testing, and recordkeeping. Staff presented the initial PR 1407.1 to the Governing Board in November 2018. At that time, the California Metals Coalition (CMC) presented an alternative approach for source testing chromium alloy melting operations to obtain the needed emissions data. The Governing Board directed staff to work with CMC on the source testing approach. After working with CMC to finalize the source testing approach, in December 2018 staff presented to the Stationary Source Committee the proposal for South Coast AQMD to fund source tests at three volunteer facilities, that would remain anonymous. The source testing would be conducted by a third-party consultant, and the results would be used to inform the rule development. Source testing began in January 2019 and was completed in February 2020. (Details of the source testing results are discussed under "Emissions Data from Chromium Alloy Melting" in this chapter). Staff re-initiated rulemaking for PR 1407.1 in April 2020.

METAL TOXIC AIR CONTAMINANTS AND HEALTH EFFECTS

Metal melting operations with chromium alloys, such as alloy steel, stainless steel, and superalloys can result in toxic air contaminant emissions of arsenic, cadmium, hexavalent chromium, and nickel. Arsenic, cadmium, hexavalent chromium, and nickel have high relative risks compared to other toxics. Hexavalent chromium has a significantly higher cancer potency factor than the other metal toxic air contaminants.

The California Office of Environmental Human Health Assessment (OEHHA) classifies these metals as toxic air contaminants[1] and publishes their cancer potency[2]. Cancer potency provides the potency based on the dose and response of a specific toxic air contaminant and is based on the unit risk values for the various exposure pathways (i.e. inhalation, oral, dermal). A unit risk value is an estimation of the lifetime cancer risk associated with an exposure to a toxic air contaminant at a certain concentration through one of the exposure pathways. Although nickel and arsenic have cancer potency factors, these metals also have reference exposure levels for non-cancer 1-hour acute inhalation[3]. Table 1.1 provides the OEHHA inhalation unit risks for arsenic, cadmium, hexavalent chromium, and nickel based on chronic inhalation exposure to these metals at an air concentration of 1 $\mu g/m^3$.

[1] Toxic Air Contaminants, California Office of Environmental Health Hazard Assessment, https://oehha.ca.gov/air/toxic-air-contaminants

[2] Appendix A: Hot Spots Unit Risk and Cancer Potency Values, California Office of Environmental Health Hazard Assessment, May 2019, https://oehha.ca.gov/media/downloads/crnr/appendixa.pdf

[3] California Office of Environmental Health Hazard Assessment, November 2019, https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary

Table 1.1: OEHHA Inhalation Unit Risk of Metals[2]

Metal	Inhalation Unit Risk Value [$(\mu g/m^3)^{-1}$]
Arsenic	3.3×10^{-3}
Cadmium	4.2×10^{-3}
Chromium (hexavalent)	1.5×10^{-1}
Nickel	2.6×10^{-4}

Based on the OEHHA inhalation unit risk values in Table 1.1, the cancer potency of hexavalent chromium is two orders of magnitude greater than arsenic and cadmium and three orders of magnitude greater than nickel.

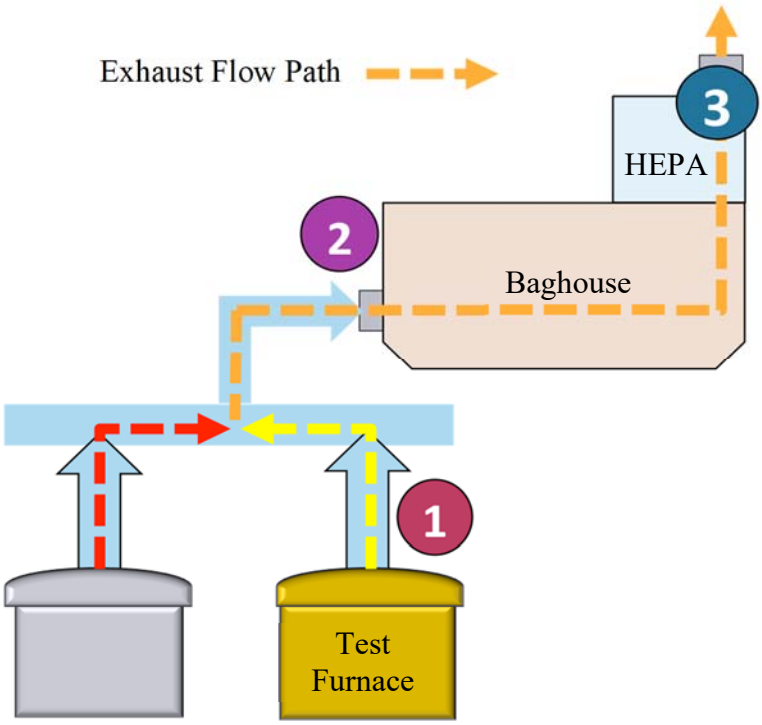
SOURCE TESTING OF CHROMIUM ALLOY MELTING OPERATIONS

The South Coast AQMD worked with the California Metals Coalition to identify three chromium alloy melting facilities that would volunteer to participate in the source testing. South Coast AQMD and CMC agreed that: the facilities would remain anonymous; a third-party consultant would conduct the source testing; and South Coast AQMD would pay for the source tests. Source testing was completed at two facilities, Facility A and Facility C; the third facility, Facility B, went out of business prior to conducting the source tests.

Source Testing

The purpose of source testing was to confirm the formation of hexavalent chromium from chromium alloy melting operations, quantify toxic air contaminant emissions from chromium alloy melting operations, and assess the effectiveness of associated pollution control devices. The source tests quantified the emissions of arsenic, cadmium, total chromium, hexavalent chromium, nickel, and particulate matter at three locations of the operations (see Figure 1.1): 1) Inlet 1 Furnace (Inside), inside the exhaust duct solely venting the test furnace; 2) Inlet 2 (Upstream to Baghouse), inside the exhaust duct venting multiple furnaces at the inlet of the air pollution control device; and 3) Exhaust, at the outlet of the air pollution control device. At the tested facilities, the air pollution control device was a baghouse with a high-efficiency particulate air (HEPA) filter.

Figure 1.1: Sampling Locations



Source Test Results[4]

Source testing was completed at two facilities, Facility A and Facility C. Table 1.2 summarizes the operating conditions at Facilities A and C during the source testing.

Table 1.2: Operating Conditions at Source-Tested Facilities

Facility	Test Furnace	Melt Temperature (˚F)	Material	Emission Capture System	Emission Control System
A	Furnace Type: 1,000 kW Electric Induction, Crucible-Type Melt Capacity: 4,500 lbs	2925	316 Stainless Steel • Cr: 16 – 18% • Ni: 10 – 14%	• Slot exhaust system that mounts furnace • Mobile overhead hood during metal pour process	Baghouse with HEPA filter • Inlet combines multiple furnaces • 2 other furnaces were operating at 2,425°F and melting AMS 4881 (Cr: ≤0.05%; Ni: 4 – 6%)
C	Furnace Type: 1,500 kW Electric Induction, Crucible-Type Melt Capacity: 6,000 lbs	2619	25CH Chrome Iron • Cr: 23 – 30% • Ni: 2 – 3%	• Slot exhaust system that mounts furnace	Baghouse with HEPA filter • Inlet combines multiple furnaces • 1 other furnace was operating at 2,619°F and melting 25CH

The source test results at both facilities provided quantification of toxic air contaminants from chromium alloy melting operations and assessment of the effectiveness of the current pollution control technology in use during the source testing. The full source test reports submitted by the third-party consultant were evaluated and approved by the South Coast AQMD. Table 1.3 summarizes the results of the source tests as reported in the Source Test Report Evaluations completed by the South Coast AQMD.

[4] Proposed Rule 1407.1 Source Testing, South Coast AQMD, accessed August 2020 http://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/proposed-rule-1407-1-source-testing

Table 1.3: Source Test Results*

Toxic Air Contaminant	Facility A			Facility C		
	Inlet 1 Furnace (Inside)	Inlet 2 (Upstream to Baghouse)	Exhaust	Inlet 1 Furnace (Inside)	Inlet 2 (Upstream to Baghouse)	Exhaust
	(mg/hr)			(mg/hr)		
Arsenic	Non-Detect (<2.86)	Non-Detect (<24.89)	Non-Detect (<31.14)	5.9	8.7	Non-Detect (<5.7)
Cadmium	Non-Detect (<1.89)	Non-Detect (<25.78)	Non-Detect (<31.14)	Non-Detect (<0.69)	Non-Detect (<3.7)	Non-Detect (<5.7)
Total Chromium	350.19	291.43	Non-Detect (<64.74)	922.8	1016.5	Non-Detect (<3.4)
Hexavalent Chromium	44.13	56.55	Non-Detect (<1.73)	10.2	14.9	Non-Detect (<0.78)
Nickel	109.74	596.76	73.40	105.6	168.7	7.1
Particulate Matter	93,324	349,569	106,845	122,533	283,356	61,568

"Non-Detect" means the result was below the limit of detection and was reported with respect to the limit of detection of the analytical instrument or method (e.g. report "<10 ppm", if detection limit is 10 parts per million).

* Results are presented as an average of the three two-hour test runs conducted at each sampling location to sample the metals during metal melting, except for particulate matter, which was sampled for one two-hour test run at each sampling location.

The source tests at Facilities A and C are the first to examine and confirm the formation of hexavalent chromium from melting operations of metals containing chromium. The source test results and report evaluations for both facilities demonstrated the following:

- Hexavalent chromium emissions occur during the chromium alloy melting process;
- Hexavalent chromium persist to the inlet of the baghouse;
- The baghouse and HEPA filter substantially reduced emissions of hexavalent chromium and other toxic air contaminants; and
- Based on observations during the capture and collection efficiency testing at both facilities, improvements can be made to the capture efficiency of the emission collection system to ensure more emissions are collected in the control device.

At both facilities, source test results indicate the presence of hexavalent chromium at the individual exhaust duct of the test furnace melting the chromium alloy (Inlet 1 Furnace [Inside]) and the exhaust duct venting multiple furnaces at the inlet of the control device (Inlet 2 [Upstream to Baghouse]). This confirms hexavalent chromium emissions is directly formed from the chromium alloy melting process and the hexavalent chromium emissions persist in the air stream before entering the control device. The uncontrolled average mass emission rates of hexavalent chromium measured at these two sampling locations exceed the South Coast AQMD Permitting Screening Emissions Level[5] for hexavalent chromium by approximately 26 to 33 times for Facility A and approximately 6 to 9 times for Facility C, assuming that the screening emissions level is based on a cancer risk of 25 in a million for a receptor located 100 meters in the downwind direction from a facility operating 12 hours a day for 300 days per year.

Source test results at the outlet of the HEPA filter stage of the control device (Exhaust) showed that the baghouse and HEPA filter reduced the hexavalent chromium emissions from the test furnace at both facilities to non-detect levels. Using the same previous assumptions for screening emissions, these levels are below the South Coast AQMD Permitting Screening Emissions Level for hexavalent chromium for both facilities.

Arsenic and cadmium emissions at the three sampling locations were found to be non-detect or close to non-detect levels at both facilities, confirming that chromium alloys contain only trace levels of arsenic and cadmium. Testing also showed that melting of chromium alloys containing nickel generates nickel emissions, as demonstrated in the results at each of the sampling locations. The baghouse and HEPA filter also significantly reduced the nickel emissions from the test furnace. The average mass emission rates of nickel at the three sampling locations are well below the South Coast AQMD Permitting Screening Emissions Level for nickel, based on the same previous assumptions.

In addition to the sampling of multiple metals, observation of capture and collection efficiency was conducted during the source testing at both facilities. Facilities A and C utilized capture systems that rely on the furnace lid being in a predominately closed position. During testing, South Coast AQMD staff observed that capture of emissions was periodically escaping the control system when the lid to the furnace was temporarily removed for various operational needs (e.g. charging the furnace, de-slagging, pouring operations, etc.). This process is not automated and relies heavily on manual procedures conducted by an operator. This observation was only made on a single day at each facility to get an estimate of periods when capture is lost. One facility has since modified operations to improve emission capture.

Based on these source tests, staff concludes that chromium alloy melting can emit hexavalent chromium at levels exceeding cancer risk screening thresholds and the HEPA filter is effective in controlling toxic metal particulates emitted from chromium alloy melting to health protective levels.

NEED FOR PROPOSED RULE 1407.1

Ambient monitoring near metal facilities highlighted the contribution of fugitive toxic metal particulate emissions from metal melting, heating, finishing, grinding, and other metal working operations. Metal toxic air contaminants such as lead, arsenic, cadmium, hexavalent chromium,

[5] South Coast AQMD Permit Application Package "N", Table 1, accessed April 2020 http://www.aqmd.gov/docs/default-source/permitting/rule-1401-risk-assessment/attachmentn-v8-1.pdf?sfvrsn=4

and nickel have been measured in the ambient air in and around these facilities. Deposition of these fugitive emissions on surfaces can get re-entrained affecting the surrounding community. In addition to ambient monitoring, source tests have identified high-temperature metalworking operations processing chromium-containing metal as sources of hexavalent chromium emissions. These processes were not previously known to generate large amounts of hexavalent chromium emissions. Staff recognized the need to address the potentially higher health risks posed by the toxic air contaminants being emitted from chromium metal melting and better controlling fugitive toxic metal particulate emissions from these operations.

Melting operations of metals containing chromium, such as alloy steel, stainless steel, and superalloys, are currently not regulated under a source-specific rule to address toxic air contaminant emissions. PR 1407.1 will fill a regulatory gap to address toxic air contaminant emissions from melting operations of these metals containing chromium.

AFFECTED INDUSTRIES

Approximately 11 facilities are expected to be impacted by PR 1407.1. The facilities are foundries or metal casting businesses generally classified under the NAICS codes 331XXX and 332XXX, including:

- 331110 Iron and Steel Mills and Ferroalloy Manufacturing;
- 331512 Steel Investment Foundries;
- 331513 Steel Foundries (except Investment);
- 331529 Other Nonferrous Metal Foundries (except Die-Casting); and
- 332XXX Fabricated Metal Product Manufacturing.

These facilities process iron, steel, and other nonferrous metals; only those facilities that process metals containing greater than 0.5 percent chromium are subject to PR 1407.1. Carbon steel and iron have no minimum specifications for chromium but are expected to have only trace contaminants of chromium and therefore are not applicable to PR 1407.1. Stainless steels, alloy steels, and superalloys are expected to have a chromium content greater than 0.5 percent chromium. Stainless steels contain a minimum of 11 percent chromium and include common grades such as Grades 316 and 304. Alloy steels are steels that are alloyed with between 1.0 to 50 percent other alloying elements in addition to carbon and iron, common alloyants include manganese, nickel, chromium, molybdenum, vanadium, silicon, and boron. Superalloys are alloys that can be use at high temperatures. Nickel based superalloys are the most common superalloys and are alloyed with carbon, chromium, molybdenum, tungsten, niobium, iron, titanium, aluminum, vanadium, and tantalum.

Foundries, mills, and manufactures subject to PR 1407.1 process stainless steels, alloy steels, and superalloys. These facilities make ingots or shapes including bars, plates, rods, sheets, strips, or wire. Foundries manufacture castings, including investment castings that leave a seamless mold providing a highly detailed and consistent casting. Foundries also make castings in which the molten metal is poured into a mold and allowed to solidify. Operations that cast molten metal into various parts and products are classified by the type of part they manufacture. Often these facilities cast parts for a wide variety of industries.

The alloys mills and foundries melt and cast are a combination of metals and elements that provide qualities such as corrosion resistance or strength. Common chromium alloy materials include chromium ranging from 0.5 to 26 percent and nickel ranging from 0.3 to 28 percent. Metal

emissions may occur during metal melting, transfer, pouring, and sand reclamation. Emissions may also occur during casting shakeout when the casting is freed from the mold. Metal cutting and metal grinding may emit particulates possibly containing toxic air contaminants. Fugitive emissions may result from crushing, grinding, and handling of materials. Other potential sources of emissions are re-entrainment of surface dust by foot and vehicle traffic in areas of the facility where metal-containing particulate matter has been deposited. Lastly, emissions may occur from the collection points of an emission control device or from the exhaust of an emission control device.

The 11 facilities subject to PR 1407.1 were identified by reviewing South Coast AQMD permits for furnaces, reviewing South Coast AQMD inspector reports for metal operations facilities, searching websites for facilities that offer metal melting services, and site visits to 10 of the 11 affected facilities. Facilities that conduct heat treating or other metalworking operation but do not melt the metal were excluded. Additionally, facilities that melt metals but do not melt alloy steel, stainless steel, or superalloys were excluded.

PUBLIC PROCESS

PR 1407.1 is being conducted through a public process. The Working Group originally met under PAR 1407. Based on industry stakeholder input, PAR 1407 was separated into two rulemakings: PAR 1407 and PR 1407.1. The Governing Board in November 2018 directed staff to work with stakeholders to conduct anonymous source testing at volunteer facilities. The following working group meetings were conducted: four as part of (then Proposed Amended) Rule 1407; three prior to November 2018 Governing Board Meeting; and five after completion of source testing. The first seven working group meetings were held at the South Coast AQMD Headquarters in Diamond Bar, CA on the following dates: September 5, 2017; November 9, 2017; January 30, 2018; April 25, 2018; June 6, 2018; July 10, 2018; and August 9, 2018. A Public Workshop was held on August 30, 2018. Once source testing was completed and PR 1407.1 rule development was re-initiated, staff has then held five Working Group Meetings. The five working group meetings were held remotely on the following dates: April 8, 2020; July 9, 2020; August 6, 2020; August 27, 2020; and September 10, 2020. A Public Workshop is scheduled for October 14, 2020.

CHAPTER 2: SUMMARY OF PROPOSAL

INTRODUCTION

PROPOSED RULE 1407.1

- Purpose (Subdivision (a))
- Applicability (Subdivision (b))
- Definitions (Subdivision (c))
- Emission Control Requirements (Subdivision (d))
- Prohibitions (Subdivision (e))
- Housekeeping Requirements (Subdivision (f))
- Building Requirements (Subdivision (g))
- Source Testing Requirements (Subdivision (h))
- Material Testing Requirements (Subdivision (i))
- Parameter Monitoring (Subdivision (j))
- Recordkeeping Requirements (Subdivision (k))
- Exemptions (Subdivision (l))
- Periodic Smoke Test (Attachment A)

INTRODUCTION

Proposed Rule 1407.1 (PR 1407.1) will fill a regulatory gap to address toxic air contaminant emissions from chromium alloy melting operations. PR 1407.1 establishes requirements for controlling toxic air contaminant emissions from chromium alloy melting operations, including collection efficiency and hexavalent chromium mass emission limits to control point source emissions, housekeeping and building provisions to minimize fugitive emissions, and source testing, parameter monitoring, material testing, and recordkeeping requirements. Many of the provisions in PR 1407.1 are based on similar types of provisions used for Rules 1407 – Control of Emissions of Arsenic, Cadmium, and Nickel from Non-Chromium Metal Melting Operations, 1420 – Emissions Standard for Lead, 1420.1 – Emission Standards for Lead and Other Toxic Air Contaminants from Large Lead-Acid Battery Recycling Facilities, 1420.2 – Emission Standards for Lead from Metal Melting Facilities, and 1430 – Control of Emissions from Metal Grinding Operations at Metal Forging Facilities, which were recently adopted or amended.

PROPOSED RULE 1407.1

Purpose (Subdivision (a))

The purpose of PR 1407.1 is to reduce point source and fugitive emissions of toxic air contaminants, in particular arsenic, cadmium, hexavalent chromium, and nickel, from facilities conducting chromium alloy melting, thereby minimizing public health impacts by controlling exposure to toxic air contaminants at health protective levels. Chromium alloys typically contain high amounts of chromium and nickel and trace amounts of arsenic and cadmium. Source tests of two chromium alloy melting furnaces show that hexavalent chromium is formed and emitted during the melting process.

The proposed purpose is as follows:

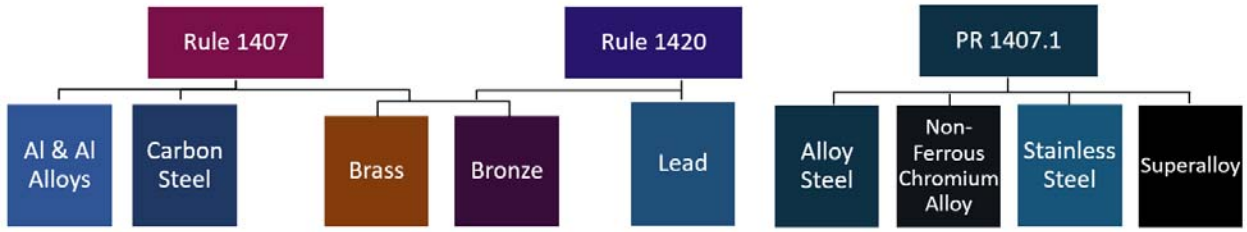
> *The purpose of this rule is to reduce emissions of toxic air contaminants from chromium alloy melting operations.*

Applicability (Subdivision (b))

PR 1407.1 will apply to chromium alloys, which is defined as a metal that is at least 0.5% chromium by weight and includes alloy steel, stainless steel, non-ferrous chromium alloy, and superalloy. Facilities conducting chromium alloy melting include smelters, foundries, die-casters, and other miscellaneous melting processes.

With the adoption of PR 1407.1, metal melting operations will be regulated by metal or alloy as depicted in Figure 2.1 below.

Figure 2.1: Metal or Alloy Addressed Under Different South Coast AQMD Metal Melting Rules



The proposed applicability is as follows:

> *This rule applies to an owner or operation of a facility conducting chromium alloy melting, including, but not limited to, smelters (primary and secondary), foundries, die-casters, mills, and other miscellaneous melting processes.*

Definitions (Subdivision (c))

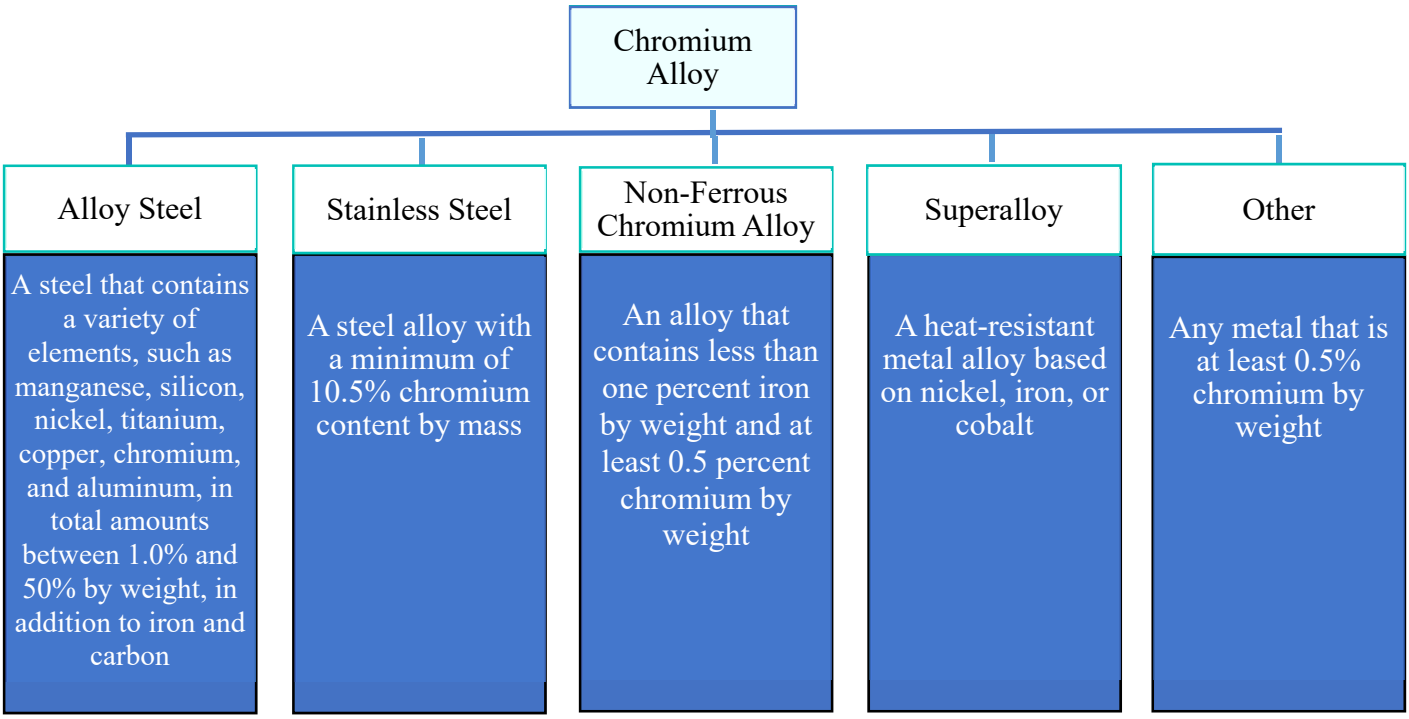
PR 1407.1 includes definitions to clarify and explain key concepts. The definitions used also maintain consistency with other South Coast AQMD toxics rules. Please refer to PR 1407.1 subdivision (c) for each definition.

Proposed Definitions:

Aggregate Hexavalent Chromium Mass Emissions
Alloy Steel
Approved Cleaning Methods
Bag Leak Detection System
Building
Capture Velocity
Casting
Casting Material
Chromium Alloy
Chromium Alloy Melting Facility
Chromium Alloy Melting Furnace
Chromium Alloy Melting Operation
Die-Caster
Dross
Dry Sweeping
Duct Section
Dust Suppressing Sweeping Compound
Emission Collection System
Emission Control Device
Enclosed Storage Area
Finishing
Foundry
Fugitive Metal Dust Emissions
Hexavalent Chromium
Low Pressure Spray
Maintenance and Repair Activity
Metal Cutting
Metal Grinding
Metal Removal Fluid
Molten Metal
Non-Ferrous Chromium Alloy
Opening
Rerun Scrap
School
Scrap
Sensitive Receptor
Slag
Smelter
Stainless Steel
Steel
Superalloy
Used Casting Material

The applicability of PR 1407.1 specifies chromium alloy which is defined as any metal that is at least 0.5% chromium by weight, including, but not limited to, alloy steel, stainless steel, non-ferrous chromium alloy, and superalloy. Alloy steel, stainless steel, steel, and superalloys are standard industry definitions. Figure 2.2 below presents the definitions of chromium alloy and the different types of chromium alloys applicable to this rule:

Figure 2.2: Chromium Alloy



Non-ferrous chromium alloys are subject to requirements established in the California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM) for Non-Ferrous Metal Melting[6]. Non-ferrous chromium alloys include cobalt- and nickel-based superalloys, cobalt-chromium-tungsten alloys, and aluminum-, copper-, lead-, and zinc-based alloys that contain at least 0.5 percent chromium by weight. Additional definitions for the types of materials subject to these requirements are as follows:

> ***RERUN SCRAP*** *means any material that includes returns, trims, punch-outs, turnings, sprues, gates, risers, and similar material intended for remelting that has not been coated or surface with any material and:*
>
> *(A) Was generated at the chromium alloy melting facility as a consequence of a casting or forming process; or*
>
> *(B) Was generated offsite of the chromium alloy melting facility as a consequence of a casting or forming process from materials generated at the chromium alloy melting facility, prior to resale of the product or further distribution in commerce, and includes documentation confirming that the materials were generated at the chromium alloy melting facility.*
>
> ***SCRAP*** *means any metal or metal-containing material that has been discarded or removed from the use for which it was produced or manufactured and which is intended for reprocessing. This does not include rerun scrap.*

[6] Airborne Toxic Control Measure for Emissions of Toxic Metals from Non-Ferrous Metal Melting, CARB, 1998 https://ww2.arb.ca.gov/sites/default/files/classic//toxics/atcm/metalm.pdf

PR 1407.1 will establish point source control requirements that will apply to all chromium alloy melting furnaces and associated emission control devices, and housekeeping and building provisions that will limit fugitive emissions from chromium alloy melting operations.

Definitions proposed to address these point and fugitive emission sources subject to PR 1407.1 are as follows:

> ***AGGREGATE HEXAVALENT CHROMIUM MASS EMISSIONS*** *means the sum of hexavalent chromium mass emissions in milligrams per hour from all chromium alloy melting furnaces and associated emission control devices.*
>
> ***APPROVED CLEANING METHODS*** *means cleaning using wet wash, wet mop, damp cloth, or low pressure spray; sweeping with use of dust suppressing sweeping compounds; or vacuuming with a vacuum equipped with filter(s) rated by the manufacturer to achieve a 99.97% control efficiency for 0.3 micron particles.*
>
> ***CHROMIUM ALLOY MELTING FACILITY*** *means a source at which chromium alloy melting is conducted, and is located on one or more contiguous or adjacent parcels of property in actual contact, or separated solely by a public roadway or other public right-of-way, and is owned or operated by the same person or person(s), corporation, government agency, public district, public officer, association, joint venture, partnership, or any combination of such entities.*
>
> ***CHROMIUM ALLOY MELTING FURNACE*** *means any apparatus in which chromium alloy(s) is brought to a liquid state, including, but not limited to, blast, crucible, cupola, direct arc, electric arc, hearth, induction, pot, reverberatory, and sweat furnaces, and refining kettles.*
>
> ***CHROMIUM ALLOY MELTING OPERATION*** *means any process conducted where a chromium alloy is melted, poured, casted, and finished including, but not limited to, chromium alloy melting, casting, casting material removal, metal grinding, and metal cutting.*
>
> ***DRY SWEEPING*** *means cleaning using a broom or brush to collect and remove dust, dirt, debris, trash, and any solid particulate matter from a surface without the use of water or dust suppressing sweeping compounds.*
>
> ***DUST SUPPRESSING SWEEPING COMPOUND*** *means non-grit-, oil- or waxed, hygroscopic, or water-based materials used to minimize dust from becoming airborne during dry sweeping.*
>
> ***USED CASTING MATERIAL*** *means any material that has been exposed to the molten metal in the casting process, including but not limited to, sand, plastic, ceramic, plaster, and clay.*

Emission Control Requirements (Subdivision (d))

Aggregate Hexavalent Chromium Emission Limits (paragraph (d)(1))

PR 1407.1 will control emissions from chromium alloy melting furnaces and associated emission control devices by establishing aggregate mass emission standards for hexavalent chromium. Chromium alloys typically contain high amounts of chromium and nickel and trace amounts of arsenic and cadmium. Chromium is converted to hexavalent chromium as shown by source tests

of two chromium alloy melting furnaces. Among the metal particulate toxic air contaminants emitted from chromium alloy melting, hexavalent chromium is the cancer risk driver. Controlling hexavalent chromium, the cancer risk driver, will concurrently reduce the other metal particulate toxic air contaminants and ensure the resulting emissions from chromium alloy melting are health protective. Focusing on the control of hexavalent chromium will streamline the implementation of emission control requirements and reduce source testing costs. An overview of the approach for establishing aggregate mass emission standards for hexavalent chromium is presented as follows:

1) Establish that hexavalent chromium is the risk driver;
2) Set an initial mass emission standard for hexavalent chromium based on the source tests of two chromium alloy melting furnaces;
3) Verify that the initial mass emission standard for hexavalent chromium is health protective for all affected facilities; and
4) If the initial mass emission standard for hexavalent chromium is not health protective for an affected facility, set a lower mass emission standard.

To establish that hexavalent chromium is the cancer risk driver, staff evaluated: 1) the cancer potency of hexavalent chromium relative to arsenic, cadmium, and nickel; and 2) the amount of each of these toxic air contaminants from the exhaust stack, accounting for cancer potency. Based on the OEHHA inhalation unit risk values in Table 1.1 (page 1-3 of the Staff Report), the cancer potency of hexavalent chromium is two orders of magnitude greater than arsenic and cadmium and three orders of magnitude greater than nickel. Although the cancer potency of hexavalent chromium is significantly higher than arsenic, cadmium, and nickel, it is possible for arsenic, cadmium, or nickel to be the risk driver if the mass emissions of these toxic air contaminants are higher than the mass emissions of hexavalent chromium by a certain ratio. The ratio of arsenic, cadmium, or nickel emissions to hexavalent chromium emissions needed for any of these toxic air contaminants to be the risk driver is calculated using the ratios of the inhalation unit risk[7] of hexavalent chromium to arsenic, cadmium, and nickel. These calculated ratios are then compared to the ratio of the mass emission rates of arsenic, cadmium, and nickel to hexavalent chromium from an emission point. Using the source test results at the Exhaust for Facilities A and C (see Table 1.4 of the Staff Report), this comparison is presented in Table 2.1 below:

[7] Appendix A: Hot Spots Unit Risk and Cancer Potency Values, California Office of Environmental Health Hazard Assessment, May 2019, https://oehha.ca.gov/media/downloads/crnr/appendixa.pdf

Table 2.1: Comparison of Ratios of Unit Risk to Mass Emission Rates

Toxic Air Contaminant	Unit Risk $(\mu g/m^3)^{-1}$	Ratio of Unit Risk of Hexavalent Chromium to Toxic Air Contaminant	Ratio of Mass Emission Rate of Toxic Air Contaminant to Hexavalent Chromium	
			Facility A (Exhaust)	Facility C (Exhaust)
Chromium (hexavalent)	1.5×10^{-1}	1	1*	1*
Arsenic	3.3×10^{-3}	45	18*	7*
Cadmium	4.2×10^{-3}	36	18*	7*
Nickel	2.6×10^{-4}	577	42	9

* Source test results were non-detect. For the purpose of the mass emission rate ratio calculation, the emission rate was assumed at the detection limit.

Based on the comparisons presented in Table 2.1, the mass emissions of arsenic, cadmium, and nickel from the exhaust of the control device at both facilities are well below the levels that would be needed to exceed hexavalent chromium as the risk driver. Furthermore, the contribution of arsenic, cadmium, and nickel emissions to the overall cancer risk from these chromium alloy melting furnace emissions is less than 10%. According to this assessment, hexavalent chromium is the risk driver among these toxic air contaminants and controlling hexavalent chromium will reduce the overall health risk posed by toxic metal emissions from chromium alloy melting.

To develop a mass emission standard for hexavalent chromium for PR 1407.1, staff first looked at the outlet mass emission rates that have been achieved in practice by current pollution control technology for metal particulates from chromium alloy melting operations and confirmed that the outlet mass emission rate was health protective using air dispersion modeling. Based on the Facility A and Facility C source test results (see Table 1.3 of the Staff Report), which showed that the baghouse with high-efficiency particulate air (HEPA) filter in use at the facilities reduced hexavalent chromium emissions to non-detect levels, an initial hexavalent chromium mass emission limit was proposed at 1.8 milligrams per hour. Then, using air dispersion modeling, for each of the 11 facilities that would be affected by PR 1407.1, the cancer risk at the nearest sensitive receptor was estimated assuming the facility was emitting hexavalent chromium at the initial proposed mass emission limit of 1.8 milligrams per hour (mg/hr). Sensitive receptors include residences, schools, preschools, daycare centers and health facilities such as hospitals and retirement and nursing homes. Assumptions used in the air dispersion modeling included:

- Meteorological conditions based on the nearest meteorological (MET) station;
- Exhaust stack of height of 10 meters;
- A yearly facility operating schedule of 16 hours (4 am – 8pm) per day at 365 days; and
- Nearest sensitive receptor in the downwind direction.

The estimated cancer risk for each of the facilities was compared to an established cancer risk threshold. Rule 1402 – Control of Toxic Air Contaminants from Existing Sources establishes cancer risk thresholds for facilities that are required to conduct a health risk assessment to

implement the AB 2588 Air Toxics "Hot Spots" Program[8]. The cancer risk thresholds under Rule 1402 are designed to address facility-wide emissions at existing facilities. The cancer risk threshold chosen for comparison was the Rule 1402 Notification Risk Level of 10 in-a-million (10×10^{-6}) Maximum Individual Cancer Risk (MICR)[9]. This cancer risk was chosen as it would provide greater assurance that if there are other sources of toxic air contaminant emissions within a facility, the facility-wide emissions from the facility would likely be below the Rule 1402 Action Risk Level of 25 in-a-million (25×10^{-6}) MICR.

For nine affected facilities, which have a nearest sensitive receptor greater than 100 meters away, the maximum estimated cancer risk was less than 10 in-a-million. For the other two affected facilities, which have a nearest sensitive receptor 50 to 100 and less than 50 meters away, the estimated cancer risk exceeded 10 in-a-million. For these two facilities to meet the 10×10^{-6} cancer risk threshold, the initial proposed hexavalent chromium mass emission limit was adjusted according to the approximate distance of the nearest sensitive receptor to the facility. Thus, two additional mass emission standards were developed by determining the adjusted mass emission rate using the ratio of the initial proposed mass emission standard to the estimated cancer risk for each of the two facilities, as shown in Table 2.2 below:

Table 2.2: Mass Emission Rate Adjusted for Facilities with Estimated Cancer Risk Above 10 in-a-million Cancer Risk Threshold

Nearest Sensitive Receptor (meters)	Estimated Cancer Risk ($\times 10^{-6}$) at 1.8 mg/hr	Adjusted Mass Emission Rate (mg/hr) to Meet Cancer Risk Threshold of 10×10^{-6}
Less than 50	45 (at 25 meters*)	$(\frac{1.8\ mg/hr}{45 \times 10^{-6}})(10 \times 10^{-6}) = 0.40$
50 to 100	12 (at 60 meters)	$(\frac{1.8\ mg/hr}{12 \times 10^{-6}})(10 \times 10^{-6}) = 1.5$

* Estimated cancer risk was calculated at the 25-meter distance due to a sensitive receptor located very close to the facility

Based on these calculations, PR 1407.1 establishes the hexavalent chromium emission limits shown in Table 2.3, to be met no later than July 1, 2024. An owner or operator of a chromium alloy melting facility must demonstrate through source testing that the sum, or aggregate, of hexavalent chromium emissions from all chromium alloy melting furnaces, with or without associated emission control devices, and associated emission control devices meets the aggregate hexavalent chromium emission limit.

[8] Air Toxics "Hot Spots" Program (AB 2588), accessed July 2020 http://www.aqmd.gov/home/rules-compliance/compliance/toxic-hot-spots-ab-2588

[9] Rule 1402 defines Maximum Individual Cancer Risk (MICR) as the estimated probability of a potential maximally exposed individual contracting cancer as a result of exposure to toxic air contaminants calculated pursuant to the Risk Assessment Procedures referenced in Rule 1402 subdivision (l) for residential receptor locations.

Table 2.3: Aggregate Hexavalent Chromium Emission Limits (On and after July 1, 2024)

Distance to Sensitive Receptor (meters)	Aggregate Hexavalent Chromium Emission Limit (milligrams per hour)
Less than 50	0.40
50 to 100	1.5
Greater than 100	1.8

The applicable aggregate hexavalent chromium emission limit is determined by the distance measured, rounded to the nearest meter, from the stack or centroid of stacks venting the chromium alloy melting furnaces or operations at the facility to the nearest property line of the closest sensitive receptor. This determination of sensitive receptor distance is consistent with South Coast AQMD Risk Assessment Procedures[10] for a point source. As the emission limits were developed to specifically address 11 affected facilities, sensitive receptor distances shall reflect sensitive receptors at the time the permit application(s) submitted for new, modified, or relocated chromium alloy melting furnaces and/or associated emission control equipment is deemed complete by the South Coast AQMD. This will allow the affected facilities to continue to comply with rule emission limits when there are unforeseen changes to the surrounding land use affecting the nearest sensitive receptor distance (e.g. a new housing development occurring within a shorter distance to the facility).

The 9 facilities subject to the 1.8 milligrams per hour mass emission limit likely can achieve this limit using a baghouse with a HEPA filter, which is certified to achieve a minimum filtration of 99.97 percent for particles sized 0.3 microns or larger. The facility subject to the 1.5 milligrams per hour mass emission limit should be able to achieve the limit using a baghouse with HEPA filter, but may need to conduct a source test with longer test runs to demonstrate the limit. The facility subject to the more stringent mass emission limit, 0.40 milligrams per hour, may need to install Ultra Low Particulate Air (ULPA) control technology to meet the limit. ULPA is certified to achieve a minimum filtration of 99.9995 percent for particles sized 0.12 microns or larger and can provide one order of magnitude of additional control than HEPA.

Collection Efficiency (paragraph (d)(2))

On and after July 1, 2024, emission collection systems associated with emission control devices shall be operated at a minimum capture velocity specified in the most current edition of the *Industrial Ventilation: A Manual of Recommended Practice for Design (Industrial Ventilation Manual),* published by the American Conference of Governmental Industrial Hygienists, at the time a permit application is deemed complete with the South Coast AQMD. As specified in the *Industrial Ventilation Manual*, the minimum collection velocity should be sufficient to overcome the combustion products and heat of combustion and maintain proper collection efficiency to minimize fugitive emissions.

[10] South Coast AQMD Risk Assessment Procedures for Rules 1401, 1401.1 and 212, Version 8.1, September 1, 2017 http://www.aqmd.gov/docs/default-source/permitting/rule-1401-risk-assessment/riskassessproc-v8-1.pdf?sfvrsn=12

Visible Emissions (paragraphs (d)(3) and (d)(4))

Paragraph (d)(4) will also include a provision limiting visible emissions from any activity associated with chromium alloy melting operation(s), including melting, emission collection system and emission control device operation, storage, handling, or transferring of metal-containing materials. Visible emission cannot be half as dark or darker in shade as that designated as Number 1 on the Ringelmann Chart, as published by the United States Bureau of Mines, or be of such opacity as to obscure an observer's view to a degree equal to or greater than the previous smoke shade requirement or 10 percent opacity. These requirements are also carried over from the CARB ATCM for Non-Ferrous Metal Melting.

Additionally, this subdivision will include a provision, paragraph (d)(5), which prohibits visible emissions from chromium alloy melting furnaces from escaping the emission collection system and must have a direct path to the collection location of an emission collection system. This provision allows South Coast AQMD enforcement to visually observe emission collection systems that are not functioning properly.

Permitting (paragraph (d)(5))

Existing permitted and unpermitted chromium alloy melting furnaces and emission control equipment as well as new or modified installations of emission control equipment will require permit applications to ensure compliance with rule requirements. PR 1407.1 will require permit applications be submitted by January 1, 2022 for the following:

- Change in permit conditions for permitted chromium alloy melting furnace and emission control devices to reconcile the permit(s) with the requirements of PR 1407.1;
- Previously Rule 219 exempt unpermitted chromium alloy melting furnaces and emission control devices installed before PR 1407.1 adoption; and
- New construction or modification of emission control devices.

Prohibitions (Subdivision (e))

PR 1407.1 will establish the following prohibitions effective upon rule adoption: non-ferrous chromium alloys containing high concentrations of arsenic and cadmium; horizontal exhaust stacks; and weather caps.

Non-Ferrous Chromium Alloys Containing Arsenic and Cadmium (paragraph (e)(1))

Paragraph (e)(1) will limit the arsenic and cadmium content of materials melted in non-ferrous chromium alloy melting furnaces, as required by the CARB ATCM for Non-Ferrous Metal Melting[11]. Materials melted in these furnaces cannot contain more than 0.002 percent arsenic and 0.004 percent cadmium by weight. These content limits are the same limits found in the Metal or Alloy Purity Exemption in Rule 1407 and the CARB ATCM for Non-Ferrous Metal Melting. Since arsenic and cadmium are expected to be trace contaminants in chromium alloys, facilities that melt non-ferrous chromium alloys are expected to be able to comply with this requirement.

Horizontal Exhaust Stacks (paragraph (e)(2))

To ensure that emissions associated with chromium alloy melting operations are discharged vertically which allows greater dispersion and less risk for receptors close to the stack, paragraph

[11] Airborne Toxic Control Measure for Emissions of Toxic Metals from Non-Ferrous Metal Melting, CARB, 1998 https://ww2.arb.ca.gov/sites/default/files/classic//toxics/atcm/metalm.pdf

(e)(2) will prohibit installations of new exhaust stacks or modifications to existing exhaust stack from releasing emissions in a horizontal direction.

Weather Caps on Exhaust Stacks (paragraph (e)(3))

Paragraph (e)(3) prohibits the use of weather caps on any vertical stacks associated with chromium alloy melting operations. Weather caps reduce the vertical flow of the exhaust which results in the exhaust not dispersing properly and causing a higher risk for receptors close to the stack. Acceptable exhaust caps include butterfly dampers which provide a clear path for air movement when the exhaust fan is operating.

Housekeeping Requirements (Subdivision (f))

Fugitive emissions are generally emissions that are not collected through an air pollution control device and can accumulate on surfaces in and around the facility. These fugitive emissions can then be tracked out via foot or vehicular traffic and become airborne impacting the surrounding community. Housekeeping requirements are proposed to remove emissions resulting from chromium alloy melting operations before they can become fugitive emissions.

Routine Housekeeping (paragraph (f)(1))

The following housekeeping provisions for material storage and transport and emission control devices in subparagraphs (f)(1)(A) through (f)(1)(G) will become effective July 1, 2021:

- Store dust-forming chromium alloy-containing material generated as a result of chromium alloy melting operations (e.g., slag, dross, ash, trash, debris, used casting material, rerun scrap, and waste from housekeeping, construction, and maintenance and repair activities) in closed leak-proof containers or in a building at least 20 feet from an opening. Leak-proof is the condition whereby the contents of the container are prevented from escaping or spilling out. Chromium alloy-containing material that has been prepared for delivery to a customer does not need to be stored in a closed container or in a building;
- Store scrap in an enclosed storage area or at least 20 feet away from an in opening in a building. An enclosed storage area (paragraph (c)(2)) must have a wall or partition that covers 75% of its circumference, must be at least 6 inches above the height of the materials contained in the space, and screens the stored materials;
- Transport chromium alloy-containing material (e.g., used casting material, slag, dross, ash, trash, debris, rerun scrap, and housekeeping waste) within a building or in closed leak-proof containers. Chromium alloy-containing material that has been prepared for delivery to a customer does not need to be transported in a closed container outside of the building;
- Discharge materials collected by emission control devices into sealed leak-proof containers unless waste is being removed;
- Close containers containing chromium-alloy containing materials at all times and only open to deposit or remove material;
- Keep containers containing chromium-alloy containing materials free of any leaks;
- Keep filter media of emission control devices, except for unused filter media, in a housing with no exposure to external air.

Due to the potential of fugitive metal dust emissions from chromium alloy melting operations (e.g. metal grinding or cutting) settling in work areas, rerun scrap is treated as dust-forming chromium-alloy containing material unless the material has been prepared for sale or delivery to a customer. Finished product is excluded from housekeeping provisions for material storage and transport.

Additionally, effective July 1, 2021, the following are housekeeping provisions for cleaning with an approved cleaning method are in subparagraphs (f)(1)(H) through (f)(1)(N):

Table 2.4: Routine Cleaning Housekeeping Provisions

Effective July 1, 2021	
Using an approved cleaning method:	
Daily	Clean all floor areas within 20 feet of chromium alloy melting operations, with the exception for areas where metal grinding or metal cutting is conducted under a continuous flow of metal removal fluid
Weekly	Clean all floor areas within 20 feet of where: • Chromium alloy-containing materials (e.g., ingots, scrap, rerun scrap, dross, slag, ash, and finished products) are stored or placed; • Emission collection systems and emission control devices are operated; • Casting material is handled, mixed, reclaimed, or stored; • Waste from used casting material, housekeeping activities, construction and maintenance and repair activities, and emission control devices is stored, disposed, recovered, or recycled; and • Any entrance or exit of enclosed storage areas or buildings in which chromium alloy melting operations occur
Quarterly	Inspect and clean collection vents, openings, and ducting of emission control devices to prevent dust building up and clogging
Every Six Months	Clean all floor areas outside of the building where there is foot or vehicle traffic
Every Twelve Months	Clean the entire facility where fugitive metal dust may deposit, including areas that are not already specified in the rule
Every Two Years	Clean buildings where chromium alloy melting operations occur during the summer (June through September) to avoid occurrences of rain
Within an Hour	Clean the area where the construction or maintenance and repair activity or event (e.g., accidents, process upsets, or equipment malfunction that results in the deposition of fugitive metal dust emissions) occurred

The intent of cleaning provisions is to minimize the accumulation of metal dust on floors and surfaces in and around the facility and in collection slots and ducts of emission control devices. Observation of negligible dust on floors, surfaces, and emission collection vents and ducting will not constitute a violation of these provisions.

Prohibitions of Dry Sweeping and Compressed Air Cleaning (paragraph (f)(2))

Effective upon rule adoption, paragraph (f)(2) prohibits dry sweeping and compressed air cleaning in areas where chromium alloy melting operations occur. Dry sweeping and compressed air cleaning have the potential to disperse fugitive emissions into the air.

Alternative Housekeeping Measures (paragraph (f)(3))

For these cleaning provisions in subparagraphs (f)(1)(H) through (f)(1)(N), paragraph (f)(3) allows for alternative housekeeping measures. The alternative housekeeping measure must meet the same objective and effectiveness of the housekeeping measure it is replacing and must be approved in writing by the Executive Officer.

Building Requirements (Subdivision (g))

If fugitive emissions land on surfaces outside of a facility (e.g., rooftops, walkways, or perimeter), they can be become re-entrained via foot traffic, vehicular traffic, or wind and impact the surrounding community. Buildings are proposed to contain fugitive emissions and with cross-draft minimization will help prevent a loss in the efficiency of an emission collection system.

Paragraph (g)(1) requires that chromium alloy melting operations be conducted in a building by July 1, 2021. A building, as defined by (c)(5), is a structure, enclosed with a floor, walls, and a roof to prevent exposure to the elements (e.g. precipitation or wind).

Cross-Draft Minimization (paragraph (g)(2))

By January 1, 2022, paragraph (g)(2) requires buildings to minimize cross-draft conditions by not allowing openings on opposite ends of the building to be opening simultaneously. Openings, as defined by (c)(32), are passages, doorways, bay doors, wall openings, roof openings, vents, and windows and do not include stacks, ducts, and openings to accommodate stacks and ducts. Full-length roof monitors (i.e. vents in the roof structure of the building), are allowed if they are greater than 15 feet above the edge of a chromium alloy melting furnace or where molten metal is poured and cooled. Methods to close openings, include: use of automatic doors; installation of overlapping plastic strip curtains; vestibules; and airlock systems. Barriers, such as large pieces of equipment that do not process chromium alloys, may also be used to block openings or prevent cross-drafts inside an enclosure. Additionally, the owner or operator can use an alternative cross-draft minimization method, if approved, that demonstrates to the Executive Officer the alternative method is equivalent or more effective at minimizing cross-draft conditions.

Illustrations of example acceptable building configurations are provided in Figures 2.3 through 2.6 below:

Figure 2.3: Two Building Openings at Non-Opposing Ends

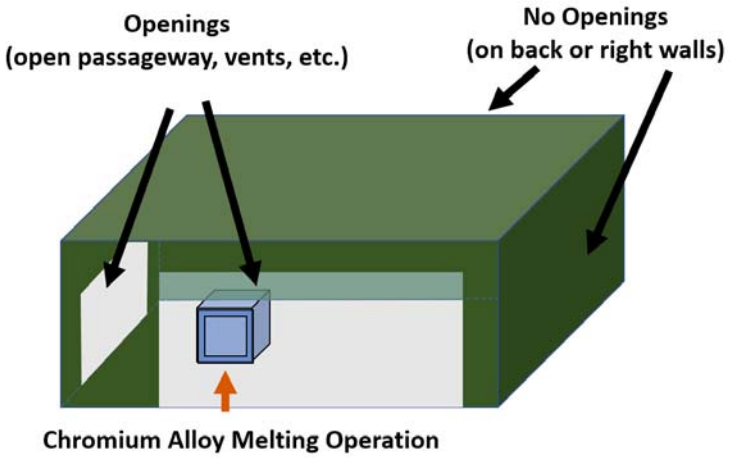


Figure 2.4: Two Building Openings at Opposing Ends

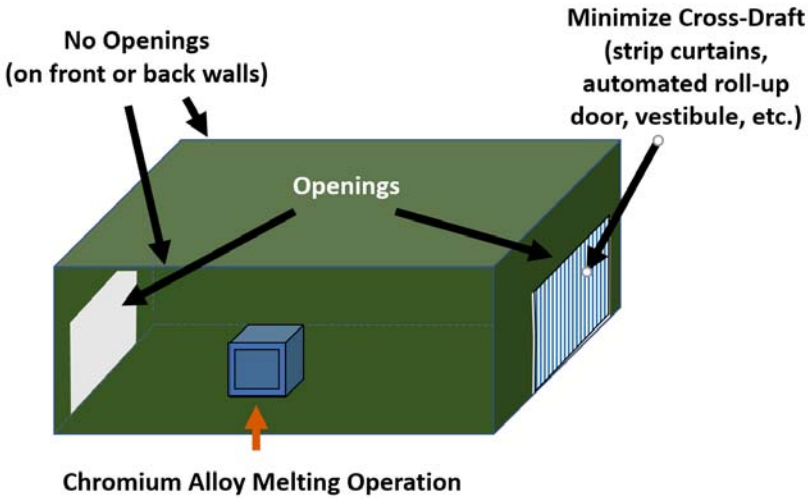


Figure 2.5: Three Building Openings with Two on Opposing Ends

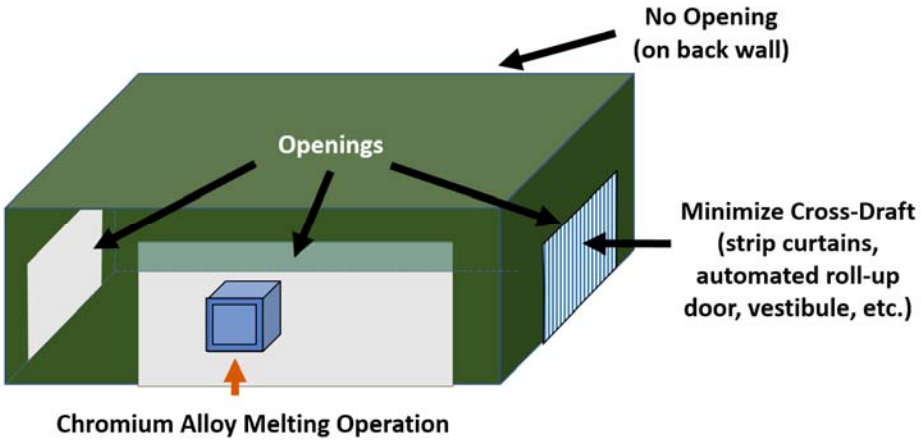
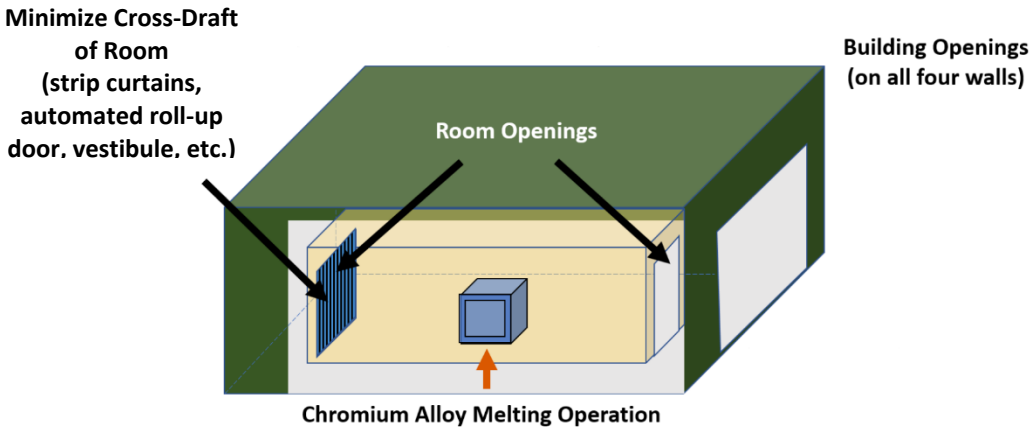


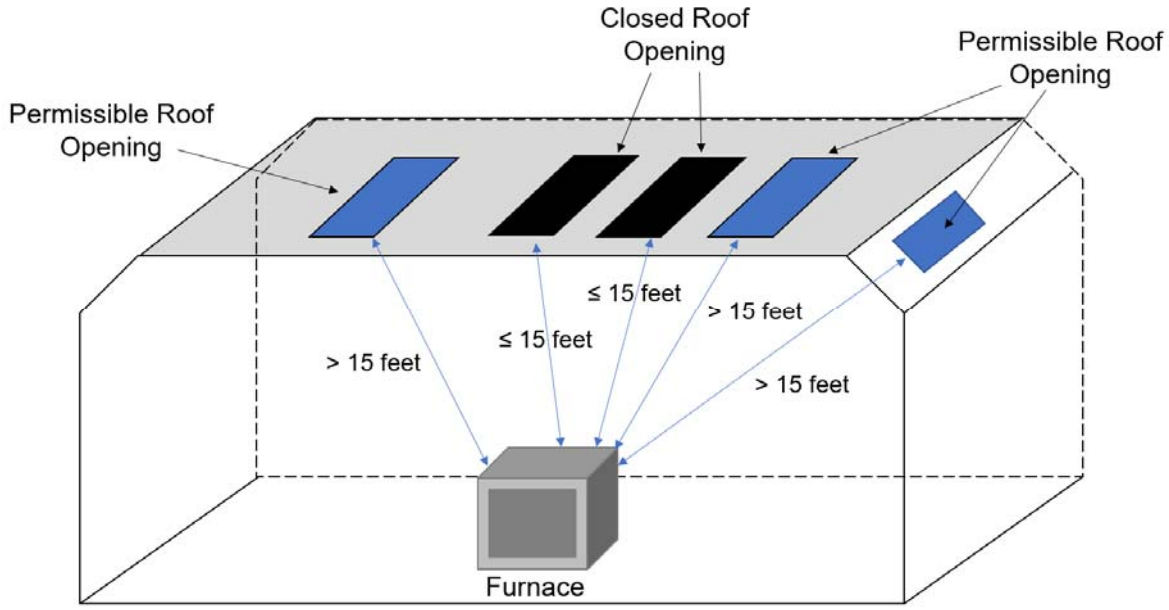
Figure 2.6: Room within a Building



Closing Roof Openings (paragraph (g)(3))

All roof openings located 15 feet or less above the edge of a chromium alloy melting furnace or where molten metal is poured and cooled are required to be closed, except during the passage of equipment or parts. Illustration of which roof openings must be closed or may remain open is provided in Figure 2.7.

Figure 2.7: Closing of Roof Openings



Alternative Building Compliance Measures (paragraph (g)(4))

In the event that an owner or operator cannot comply with the requirements of paragraph (g)(2) and/or (g)(3) due to conflicts with United States Department of Labor Occupational Safety and Health Administration (OSHA), California Division of Occupational Safety and Health Administration (CAL/OSHA), or other municipal codes or agency requirements directly related to worker safety, paragraph (g)(4) allows use of alternative building compliance measures. The alternative building compliance measure must meet the same objective and effectiveness of the building requirement it is replacing and must be approved in writing by the Executive Officer. The alternative building compliance measures must minimize cross-draft conditions and fugitive emissions from chromium alloy melting, pouring, and cooling processes from entering the atmosphere through roofs. Paragraph (g)(4) also allows for use of approved alternative building compliance measures for facilities that implemented the provisions in paragraphs (g)(2) and (g)(3) and then became aware of a conflict with OSHA, CAL/OSHA, or municipal codes or agency requirements directly related to worker safety. After approval, the alternative building compliance measures must be implemented within 90 days.

Source Testing Requirements (Subdivision (h))

Source test results are used to demonstrate compliance with hexavalent chromium emission limit and collection efficiency requirements.

Source Test Protocol (paragraphs (h)(1) and (h)(2))

The first step of source testing is submitting a source test protocol for approval. Source test protocol specifies which source will be tested and how emissions and samples will be sampled, analyzed, and reported. Source test protocols establish procedures to ensure results are accurate and representative of a source's emissions. Once South Coast AQMD evaluates and approves a test protocol, the owner or operator of a facility conducting chromium alloy melting operation(s) can be reasonably assured that test results will be accepted if the source test protocol is followed.

PR 1407.1 requires facilities to submit a source test protocol to the Executive Officer: 1) no later than 90 days prior to the initial source test for existing chromium alloy melting furnaces and/or associated emission control devices; 2) within 90 days after the Permit to Construct is issued for the initial source test for new or modified chromium alloy melting furnaces and/or associated emission control devices; and 3) no later than 90 days prior to the due date of periodic and failed parameter monitoring source tests.

The source test protocol must specify the information necessary to properly conduct the source test including: 1) source test criteria, all assumptions, and required data; 2) target hexavalent chromium emissions in milligrams per hour; 3) planned sampling parameters, including sampling locations, dimensions of the ducts or stacks at the sampling locations, and the total sample volume for each sample sufficient to demonstrate compliance with the aggregate hexavalent chromium emission limit at the method reporting limit; 4) an evaluation of the emission collection system's capture efficiency and velocity; and 5) information regarding equipment, logistics, personnel and other resources necessary to facilitate an efficient and coordinated source test. This information is standard to include in a source test protocol. The protocol should contain a description of the process or equipment to be source tested (e.g. operating temperatures, flows, production rates, charge material), applicable rule or permit conditions, the sampling and analytical methods to be used, and the calibration and quality assurance procedures to be conducted. By collecting a total sample volume enough to demonstrate compliance with the aggregate hexavalent chromium emission limit at the method reporting limit, non-detect results (i.e. below the method reporting limit) can be evaluated and confirmed to be below the emission limit. The capture efficiency and velocity of the emission collection system should be evaluated according to conditions of the Permit to Operate for the emission control device or recommendations for the particular control system in the *Industrial Ventilation: A Manual of Recommended Practice for Design,* published by the American Conference of Governmental Industrial Hygienists (ACGIH).

Source Test Notification Requirement (paragraph (h)(3)

The owner or operator shall notify the South Coast AQMD at least seven days prior to conducting any source tests and at least 24 hours prior to a test date to be cancelled or rescheduled to allow South Coast AQMD Compliance and Enforcement staff reasonable time to go out and observe the source test and to adjust their schedule for any cancelled or rescheduled test, if needed. For any source test date to be changed, the owner or operator must set the date of the rescheduled source test to allow reasonable notice to the Executive Officer of at least seven days prior to conducting the source test.

Source Testing Frequency (paragraph (h)(4))

PR 1407.1 paragraph (h)(4) will require source tests to demonstrate compliance with the aggregate hexavalent chromium emission limits, a passing smoke test, and maintenance of the minimum velocity for the emission collection system. The following source tests are required: 1) no later than July 1, 2024, an initial source test for chromium alloy melting furnaces and/or associated emission control devices installed before PR 1407.1 adoption; 2) within 120 days after approval of the source test protocol, an initial source test for chromium alloy melting furnaces and/or associated emission control devices installed or modified on or after PR 1407.1 adoption; and 3) periodic source tests. Though source testing confirms compliance with emission limits and collection efficiency requirements, parameter monitoring ensures that the emission control equipment is operating properly and is less costly than source testing on a frequent basis. Parameter

monitoring provides a continuous status of the operating conditions of the control equipment in between source tests and alerts the operator to operation and maintenance issues with the control equipment. To incentivize facilities to regularly monitor their emission control equipment and fix issues as soon as they are detected, PR 1407.1 subparagraph (h)(4)(C) will establish periodic source testing, within 60 months after the most recent source test, and once every 60 months thereafter, provided that the owner or operator consistently conducts all parameter monitoring requirements pursuant to subdivision (j). The owner or operator must install and operate calibrated monitoring devices appropriate for the required parameter measurements, measure the parameters at the required frequencies, and correct the issue(s) identified by the parameter monitoring and re-measure the parameter for the affected emission collection system or control device.

If an owner or operator fails to properly conduct parameter monitoring or correct issues identified by the parameter monitoring, PR 1407.1 subparagraph (h)(4)(D) will require a source test be conducted within 6 months of the discovery of failure. Source testing is necessary to confirm compliance with emission limits and collection efficiency requirements when interim measures to ensure proper operation of the emission control equipment are not in place or not being followed consistently and continuously. A deficient parameter measurement may indicate that the toxic air contaminant emissions from the chromium alloy melting furnace(s) are not being collected or being controlled by the emission control device. If the owner or operator does not address the issue identified by the deficient measurement, proper collection and control of emissions may and continue to be compromised and lead to fugitive emissions. Criteria for passing parameter monitoring measurements are established in subdivision (j) – Parameter Monitoring Requirements. The provisions that would trigger a source test to be conducted within 6 months are:

- Not conducting any parameter monitoring requirement by the effective date, at the required frequency, or with a calibrated and properly operating monitoring device as specified in subdivision (i);
- Continuing to operate a furnace associated with an emission control equipment that has been identified by parameter monitoring to have an issue beyond 24 hours after the discovery of the failed parameter; and
- Failing to meet a passing parameter monitoring requirement for any one parameter three consecutive times.

An owner or operator meeting any of the above criteria warrants a source test to be conducted within a shorter time frame due to the absence of interim measures to ensure proper operation of the emission control equipment, continuing to operate an emission source that may be improperly controlled and potentially allowing emissions to escape, or that efforts to repeatedly fix an issue with an emission collection system or control device identified by a parameter monitoring for one parameter are not effective.

Emission Limit Exceedance Notification (paragraph (h)(5))

The owner or operator shall notify the South Coast AQMD within five calendar days of receiving source test results that exceeded the applicable aggregate hexavalent chromium emission limit, failed a smoke test, or does not maintain the required velocity of the emission collection system. The owner or operator shall follow up with a written notification within 10 days of the initial notification that contains a copy of the source test results.

Source Test Criteria and Test Methods (paragraph (h)(6))

PR 1407.1 will be basing emission control requirements specifically on the control of hexavalent chromium. Therefore, the source test method requirement in PR 1407.1 in paragraph (h)(6) is CARB Method 425 – *Determination of Total Chromium and Hexavalent Chromium Emissions from Stationary Sources*. Source tests shall be conducted representative of typical operating conditions. Additionally, the total sample volume for each sample must be large enough to demonstrate compliance with the aggregate hexavalent chromium emission limits at the method reporting limit, or the test must be run for a minimum sampling time of 8 hours for each sample, assuming that the method reporting limit is 0.05 micrograms or less per sample for hexavalent chromium. These sampling parameters ensure that sufficient mass of hexavalent chromium is collected during a test run to allow for analytical quantification of results and confirmation that results are below the emission limit if they are below the method reporting limit. Since the hexavalent chromium emission limits are aggregate standards, demonstration of compliance with the aggregate standards is the summation of each source test result for all the chromium alloy melting furnaces and associated emission control devices at a facility. If a source test for a furnace or emission control device results in all runs below the method reporting limit for a compound, then that compound will be reported as non-detect and will be counted as a zero. If a source test for a furnace or emission control device results in at least one run below and one run above the method reporting limit for a compound, then the runs that are below the method reporting limit shall be assigned one half of the method reporting limit for those runs[12].

Alternative and Equipment Test Methods (paragraphs (h)(7) through (h)(9))

Paragraph (h)(7) allows for the use of an alternative or equivalent test method as defined by the U.S. EPA in 40 CFR Part 60, Section 60.2 and as long as it is approved in writing by the Executive Officer, in addition to the California Air Resources Board, or the U.S. EPA, as applicable.

As required by paragraph (h)(8), the source test shall be performed by a South Coast AQMD approved laboratory[13]. When an approved laboratory is not available, using South Coast AQMD protocols and procedures, the Executive Officer will approve a laboratory on a case-by-case basis using South Coast AQMD. When there is more than one possible source test method, paragraph (h)(9) states that the source test method selected must be approved by the Executive Officer and violating any specified source test method constitutes violating the rule.

Existing Source Tests (paragraph (h)(10))

Paragraph (h)(10) allows a facility to utilize a source test conducted no more than 36 months prior to the adoption of PR 1407.1 instead of conducting the initial source test required in paragraph (h)(4)(A) provided that the source test:

- Is the most recent completed source test for that equipment;
- Demonstrated compliance with the limits in subdivision (d) and emission collection system requirements in subdivision (j);
- Was conducted using PR 1407.1 specified test methods; and
- Was evaluated and approved by the Executive Officer.

[12] South Coast AQMD Risk Assessment Procedures for Rules 1401, 1401.1 and 1402, Version 8.1, South Coast AQMD, September 1, 2017

[13] South Coast AQMD Laboratory Approval Program. http://www.aqmd.gov/home/programs/business/business-detail?title=laboratory-approval

Source Test Reports (paragraph (h)(11))

Reports from source testing must be submitted to the South Coast AQMD within 90 days of completion of source testing in order to comply with paragraph (h)(11).

Material Testing Requirements (Subdivision (i))

To align with the CARB ATCM for Non-Ferrous Metal Melting, this subdivision will require material testing to confirm compliance with the arsenic and cadmium content limits specified in paragraph (e)(1) for non-ferrous chromium alloys, which include superalloys. With exception of iron-based superalloy, superalloys are non-ferrous metals due to having less than one percent iron content by weight. Material testing must be conducted of each furnace charge to determine the weight average percentages of arsenic and cadmium contained in the materials melted in non-ferrous chromium alloy melting furnaces. PR 1407.1 allows for the use of U.S. EPA-approved methods, active ASTM International methods, or alternative methods approved by the Executive Office. The method(s) needs to be appropriate to the sample matrix, has the appropriate method detection limit, and has no interferences. In lieu of material testing, the owner or operator may use metallurgical assays, certificates of analysis, material specification sheets, or similar documentation to confirm the weight average percentages of arsenic and cadmium. Rerun scrap and material generated at another facility that has documentation confirming the material has no more than 0.002 percent arsenic and 0.004 percent cadmium by weight (e.g. customer returns) are excluded from material testing. Since rerun scrap is generated at the chromium alloy melting facility as a result of either processing virgin, unused raw material or scrap that is confirmed to contain arsenic and cadmium that do not exceed the content limits, it is not necessary for rerun scrap to undergo material testing. Documentation that shows the arsenic and cadmium contents of an outside material is evidence that the material has been tested by the supplier, and thus does not require re-testing for arsenic and cadmium content.

Parameter Monitoring Requirements (Subdivision (j))

Parameter monitoring, which is separate from source testing, ensures proper maintenance and operation of the chromium alloy melting emission collection system and control device, and allows early detection of issues. Operational parameters are generally expressed as range parameter measurements within which the emission control device functions best and realizes optimum efficiency. PR 1407.1 will have four general parameter monitoring requirements: 1) Bag Leak Detection system; 2) Pressure Across the Filter Media; 3) Verifying Collection Efficiency; and 4) Smoke Testing.

Bag Leak Detection System (paragraph (j)(1))

Bag Leak Detection Systems (BLDSs) continuously monitor and identify potential breach, blockage, or similar failures with the bag. BLDSs measure changes in particle mass loading and activate an alarm when a change is detected. This provision requires a BLDS for all PR 1407.1 baghouses by July 1, 2024. A BLDS must be operated, calibrated, and maintained pursuant to the Tier 3 requirements of Rule 1155 – Particulate Matter (PM) Control Devices regardless of the size and position within a series of emission control devices of the PR 1407.1 baghouse.

Pressure Across the Filter Media (paragraph (j)(2))

By July 1, 2024, the pressure across each filter stage of the emission control device shall be continuously measured with a gauge. The reading from the gauge provides an indication of

whether the emission control device is operating within the proper range of pressure differential, whether the bags or filters may be clogged or have leaks thereby compromising their effectiveness. The gauge shall:

- Operate within the range specified by the manufacturer or in the Permit to Operate;
- Be positioned so that it is visible and in clear line of sight;
- Be equipped with ports that allow for periodic calibration in accordance with manufacturer's specifications;
- Be calibrated according to manufacturer's specifications at least once every 12 months;
- Have with a continuous data acquisition system (DAS) which record the data output in inches of water column at a frequency of at least than once every sixty (60) minutes;
- Generate a daily data file from the computer system interfaced with each DAS which contains a tabulation of chronological dates and time and the corresponding data output value from the gauge in inches of water column; and
- Be maintained in accordance with manufacturer's specifications.

Smoke Test (paragraph (j)(3))

In addition, for each emission collection system required by PR 1407.1, a passing smoke test shall be conducted during each source test and at least once every 180 days after the initial source test. The periodic smoke test provides a qualitative test for owners and operators to help determine whether cross-draft conditions or other activities conducted at the facility are affecting the ability of the emission collection system or hood to effectively capture emissions. It also serves to verify that the airflow is moving towards the air pollution collection system, which verifies the effectiveness of the air pollution control device. Smoke test procedures are outlined in PR 1407.1 Attachment A – Smoke Test to Demonstrate Capture Efficiency for Emission Collection Systems of an Emission Control Device.

Anemometer (paragraph (j)(4))

The face velocity of each intake of each emission collection system shall be measured using a calibrated anemometer beginning July 1, 2024 and at least once every 180 days thereafter. The calibrated anemometer shall be kept onsite to allow South Coast AQMD compliance and enforcement staff to check that it is functioning properly and to verify the velocity using the anemometer during an inspection. The face velocity is based on the emission collection system's location and design and can be calculated according to guidelines specified in the *Industrial Ventilation Manual*. An emission collection system designed with a hood or enclosure shall maintain a capture velocity of at least 200 feet per minute as measured at the face of the enclosure. An emission collection system with collection slots, but without an enclosure or hood, shall maintain slot velocities of at least 2,000 feet per minute. An emission collection system designed with a canopy hood without an enclosure shall maintain a capture velocity of at least 200 feet per minute across the entirety of all open sides extending from the perimeter of the hood without any cross-drafts. Instead of complying with the three capture velocities above, the operator can instead maintain at least 95 percent of the minimum velocity that verifies 100 percent collection efficiency as prescribed in the conditions of the Permit to Operate for the emission control device.

Reporting and Correction of Failed Parameter Measurements (paragraphs (j)(5) and (j)(6))

Within 24 hours, the owner or operator is required to report to 1-800-CUT-SMOG any of the following:

- A cumulative number of hours of BLDS alarm activation due to detection of changes in the particle mass loading on the bag filters within any continuous six-month rolling period that has exceed more than five percent of the total operating hours in that period;
- An average pressure differential across a filter stage of the emission control device that is not maintained within the range specified in the Permit to Operator or specified by the manufacturer, based on hourly or more frequent recordings by the DAS for a rolling 4-hour time period on 3 or more separate occasions over 60 continuous days, or any rolling consecutive 24-hour period;
- A DAS that is not recording or generating the data output from a pressure gauge;
- A failed smoke test; or
- An anemometer reading indicating that the minimum velocity required for each intake of the emission collection system is not maintained.

The reporting criterion for the BLDS alarm activation is a monitoring requirement established in Rule 1155 and is an indicator of ongoing bag leakage due to elevated PM emissions and the equipment being vented into the baghouse needs to be shut down. Reporting criteria for the average pressure differential across a filter stage is a monitoring requirement established previously in other toxic metal rules and is an indicator of continual issues with the bags or filters of the emission control device. The averaging period allows sufficient time for the owner or operator to address the issue with the bags or filters, before triggering additional requirements (i.e. a source test within 6 months of discovering a failure of a parameter monitoring requirement), to ensure continuous compliance with the emission control requirements of the rule. If an emission control device or emission collection system fails any of the required parameter measurements specified in this subdivision, the owner or operator must stop the use of the associated furnace(s) for production starting no later than 24 hours after the discovery of the failure and until the emission control device or emission collection system passes all parameter measurements.

DAS Failure Due to an Emergency Situation (paragraph (j)(7))

If a DAS fails to record or generate the data output of the pressure gauge due to an emergency situation beyond the control of the owner or operator (e.g. power outages, computer malfunctions), the owner or operator must restore the DAS to working condition no later than 24 hours after the end of the emergency situation, and manually record the data output from the gauge associated with the non-operation DAS at least once every eight hours until the DAS is restored. If the gauge associated with the DAS is also not operational due to the emergency, the pressure differential needs to be measured by a mechanical gauge and manually recorded. Only the period of missing DAS data beginning from the start of the DAS failure due to the emergency situation to the start of the manual recording of pressure shall not be used to determine compliance with the DAS requirements specified for the pressure gauge. The period of manual recording of pressure until the DAS is restored is still subject to pressure drop monitoring requirements specified in paragraph (j)(2).

Unreasonable Risk (paragraph (j)(8))

If the smoke test pursuant to paragraph (j)(3) or velocity measurement pursuant to paragraph (j)(4) cannot be conducted due to an unreasonable risk to safety, an owner or operator shall use an alternative parameter monitoring measure that has been approved by the Executive Officer in a source test protocol. An example of an unreasonable risk would be the tester cannot physically and/or safely access certain sampling points, even with the assistance of a probe extension on the monitoring device to facilitate access, due to obstructions, moving machinery, or excessive

temperatures. Alternative measures can be fitting a monitoring device with a probe extension to reach hard-to-access sampling points or calculating velocities using indirect parameters (e.g. total flow divided by the cross-sectional area of the intake). If there is no safe alternative parameter monitoring measure, as evaluated by the Executive Officer, the owner or operator is no longer subject to the smoke test or velocity measurement requirement.

Recordkeeping Requirements (Subdivision (k))

To assist in verifying compliance with PR 1407.1, the rule will require records be kept. Owners and operators will be required to keep records onsite, maintain them for five (5) years, and make them accessible and available to South Coast AQMD compliance staff upon request. Records shall include the following:

Raw Material Quantity (paragraph (k)(1))

Quantity of raw materials (i.e., ingots, scrap, customer returns, and rerun scrap) processed on a quarterly basis, and the purchase records to verify these annual quantities for facilities exempt from PR 1407.1 requirements due to melting less than one ton of chromium alloy(s) per year;

Material Testing Data (paragraph (k)(2))

Material testing data as required by subdivision (i) to verify the arsenic and cadmium percentages in weight for each non-ferrous chromium alloy tested and to evaluate the applicability and sensitivity and selectivity of the test method(s) used. This includes description of each material test, quantity of material processed, test method(s) used, method detection and reporting limits, quality assurance, quality control, and calibration data, and results of arsenic and cadmium percent in weight for each material tested;

Source Testing (paragraph (k)(3))

All source test protocols and reports required by subdivision (h);

Housekeeping Activities (paragraph (k)(4))

Housekeeping activities conducted as required by subdivision (f), including the name of the person conducting the activity and the dates and times at which specific activities were completed;

Construction and Maintenance and Repair Activities (paragraph (k)(5))

Construction and maintenance and repair activities conducted on any equipment or structure associated with the chromium alloy melting operation(s) including emission collection systems, emission control devices, and buildings housing chromium alloy melting operation(s);

Inspection, Calibration, and Maintenance (paragraph (k)(6))

Inspection, calibration documentation, and maintenance of emission control devices and parameter monitoring devices as required by subdivision (j), including the name of the person conducting the activity and the dates and times at which specific activities were completed; and

Parameter Monitoring Data (paragraphs (k)(7) through (k)(12))

All parameter monitoring data including: 1) cumulative number of hours of BLDS alarm activation pursuant to paragraph (j)(1) and Rule 1155; 2) DAS data files as required by paragraph (j)(2); 3) smoke test documentation required in Attachment A; 4) anemometer data as required by paragraph (j)(4), including capture velocities, and dates of measurement; 5) call log of all reporting made to 1-800-CUT-SMOG as required by paragraph (j)(5), including the dates and times of the calls and

the reported parameter monitoring requirements; and 6) documentation of any repairs or replacements that were performed in order to pass any parameter monitoring requirement.

Exemptions (Subdivision (l))

PR 1407.1 includes exemptions limiting all or nearly all PR 1407.1 requirements that a facility may be subject to. This allows for relief from rule requirements, such as point source or fugitive emission controls, that are disproportional or onerous to owners and operators of minor operations of chromium alloy melting.

Small Quantity (paragraph (l)(1))

Facilities that melt no more than one ton per year of chromium alloy(s) are exempt from all requirements except for paragraph (k)(1), maintaining records verifying that they melt less than one ton of chromium alloy(s) annually. This will exclude many small operations.

Educational Facilities (paragraph (l)(2))

Educational facilities (i.e. universities, colleges, schools) that melt chromium alloy(s) for purposes of education, and jewelers are exempt from all requirements due to being small operations of chromium alloy melting.

Jewelers (paragraph (l)(3))

Jewelers are exempt from all requirements due to being small operations of chromium alloy melting.

Rules 1420.1 and 1420.2 – Lead Rules (paragraph (l)(4))

Equipment or operations that are subject to the lead rules listed above are exempted from all PR 1407.1 requirements as they are currently subject to requirements which are just as or more stringent for point source and fugitive emission control than the requirements of PR 1407.1. A facility that is subject to Rule 1420.1 or 1420.2 but also has furnaces that melt chromium alloy(s) would be required to comply with PR 1407.1 for those chromium alloy melting furnaces.

Brazing and Soldering Operations (paragraph (l)(5))

Brazing, dip soldering, and wave soldering operations are not subject to the requirements of this rule as these are miscellaneous minor metalworking operations compared to chromium alloy melting furnaces.

Maintenance and Repair (paragraph (l)(6))

Metal cutting and metal grinding conducted for maintenance and repair purposes that do not generate fugitive metal dust emissions originating from or relating to the chromium alloy melting operation are not subject to the requirements of this rule. This exemption excludes maintenance and repair activities associated with chromium alloy melting operation(s), emission collection systems and emission control devices. It also excludes any activities required by subdivisions (f) – Housekeeping Requirements and (g) – Building Requirements that generate or have the potential to generate fugitive metal dust emissions.

Periodic Smoke Test (Attachment A)

Attachment A specifies the method for periodic smoke tests to qualitatively demonstrate total capture for emission collection systems of emission control device(s) pursuant to paragraph (j)(3). A smoke generator is placed within the area where collection of emissions by the ventilation system reveals the capture efficiency. The test is conducted while the emission control device is

in normal operation and under typical draft and cross-draft conditions. An acceptable smoke test shall demonstrate a direct stream to the collection location(s) of the ventilation system without escaping. The periodic smoke test requirement of PR 1407.1 will not be required if performing such a test presents an unreasonable risk to safety. The owner or operator must obtain evaluation and approval of the unreasonable risk by the Executive Officer in the source test protocol.

CHAPTER 3: IMPACT ASSESSMENT

INTRODUCTION

PR 1407.1 is estimated to affect 11 chromium alloy melting facilities including those that melt alloy steel, stainless steel, superalloys, and other chromium alloys. These facilities include smelters, foundries, die-casters, mills, and other establishments conducting miscellaneous melting processes.

AFFECTED FACILITIES

The facilities subject to PR 1407.1 were identified by reviewing South Coast AQMD permits for metal melting furnaces, reviewing South Coast AQMD inspection reports for metal melting facilities, internet searches for facilities that offer metal melting services, and site visits. Internet searches were conducted to locate facilities where the furnaces do not require permits. Facilities that conduct heat treating or other metalworking operation but do not melt the metal were excluded. Additionally, facilities that melt only non-chromium metals were excluded as they are subject to Rule 1407 – Control of Emissions of Arsenic, Cadmium, and Nickel from Non-Chromium Metal Melting Operations. Likewise, facilities that melt metals containing lead were excluded as they are subject to Rule 1420 – Emissions Standard for Lead, Rule 1420.1 – Emission Standards for Lead and Other Toxic Air Contaminants from Large Lead-Acid Battery Facilities, or Rule 1420.2 – Emissions Standards for Lead from Metal Melting Facilities. Staff conducted 30 site visits to various chromium and non-chromium metal melting operations. During these site visits, staff gathered facility operations information and data related to melting furnaces, any associated control equipment, and types and amounts of alloys melted. Based on South Coast AQMD staff analysis of compliance and permitting data, searching websites for facilities that offer metal melting facilities, and site visits, there are 11 facilities that meet the applicability requirements of the proposed rule.

COMPLIANCE COSTS

Compliance costs are estimated by observations from site visits and review of permitted equipment. The costs are estimated by actual costs provided by facilities, vendor quotes, cost estimates from other rules with similar requirements, and the U.S. EPA Air Pollution Control Cost Manual[14].

Emission Control Requirements (subdivision (d))

Five facilities are estimated to require the installation of five control devices at an estimated cost of $256,000[13] per control device, with 4 equipped with HEPA filters at an estimated cost of $35,000 per device and one equipped with ULPA filters at an estimated cost of $39,000 per device. In addition to installation costs, there would be on-going operating and maintenance costs and annual permit renewal fees for the operation of the control devices estimated at $276,500 annually and the HEPA filters at $36,500 and ULPA filters at $40,500 annually per control device. Four facilities with existing control devices are estimated to require the installation of HEPA filters for 10 control devices at an estimated cost of $39,700 per device.

[14] Cost Reports and Guidance for Air Pollution Regulations – EPA Air Pollution Control Cost Manual, U.S. EPA, accessed August 2020, https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution

Housekeeping Requirements (subdivision (f))

All 11 facilities subject to PR 1407.1 will be required to conduct housekeeping pursuant to subdivision (f). Nearly all facilities already conduct weekly cleaning and are expected to conduct daily cleaning in chromium alloy melting operation areas pursuant to subdivision (f). Covering containers holding dust-forming metal-containing slag, dross, and trash can be accomplished by a simple container with a cover or keeping those materials within a building or enclosed storage area with a roof. Inspections of control device collection points is required quarterly. The removal of a weather cap is a one-time activity. A butterfly caps to replace the weather cap is estimated to be $9,100[15] per stack. Nearly all facilities already closely track the speciation of metals in the melted metal. All facilities will be required to conduct roof cleaning of buildings housing chromium alloy melting operation(s) and enclosed storage areas once every two years. Cost for roof cleaning is estimated to be $1,400 per cleaning. Facilities are expected to record housekeeping activities. Together with recordkeeping, proposed housekeeping provisions are expected to increase labor costs by less than $1,000 annually.

All facilities are assumed to require the purchase of a HEPA vacuum system. Riding vacuum HEPA sweepers cost an estimated $11,600 and would be utilized by 4 larger facilities. Backpack vacuum HEPA equipment is approximately $600 and would be utilized by the remaining 7 facilities. Shop HEPA vacuum equipment for cleaning at and around workstations is approximately $500, with replacement of HEPA filters every 2 to 3 days at an estimated $20 per set of replacement filters, and would be utilized by all facilities.

Building Requirements (subdivision (g))

Nearly all facilities already conduct their chromium alloy melting operations in a building. To comply with the cross-draft minimization requirements pursuant to subdivision (g) – Building Requirements, staff will assume that all facilities are expected to install plastic curtains at an estimated cost of $9,100 per facility, unless staff identifies facilities that already comply with the requirements. Staff will also assume that all facilities are expected to perform minor building construction to close all roof openings within 15 feet above the edge of a chromium alloy melting furnace or where molten metal is being poured or cooled at an estimated cost of $13,750 per facility, unless staff identifies facilities that already comply with the requirement.

Source Testing Requirements (subdivision (h))

To demonstrate compliance with paragraph (d)(1), all facilities will be required to conduct an initial source test and then periodic source testing every 60 months, provided that facilities properly conduct all the required parameter monitoring, pursuant to paragraph (h)(4) at an estimated cost of $20,000 per source test. This estimated cost includes the source test, laboratory analysis, and source test report. Staff estimated the following number of source tests each facility will be required to perform to demonstrate compliance: eight facilities are expected to conduct only one source test; two facilities are expected to conduct two source tests; and one facility is expected to conduct five source tests.

[15] Cost Reports and Guidance for Air Pollution Regulations – EPA Air Pollution Control Cost Manual, U.S. EPA, accessed August 2020, https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution

Material Testing Requirements (subdivision (i))

All seven facilities that melt non-ferrous chromium alloy will likely comply with arsenic and cadmium content limits pursuant to paragraph (e)(1) of the proposed rule using documentation that specifies the arsenic and cadmium contents of the materials and melting rerun scrap. They are expected to have no additional costs for material testing. If testing is needed on scrap or material without documentation, a facility would either conduct its own material testing or send the material for testing to an outside laboratory. Material testing using an outside laboratory would result in no additional costs. One facility is expected to conduct in-house chemical analyses, which would require purchase of chemical standards for method development and calibration at an estimated one-time cost of $20,000.

Parameter Monitoring Requirements (subdivision (j))

For facilities operating control devices, PR 1407.1 requires a pressure gauge and data acquisition system at a one-time cost of $1,210. Baghouses are also required to have a baghouse leak detection system at a cost of $1,512. Anemometer costs for each baghouse is $1,000 per anemometer. Slot velocity tests are expected to cost $90 per set of tests per emission control device for a total of $1,530 every six months. There will also be an on-going requirement to conduct smoke testing at an annual cost of $535 for each of the control devices.

Recordkeeping Requirements (subdivision (k))

All 11 facilities subject to PR 1407.1 will be required to maintain records pursuant to subdivision (k). Facilities are expected to record housekeeping activities pursuant to subdivision (f), maintenance of control devices pursuant to subdivision (j), and maintain source test reports, emission control device data, anemometer data, and smoke test documentation on site. Staff estimates that additional recordkeeping associated with PR 1407.1 will cost $5,000 per facility.

The estimated total costs by expense for all facilities subject to PR 1407.1 is presented in Table 3.1 below. The total present worth value cost to meet the 2020 deadline is $31.8 million to $43.1 million using a 4 percent or 1 percent discount rate respectively. Between $3.7 and $4.4 million are one-time costs applicable in 2020 while $28.0 million to $38.7 million are recurring costs totaled over a 22-year period. The average annual cost, including one-time and recurring cost, is estimated to be $2.2 million.

Table 3.1: Total Costs by Expense Type

Cost Categories	Present Worth Value (2020)		Annual Average (2021 – 2042)	
	1% Discount Rate	4% Discount Rate	1% Real Interest Rate	4% Real Interest Rate
One-Time Cost				
Baghouse**	$2,542,000	$2,145,000	$130,000	$152,000
Bag leak detection system**	$44,000	$38,000	$2,000	$3,000
Anemometer**	$23,000	$20,000	$1,000	$1,000
Pressure gauge with DAS**	$78,000	$67,000	$4,000	$5,000
Closing roof openings***	$166,000	$162,000	$8,000	$11,000
HEPA**	$1,136,000	$959,000	$58,000	$68,000
Install butterfly cap**	$22,000	$19,000	$1,000	$1,000
Plastic curtains***	$99,000	$97,000	$5,000	$7,000
Rider HEPA vacuum*	$157,000	$128,000	$8,000	$9,000
ULPA**	$77,000	$65,000	$4,000	$5,000
Backpack HEPA vacuum*	$14,000	$12,000	$1,000	$1,000
Shop HEPA vacuum*	$19,000	$15,000	$1,000	$1,000
Standard and calibration materials	$22,000	$21,000	$1,000	$1,000
Total one-time cost	**$4,399,000**	**$3,748,000**	**$224,000**	**$265,000**
Recurring Cost				
Baghouse annual maintenance	$25,885,000	$18,702,000	$1,323,000	$1,323,000
HEPA annual maintenance	$5,613,000	$4,055,000	$287,000	$287,000
Housekeeping	$218,000	$160,000	$11,000	$11,000
Permit renewal fees	$479,000	$346,000	$24,000	$24,000
Recordkeeping	$1,091,000	$802,000	$55,000	$55,000
Replacement HEPA filters for shop vacuum	$467,000	$337,000	$24,000	$24,000
Roof cleaning	$303,000	$223,000	$15,000	$15,000
Slot velocity test	$207,000	$151,000	$11,000	$11,000
Smoke test	$2,320,000	$1,691,000	$118,000	$118,000
Source test	$1,348,000	$1,012,000	$68,000	$68,000
ULPA annual maintenance	$728,000	$526,000	$37,000	$37,000
Total recurring cost	**$38,659,000**	**$28,005,000**	**$1,973,000**	**$1,973,000**
Total	**$43,056,000**	**$31,751,000**	**$2,200,000**	**$2,239,000**

Note: Values rounded to nearest thousand dollars.
*Cost annualized over 6 years
**Cost annualized over 10 years
***Cost annualized over 20 years

Typical cost by facility type is provided in Table 3.2 below. For one facility with a sensitive receptor distance less than 50 meters, it is assumed that it would need installations of plastic strip curtains and an emission control device with ULPA filters, closing of roof openings, and one source test. For one facility with a sensitive receptor distance between 50 to 100 meters, it is assumed that it would need installation of plastic strip curtains, closing of roof openings, and one source test. For facilities with sensitive receptor distances greater than 100 meters, it is assumed

that they would all need installation of plastic strip curtains, except for one facility, and closing of roof openings. It is assumed that one source test would be necessary at six of these facilities, two source tests would be necessary at two of these facilities, and five source tests would be necessary at one facility. It is also assumed that four would need to install an emission control device with HEPA filters and four would need to install HEPA filters on existing emission control devices.

Table 3.2: Total Costs by Facility

Facility by distance to sensitive receptor (meters)	Number potentially affected facilities	Total cost if all PR 1407.1 expenses made in 2020	Annualized cost per facility
Less than 50	1	$7,009,000	$364,000
50 to 100	1	$743,000	$39,000
Greater than 100	9	$3,923,000	$204,000

Note: Values determined using 4% discount rate and rounded to nearest thousand dollars.

EMISSIONS IMPACT

Implementation of PR 1407.1 will reduce both point source and fugitive emissions of arsenic, cadmium, hexavalent chromium, and/or nickel, resulting in reduced ambient air concentrations of the toxic air contaminants arsenic, cadmium, hexavalent chromium, and nickel. Point source controls will reduce emissions from chromium alloy melting furnaces to health protective levels by establishing emission limits based on hexavalent chromium. Of the toxic air contaminants, hexavalent chromium is the cancer risk driver. Housekeeping and building enclosures will reduce fugitive emissions from chromium alloy melting and handling operations. Fugitive emissions are difficult to quantify but have been shown to be a contributing factor to ambient toxic air contaminant concentrations.

PR 1407.1 will require controlling toxic air contaminant emissions from point sources associated with chromium alloy melting operations. Owner or operators will also be required to conduct source testing that will provide the South Coast AQMD with data that may be used to improve the quantification of hexavalent chromium emissions from metal melting emission sources.

SOCIOECONOMIC ASSESSMENT

A socioeconomic analysis will be conducted and released for public review and comment at least 30 days prior to the South Coast AQMD Governing Board Hearing on PR 1407.1, which is anticipated to be heard on January 8, 2021.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

Pursuant to the California Environmental Quality Act (CEQA) and South Coast AQMD's certified regulatory program (Public Resources Code Section 21080.5, CEQA Guidelines Section 15251(l) and South Coast AQMD Rule 110), the South Coast AQMD, as lead agency, is reviewing the proposed project (PR 1407.1) to determine if it will result in any potential adverse environmental impacts. Appropriate CEQA documentation will be prepared based on the analysis.

DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE SECTION 40727

Requirements to Make Findings

California Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the South Coast AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report.

Necessity

PR 1407.1 is needed to fill a regulatory gap and to further protect public health by reducing emissions of arsenic, cadmium, hexavalent chromium, and nickel from chromium alloy melting operations. The intent of this proposed adoption is to reduce toxic air contaminant emissions. The proposed adoption will reduce toxic air contaminant emissions from point and fugitive sources of chromium alloy melting operations.

Authority

The South Coast AQMD obtains its authority to adopt, amend, or repeal rules and regulations pursuant to California Health and Safety Code Sections 39002, 39650 et. seq., 40000, 40440, 40441, 40506, 40510, 40522, 40702, 40725 through 40728, 41508, and 41700.

Clarity

PR 1407.1 is written or displayed so that its meaning can be easily understood by the persons directly affected by it.

Consistency

PR 1407.1 is in harmony with and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.

Non-Duplication

PR 1407.1 will not impose the same requirements as any existing state or federal regulations. The proposed amended rule is necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference

In adopting this rule, the following statutes which the South Coast AQMD hereby implements, interprets or makes specific are referenced: California Health and Safety Code sections 39659 (regulations to establish programs for hazardous air pollutants), 39666 (Air Toxics Control Measures), 41700 (nuisance), Federal Clean Air Act (CAA) Section 112 (Hazardous Air Pollutants), and CAA Section 116 (more stringent state standards).

COMPARATIVE ANALYSIS

Health and Safety Code Section 40727.2 requires a comparative analysis of the proposed rule with any Federal or South Coast AQMD rules and regulations applicable to the same source. See Table 3-3.

Table 3-3: Comparative Analysis

Rule Element	PR 1407.1	Rule 1407	40 CFR Part 63 ZZZZZ	40 CFR Part 63 EEEEE	CARB Non-Ferrous Metal Melting ATCM
Applicability	Chromium alloy smelters (primary and secondary), foundries, die-casters, and other establishments conducting miscellaneous chromium alloy melting processes	Non-chromium smelters (primary and secondary), foundries, die-casters, coating processes (galvanizing and tinning) and other miscellaneous processes such as dip soldering, brazing and aluminum powder production conducting non-chromium metal melting	Area source iron and steel foundries emitting less than 10 tons per year of any single hazardous air pollutant or less than 25 tons of any single hazardous air pollutant constructed after September 17, 2007	Major source iron and steel foundries emitting 10 tons per year or more of any single hazardous air pollutant or 25 tons or more of any single hazardous air pollutant	Non-ferrous smelters (primary and secondary), foundries, die-casters, coating processes (galvanizing and tinning) and other miscellaneous processes such as dip soldering, brazing and aluminum powder production conducting non-ferrous metal melting
Requirements	• Control emissions of toxic air contaminants by limiting aggregate hexavalent chromium mass emissions to 0.40 mg/hr for facilities with the nearest sensitive receptor less than 50 meters, 1.5 mg/hr for facilities with the nearest sensitive receptor 50 to 100 meters, and 1.8 mg/hr for facilities with the nearest sensitive receptor greater than 100 meters • Buildings to house chromium alloy melting operations with cross-draft minimization and closure of roof openings • Housekeeping • Visible emission standards	• Control emissions of arsenic, cadmium, and nickel by 99% or limit aggregate mass emissions to 0.000066 lb/hr of arsenic, 0.000541 lb/hr of cadmium, and 0.00848 lb/hr of nickel • Building enclosures • Housekeeping • Visible emission standards	• New foundries control particulate emissions to 0.1 lb/ton and hazardous air pollutant emissions to 0.008 lb/ton • Pollution prevention management practices for metallic scrap and mercury switches • Maintenance program for emission control device monitoring • Housekeeping • Visible emission standards	• Existing electric arc furnaces control particulate emissions to 0.005 gr/dscf and hazardous air pollutant emissions to 0.0004 gr/dscf • Existing cupolas control particulate emissions to 0.006 gr/dscf and hazardous air pollutant emissions to 0.0005 gr/dscf • New electric induction furnaces control particulate emissions to 0.001 gr/dscf and hazardous air pollutant emissions to 0.00008 gr/dscf • New electric arc furnaces and cupolas control particulate emissions to 0.002 gr/dscf and hazardous air pollutant emissions to 0.0002 gr/dscf • Plan or certification to minimize	• Control particulate emissions from emission collection system by 99% • Temperature in exhaust stream may not exceed 360F • Maintenance program for emission control device monitoring • Housekeeping • Visible emission standards

Rule Element	PR 1407.1	Rule 1407	40 CFR Part 63 ZZZZZ	40 CFR Part 63 EEEEE	CARB Non-Ferrous Metal Melting ATCM
				hazardous air pollutants from scrap • Maintenance program for emission control device monitoring • Housekeeping • Visible emission standards	
Reporting	• Source test report • Parameter monitoring failure	• Source test report • Parameter monitoring failure	Semiannual compliance reports for exceedances, parametric monitor downtime, deviations from pollution prevention practices	Semiannual compliance reports for exceedances, parametric monitor downtime, deviations from pollution prevention practices	None
Monitoring	• Initial and periodic source testing • Parameter monitoring • Material testing for non-ferrous chromium alloys	• Initial and periodic source testing • Emission control device monitoring • Material testing	• Source test on a furnace that is vented to a control device every five years • Parametric monitoring • Bag leak detection system	• Source test on a furnace that is vented to a control device every five years • Parametric monitoring • Bag leak detection system	• One-time source test on a furnace that is vented to a control device • Parametric monitoring • Bag leak detection system
Recordkeeping	Melt records, material testing and source testing results, housekeeping log, construction and maintenance and repair activity log, parameter monitoring log made available for five years	Melt records, material testing and source testing results, housekeeping log, emission control device monitoring log made available for three years	Test reports, notifications, semiannual reports made available for five years	Test reports, notifications, semiannual reports	Source testing results made available for two years