Bay Area Air Quality Management District
939 Ellis Street
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Workshop Report

BAAQMD Regulation 12, Rule 13: Metal Melting and Processing Operations

and

BAAQMD Regulation 12, Rule 14: Metal Recycling and Shredding Operations

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WORKSHOP REPORT
Regulations: Metal Melting and Recycling Operations

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I. INTRODUCTION

The Bay Area Air Quality Management District (District or BAAQMD) has the authority to regulate emissions of various air pollutants from stationary sources in all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, and portions of Solano and Sonoma Counties. Types of air pollutants regulated by the District include criteria pollutants, such as particulate matter (PM) and volatile organic compounds (VOC); toxic compounds; and odorous substances that can cause a nuisance to the general public. Table 1 provides examples of the various types of air pollutants that the District regulates and some of the sources.

Table 1
Summary of Pollutants Regulated by the District

Pollutant Category	Pollutant	Potential Stationary Sources
Criteria	Volatile organic compounds (VOC)	Refineries, chemical plants, gasoline stations, autobody repair facilities, gasoline bulk terminals & cargo tanks, solvent cleaning operations, architectural coatings, solid waste disposal sites.
	Oxides of nitrogen (NOx) & Carbon Monoxide (CO)	Power plants, IC engines & turbines, furnaces, water heaters and boilers.
	Oxides of Sulfur (SOx)	Refineries, combustion of fuel oil.
	Particulate Matter (PM)	Wood smoke, agricultural burning, restaurants.
Toxic Compounds	Toxic Air Contaminants (TACs), Hazardous Air Pollutants (HAPs)	Refineries, gas stations, dry cleaners, diesel generators.
Stratospheric Ozone Depleters	Chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs)	Refrigerants and solvents.
Nuisance	Odorous substances, dust (visible emissions)	Sewage treatment plants, construction sites, chemical plants, refineries.

Metal melting and processing facilities and metal recycling and shredding operations are sources of emissions of PM (including toxic metals that are toxic air contaminants), VOC (including toxic and odorous substances), and other pollutants. Staff has evaluated these two industrial sectors and determined that while many of these facilities comply with current District rules and regulations and that some facilities must comply also with federal rules that set emission limits for toxic compounds, the District has received complaints of odors from some facilities. Some of these facilities also raise concern with respect to PM emissions (including toxic metal particulates), particularly when in close proximity to residential areas (with most being located within or near Community Air Risk Evaluation (CARE) program designated areas).[i] Staff has evaluated these

[i] Under the Community Air Risk Evaluation (CARE) program, the District has identified six most at-risk communities in the Bay Area based on maps of toxic air emissions and sensitive

industrial sectors and concluded that PM (including toxic metals) and odorous substance emissions may be further reduced through the implementation of procedures specific to each facility aimed at reducing fugitive emissions of these pollutants. This report summarizes these industrial sectors of metal melting and processing and of metal recycling including shredding operations and the requirements of two separate draft rules that would apply to the respective sectors and that require development and implementation of procedures to minimize fugitive emissions.

II. BACKGROUND

A. Source Description

Staff has identified approximately 20 facilities that conduct metal melting or metal heating operations in the District. These metal melting and processing facilities include both foundries and forges. (These facilities can sometimes also contain metal recycling operations.) Metal melting and processing facilities can process "ferrous" metals, "non-ferrous" metals or a combination of both. Ferrous metals and alloys have iron as the largest metal component. Non-ferrous metals and alloys contain metal(s) other than iron as the major (base) component, e.g.: aluminum (Al), copper (Cu), magnesium (Mg), zinc (Zn), brass, and bronze.[1]

Staff has identified over 100 facilities that conduct metal recycling operations and two facilities that conduct shredding of automobiles and other materials in the Bay Area. Metal recycling facilities collect, sort and recycle scrap metal collected from peddlers and scrap yards and other satellite facilities. Scrap metal includes ferrous metals (iron and steel products) and non-ferrous (mainly aluminum, copper, brass, and other metals). The scrap metal must be shredded and the various ferrous and non-ferrous metals segregated from each other and other non-metallic materials.

1. Foundries and Furnaces

Foundries are metal melting operations that cast molten metals into a wide array of products, such as pipes, connectors, valves, engine parts, pump housings, ski lift and cable car castings. Foundries melt metal in furnaces, which are large ovens that are heated using coke, electricity, or natural gas. Once the molten metal has the right properties, it is poured or "tapped" and transferred to molds in which the metal casting is formed into the shape of the final product. The molten metal can also be "spun" into pipes using centrifugal force. Molten metal can also be cast into ingots or sows for subsequent transport, storage, or re-melting and casting. Foundries may operate one or more type(s) of furnaces, which include cupola, electric arc, reverberatory and crucible.

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populations, including Concord, eastern San Francisco, western Alameda County, Redwood City/East Palo Alto, Richmond/San Pablo, and San Jose. These six communities are deemed CARE areas.

Cupola Furnace

The cupola furnace is one of the oldest methods of making cast iron and is the most common furnace operating at iron and steel foundries for secondary steel production (steel made from scrap or ingots – not iron ore) in the District. A cupola is a cylindrical, water-cooled furnace which appears similar to a squat smoke stack and is lined with refractory brick made from heat resistant material, such as oxides of aluminum, magnesium, silicon, or silicon carbide. In the metal melting process, scrap iron or steel, coke and lime (used as flux) are put into the cupola near the top; this is called the “charge.” The charge is layered – coke, metal, lime. Air, often heated, is blown in near the bottom through tuyeres (nozzles though which air blasts are routed into the furnace to provide oxygen) to improve the combustion and heating of the furnace.

Electric Arc Furnace

The electric arc furnace (EAF) is also used in secondary steel production. This furnace relies on an electric arc to heat and melt metal rather than a fuel such as coke or natural gas. The furnace is lined with refractory material and is usually water-cooled. The vessel is covered with a retractable roof through which typically three cylindrical, graphite electrodes protrude into the furnace. When powered with a very strong electrical current, an electric arc forms between the charged metal and the electrode; the electrical arc that forms heats the metal to its melting point. Once the metal is molten and of the proper metallurgical properties, the electrodes are raised. The furnace is built on a tilting platform so that the liquid steel can be easily tapped.

Reverberatory Furnaces

The reverberatory furnace differs from a cupola furnace. In a reverberatory furnace, the metal is isolated from contact with the fuel. Reverberatory furnaces rely on radiant and convective heating to melt the metal. These furnaces are not considered as energy-efficient as the cupola or electric arc furnaces. Reverberatory furnaces have historically been used for melting bronze, brass, and pig iron (an intermediate product of smelting iron ore with a high carbon content). Currently these furnaces are used primarily for melting secondary aluminum, often from scrap.[2, 3]

The basic design of a reverberatory furnace is a simple steel box lined with aluminum oxide refractory bricks with a flue at one end and a vertically-lifting door at the other. The temperature in the furnace allows the aluminum to melt while leaving solid other metals that have a higher melting point, such as iron. The floor of the furnace slopes slightly to separate the molten aluminum from the solid metals.[2]

2. Forges

Forges are metal processing operations where the metal is worked in the solid state. There are several types of forging: hot, warm, and cold. In hot forging, the metal is heated in a furnace above its recrystallization temperature – often to glowing, but not to a molten state. Forging makes metal more malleable, which makes it more amenable to shaping, stamping, or forming. Warm forging occurs between 30 and 100 percent of the metal's recrystallization temperature (on an absolute scale) while cold forging occurs below 30 percent of the recrystallization temperature, usually ambient temperatures. Historically, these types of metalworking were performed by a blacksmith. Currently, industrial forging is done either with presses or hammers powered by compressed air, electricity, hydraulics or steam. The furnaces used in the forging process are heated with natural gas or electricity.[4]

Associated with forging of metal is the quenching process, in which the hot metal is rapidly cooled in a liquid (such as water or oil) or air cooled. Quenching preserves various qualities in the metal that would be lost during a slow cooling process. Quenching retards crystallization of the metal and produces greater hardness.[4]

B. Operations Associated with Foundries

Several operations are associated with metal melting at foundries. These operations include temporary mold and core making, metal casting, cooling, shakeout and sand reclamation. These operations contribute to the emissions of particulate matter and odorous substances. Once metal is heated to become molten in a furnace, it is cast. Metal casting is the process of pouring molten metal into molds to create cast metal products such pipes, engines, tools, pumps, toys, and a myriad of other products. Metal casting requires the making of molds into which the molten metal is poured. These molds must withstand the extreme heat from the molten metal and maintain their shape without collapsing until the metal has cooled and solidified. Once solid and properly cooled, the part can be extracted from the mold. In sand casting, separation of the cooled cast part from the spent mold and core assembly is called shake out. After the part is separated, the spent sand / binder mixture is sent through a sand reclamation process.

1. Temporary Mold and Core Making and Metal Casting

Temporary molds are made from mixtures of refractory (heat resistant) sand and some type of binder. (There are also a few types of permanent casting: centrifugal casting (for casting of pipes), die casting, and ingot and sow casting.)

Sand Mold and Core Making

Sand casting is one of the earliest techniques used in metal casting due to the simplicity and availability of materials used. In sand mold making, disposable mold and core assemblies are produced with a mixture of sand and an organic or inorganic binder. A mold forms the shape that the cast part is to take and cores are used to form internal spaces within the mold. A binder is needed so the mold and core shapes do not disintegrate when they come into contact with the molten metal. There are several general techniques used to produce molds and cores for sand casting: green sand, bake, no-bake, cold box, warm box and hot box.

<u>Bake Molding</u>: With bake sand molding, a shell mold of the pattern is made by covering a heated metal pattern with a mixture of sand and a thermoset plastic binder, usually phenolic urethane. This results in a thin layer of a sand and plastic mixture adhering to the pattern and some off-gassing of organic compounds. This skin is removed from the pattern to form the "shell mold." The two halves of the shell mold are secured together in a flask – a container with only sides (no top or bottom) that forms a frame around the mold – and either a casting sand or green sand is poured around the outside of the shell to support it. Once the shell is secured, molten metal is poured in the shell to form the cast part. Contact with the hot molten metal results in vapor off-gassing. When the metal solidifies, the shell is broken and the molding materials recycled. This process can produce complex parts with good surface finish and excellent dimensional tolerance. A good surface finish and good size tolerance reduce the need for machining. Shell molding offers better surface finish, better dimensional tolerances, and higher throughput due to reduced cycle times. The materials that can be used with this process include iron, and aluminum and copper alloys.[5]

<u>No-Bake and Cold Box Molding</u>: In the no bake and cold box techniques, sand is compacted around a master pattern – which is in the shape of the item to be cast – to form a mold cavity, which is sort of a negative of the master pattern and item to be cast. In order to obtain the desired properties for the binder, various solvents and additives are typically used with the reactive components of the binders to enhance the properties needed. This type of mold gets its name from not being baked in an oven like other sand mold types. Like bake casting, molds often form a two-part mold having a top and bottom that can be separated so that the master pattern can be removed.[1, 6, 7]

In the no-bake process, a liquid curing catalyst is mixed with the sand and binder before shaping the mixture in a pattern. The foundry mix is shaped by compacting it in a pattern, and allowing it to cure until it is self-supporting.[6]

Cold box casting uses organic and inorganic binders that strengthen the mold by chemically adhering to the sand. In the cold-box process, a gaseous catalyst is permeated through a shaped mixture of the sand and binder. The gaseous catalyst cures the binder to form a hardened mold. The type of catalyst or coreactant gas/vapor that is used depends upon the specific chemistry of the binder employed: epoxy-acrylic cold-box uses only sulfur dioxide. Urethane cold-box uses only tertiary amines; alkaline resole cold-box uses methyl formate or carbon dioxide; and sodium silicate cold-box uses carbon dioxide. This type of mold is not baked in an oven like other sand mold types. Because these types of mold making processes use no phenolic binders and are not heated, there is a much lower chance of emissions of odorous substances.[1,6,8]

Green Sand: The most common method for metal casting uses green sand molding, which is considered no-bake casting. Green sand is a mixture of refractory (heat resistant) sand, starch and/or seacoal (pulverized coal), and water. It is call "green" because of the moisture content of the mixture and not due to any coloration. The addition of the hot molten metal causes the starch or coal to partially combust which results in the off-gassing of organic vapors.[5,9,10]

Warm Box Molding: Warm box molding is a recently developed system that produces cores using a furfuryl alcohol-based binder that cures using a latent (heat activated) catalyst. The catalysts are acidic solutions of various salts. The resin, catalyst and release agent are mixed with the sand to form a sand mix with a long shelf life. When used, the mix is blown into a pattern heated to between 300 to 450 °F. The latent heat of the pattern rapidly accelerates the cures of the resin in sand mix to form an insoluble, infusible solid. The mold remains in the box long enough to develop adequate strength to be handled and is then ejected. Curing continues as the mold cools.[11]

Hot Box Molding: Hot box molding is a heat-cured process that produces cores using either a sand, phenolic resin or furfuryl alcohol based binder, and a latent catalyst. Typically hot box mold and core assemblies require higher curing temperatures than a warm-box process. The sand with the binder is blown (using air pressure) into a heated core box that is at a temperature between 445 and 550°F.[1]

2. Cooling

Once a metal part has been cast, it must be allowed to cool before it can be removed from the mold. The duration of cooling is dependent on the size and shape of the cast part. Parts with a large surface area will cool faster than part with a smaller surface area. During cooling, emissions of VOC (including odorous substances) and particulate matter may occur.

3. Shakeout

Once the cast metal part cools sufficiently it has to be removed from a sand mold. The process of removing the cast part is called "shakeout." With an efficient shakeout, the mold is broken up, the castings and sand are separated, and mold lumps are reduced in size. To accomplish this, most modern foundries use a vibratory or rotary shakeout system.[12]

Vibratory Shakeout System

Vibratory decks are commonly used to perform the shakeout operation. The vibrating deck consists of a heavy-duty frame constructed from steel and a perforated grid on the frame's top face. The frame is isolated by springs from the vibrating grid. The action of the vibrating deck is usually to impart high frequency vibrations to the mold to break down the compacted sand. The continuing vibration usually is enough to remove the remaining adhering sand from the casting. [12]

Rotary Drum Shakeout System

A rotary shakeout consists of two concentric drums. The outer unit is supported on rollers and may be gear- or chain-driven, typically at three to eight revolutions a minute. The inner drum is perforated to allow sand to flow into the space between the two drums. This allows the sand and castings to be delivered to fixed points for separation.[12]

4. Thermal Sand Reclamation

Many metal melting and processing facilities that cast metal parts with sand molds and cores recycle or reclaim the sand for reuse. A well-operated sand reclamation system can achieve reclamation rates of well over 90 percent. The spent sand is heated to over 1350^{o}F in a fluid calcining bed to burn off the organic binding agent, before being cooled and pneumatically scrubbed to remove remaining clay, binder and fines. The exhaust from the reclaimer is usually routed to control devices, typically an afterburner and a baghouse. Reclamation greatly reduces waste and there is usually little to no loss of quality to the reclaimed sand. The reclaimed sand can be recoated with a binder and used for subsequent core or mold making.[13]

5. Permanent Mold Casting

There are three primary types of metal casting that use permanent molds: die casting, centrifugal casting, and gravity casting. Unlike sand casting, in which the mold is destroyed with each casting, permanent mold casts are used for multiple castings of the same product.[14]

Die Casting

Die casting is used to produce small- to medium-sized castings at high production rates. Metal molds are coated with a mold release coating and preheated before molten metal is injected into it. Premeasured amounts of molten metal are forced from a shot chamber into the permanent mold or die under extreme pressure (1,450 to 30,500 pounds per square inch (psi)). This allows for high production rates.[15, 16]

Castings of varying weights and sizes can be produced. Nearly all die castings are produced in nonferrous alloys (aluminum, zinc and copper alloys), with limited amounts of cast iron and steel castings produced in special applications. The die casting process is suitable for a wide variety of applications for which high volume production is needed. Die casting provides excellent mechanical properties, surface finish, precise dimensional tolerances and can produce thin-section castings.[16]

Centrifugal Casting

In centrifugal casting, a permanent mold is rotated about its axis at high speeds (300 to 3000 revolutions per minute) as the molten metal is poured. The molten metal is centrifugally thrown towards the inner mold wall, where it solidifies while cooling. Typical materials that can be cast with this process are iron, steel, stainless steels, and alloys of aluminum, copper and nickel. Typical parts made by this process are pipes, boilers, pressure vessels, flywheels, cylinder liners and other parts that are symmetric around an axis.[17]

Ingot, Pigs and Sow Casting

Many metal melting operations produce metals and alloys to be processed as raw material in other metal melting operations. In these operations, the metal is usually made into ingots, pigs, or sows, which are masses of metal shaped for convenient transport and storage, such as in rectangular bars or blocks. The three terms, ingot, pig and sow, are often used interchangeably and the difference between them depends greatly on the context and the speaker. Ingots are typically the smallest of the three often weighing up to 20 pounds; pigs are usually larger than ingots and smaller than sows; and sows are usually the largest of the three and can weigh well over a ton. Ingots, pigs and sows are produced using the mold chill method. In mold chill, a permanent mold is cooled using a water spray or an internal cooling system. Once molten metal is poured into the mold it cools and contracts, which causes it to pull from the surface of the mold. The molds are usually arranged in a continuous loop conveyor system that continuously fills the molds with molten metal and sprays them with water to cool after the ingots are ejected.

C. Metal Recycling and Shredding Operations

There are various scrap handlers and metal recycling operations in the Bay Area that range in throughput from a few tons to thousands of tons of crushed or shredded metal per year with satellite feeder facilities. Metal is never intentionally melted or heated during recycling operations. Sources of scrap metal are as varied as metallic products themselves; however, the majority of scrap metal comes from automotive sources, demolitions (buildings, constructions sites, even the Bay and Carquinez Straits Bridges), manufacturing, wiring, and miscellany (cans and other consumer products). The majority of metals recycled are steel and other ferrous metal alloys, aluminum, and copper and copper alloys, such as brass and bronze, although precious metals are also recycled.

Scrap metal is most often delivered by regular peddlers in trucks. Upon arrival at the facility, the operator weighs the metal and sometimes scans it for radioactive materials. The load of scrap metal is inspected to minimize the presence of unacceptable substances such as wood, paper, dirt, rocks, glass and free liquids. Loads of scrap containing these substances are not accepted. Other substances that may contaminate scrap metal include other metals, insulation, plastics, paints, and oils. Staff at these facilities is trained to recognize types of metals and alloys on sight and when there is doubt, the metal can be analyzed with hand-held spectrometers that provide accurate composition.

Once the scrap has been inspected it is sized and sorted. The sizing of the scrap is dependent of the facility, but the segregation is by metal type, ferrous metal and alloys and non-ferrous metals and alloys. Ferrous includes steel and iron and can be separated from non-ferrous metals using magnets. Non-ferrous includes aluminum, copper, brass and bronze and sometimes precious metals.

Only two recycling facilities in the Bay Area operate auto shredders. Once an end-of-life vehicle or appliance has gone through a depollution process (i.e., removal of tires, the battery, lubricants and fuel), it is sent to a shredding and sorting operation to recover valuable metals (up to 75 percent) which can be recycled in iron and steelmaking processes. An auto shredder is a combination of a hammer mill – a machine that cuts and crushes cars, appliances, and other scrap metal – and screens to size the shredded materials into fist-sized scraps of metal. Water injection is used during the operation to minimize dust emissions and also to help reduce the potential for fires because the metals heat significantly due to friction and stress and the presence of residual organics. The shredding of automobiles results in a mixture of ferrous metal (i.e., iron-containing scrap) and non-ferrous metal (e.g., alloys of aluminum and copper), and shredder wastes. Once shredded, the ferrous metal is segregated magnetically from the mixture of non-ferrous metals and shredder waste also known as auto shredder residue (ASR) or “fluff.” This mixture can be further separated using air streams and screens to separate the lighter fluff from the heavier metal-containing material. ASR compositions varies; but is generally a mixture of plastic, vinyl, leather, cloth, sponge, foam, glass, dirt and other non-combustible material. In addition, traces amounts of lead, copper, cadmium, chromium, zinc, and mercury may be present, along with organic compounds, such as oil, antifreeze, transmission and brake fluids, and polychlorinated biphenyls (PCBs).[18, 19]

Scrap that has been properly sized and sorted is often sold and sent to metal melting facilities in the vicinity or shipped out of the Bay Area. At some facilities, scrap metal (such as aluminum) is charged to furnaces onsite to produce reclaimed metal that may be used as feed stock in other metal-melting processes.

D. Regulatory History

Metal melting and processing facilities in the Bay Area are subject to many air pollution control regulations which largely depend on the types of metals processed and the pollutants emitted. Included in these regulations are District rules, a State airborne toxic control measure (ATCM), and at least five national emissions standards for hazardous air pollutants (NESHAP).

1. District Regulations

The District currently regulates metal melting and processing facilities under the following rules:

- Regulation 1: General Provisions & Definitions;
- Regulation 2, Rule 1: General Requirements;
- Regulation 2, Rule 2: New Source Review;
- Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants;
- Regulation 2, Rule 6: Major Facility Review;
- Regulation 6, Rule 1: Particulate Matter General Requirements; and
- Regulation 7: Odorous Substances.

Regulation 1: General Provisions and Definitions

The provisions and definitions in this regulation are applicable to all District Regulations and are in addition to the provisions and definitions in individual rules and regulations. Regulation 1 includes sections on nuisance, exclusions, breakdown procedures, definitions, registration of sources, right-of-access, sampling facilities, records maintenance.

Regulation 2, Rule 1: General Requirements

This rule includes criteria for issuance or denial of permits, exemptions, appeals against decisions of the APCO and District actions on applications. Under the general requirements, any facility that operates equipment that causes or reduces air pollutants must have a permit to operate that provides details on how the equipment is to be operated and/or the levels to which the emissions are to be mitigated. Any equipment emitting air pollutants used in metal melting and processing facilities is required to have permits.

Regulation 2, Rule 2: New Source Review

Regulation 2, Rule 2 (Rule 2) applies to new or modified sources. Rule 2 contains requirements for Best Available Control Technology (BACT) and emission offsets. Rule 2 also implements federal New Source Review and Prevention of Significant Deterioration requirements. Any metal melting and processing facility that installs a new source or modifies an existing source of air pollutants that emits ten pounds per day of any criteria pollutant must obtain permits under this rule and install District-approved BACT.

Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants

Regulation 2, Rule 5 (Rule 2-5) requires preconstruction permit review for new and modified sources of toxic air contaminants; contains project health risk limits; and imposes requirements for Toxics Best Available Control Technology (TBACT). Any metal melting and processing facility that installs a new source or modifies an existing source of air pollutants must install District-approved TBACT.

Regulation 2, Rule 6: Major Facility Review

Regulation 2, Rule 6 establishes procedures for large facilities to obtain federal Title V permits.[ii] This rule applies to any metal melting and processing facility that is major source or operates under a Synthetic Minor Operating Permit, which limits production to keep facilities from emitting pollutants at major source amounts.

Regulation 6, Rule 1: Particulate Matter General Requirements

Regulation 6, Rule 1 limits the quantity of particulate matter in the atmosphere by controlling emission rates, concentration, visible emissions and opacity.

Regulation 7: Odorous Substances.

Regulation 7 (Reg. 7) establishes general limitations on odorous substances and specific emission limitations on certain odorous compounds. The provisions of the regulation do not apply to a facility unless the District receives ten or more confirmed odor complaints about a facility within 90 days. Compounds with

[ii] Title V operating permits are federally-enforceable permits issued by the District as required by the 1990 federal Clean Air Act amendments, and in accordance with District Regulation 2, Rule 6: Major Facility Review. Title V permits are required for “major facilities” that have the potential to emit regulated air pollutants or hazardous air pollutants above specific thresholds. Title V permits list every federally-enforceable air pollution requirement applicable at a major facility, including BAAQMD rules that have been incorporated into the state implementation plan (SIP) and include either a certification of compliance with these requirements or a schedule to comply. Title V permits must be renewed every five years, and renewals, as well as original permits, are subject to public notice requirements and EPA review.

specific emissions limits regulated under Reg. 7 include dimethylsulfide, ammonia, mercaptans, phenols, and trimethylamine.

2. California State Air Quality Regulations

Airborne Toxic Control Measures (ATCMs) are adopted by the California Air Resources Board (ARB) and are applicable throughout California. The Non-Ferrous Metal Melting ATCM applies to facilities that melt non-ferrous metals such as aluminum, copper, zinc, lead, cadmium, arsenic and their alloys.[iii] The ATCM limits emissions of PM and dust. The ATCM contains emission standards, equipment and operating requirements and specifications. All emission points equipped with an emission collection system must meet the specifications of the "Industrial Ventilation, Manual of Recommended Practices," 20th Edition, 1988. The District adopted the ATCM by reference as Regulation 11, Rule 15 on April 6, 1994.

Under this rule, any particulate matter control device must achieve a control effectiveness of at least 99 percent along with specific operating conditions. Further, the ATCM prohibits visible emissions that exceed an opacity limit of ten percent for three minutes or longer in any hour.

The District also implements the California Air Toxic "Hot Spots" Program (AB2588). This program identifies facilities that emit toxic air contaminants, prioritizes them, assesses the health risk, notifies local populations, and requires risk reduction.

3. Federal MACT Standards Affecting Foundries

Federal Maximum Achievable Control Technology (MACT) Standards are set by the US Environmental Protection Agency (EPA) to control emissions of hazardous air pollutants (HAP). Hazardous air pollutants are 187 compounds that have been determined by the US EPA to be toxic. The District estimates that some metal melting operations in the Bay Area are subject to one of more of the following five MACT Standards. They are:

- The National Emission Standard for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries: 40 CFR Part 63, Subpart EEEEE (E5);
- NESHAP for Secondary Aluminum Production: 40 CFR Part 63, Subpart RRR (R3);
- NESHAP for Electric Arc Furnace Steelmaking Facilities: 40 CFR Part 63, Subpart YYYYY (Y5);
- NESHAP for Iron and Steel Foundries: 40 CFR Part 63, Subpart ZZZZZ (Z5); and

[iii] Although the ATCM regulates facilities that melt lead, cadmium, or arsenic, there are no such facilities in the Bay Area.

- NESHAP for Aluminum, Copper, and Other Nonferrous Foundries: 40 CFR Part 63, Subpart ZZZZZZ (Z6).

NESHAP for Iron and Steel Foundries, 40 CFR Part 63, Subpart EEEEE

The NESHAP for Iron and Steel Foundries (40 CFR Part 63, Subpart EEEEE (E5)) was originally promulgated in April 2004 and was amended in May 2005 and again in February 2008. It affects iron and steel foundries (NAICS code numbers 331511, 331512, 331513) that are major sources of hazardous air pollutant (HAP) emissions. A major source is a facility with the potential to emit a total of ten tons per year of a single HAP or 25 tons per year of a combination of HAPs. E5 addresses emissions from metal melting furnaces, including electric arc furnaces (EAF), electric induction furnaces (EIF), and cupola metal melting furnaces; scrap preheaters; pouring areas and stations; automated conveyor and pallet cooling lines; automated shakeout lines that use a sand mold system; and mold and core-making lines. This MACT standard also covers fugitive emissions from certain foundry operations. At least four metal melting and processing facilities in the District may be subject to this NESHAP, including AB&I, US Pipe, PSC, and Ridge Foundry.

<u>Emission Limits:</u>

Existing Iron and Steel Foundries

Source	Existing
Electric arc furnace, Electric induction furnace Scrap preheater	0.005 grains of PM per dry standard cubic foot (gr/dscf), or 0.0004 gr/dscf of total metal HAP
Cupola furnace	0.006 gr/dscf of PM, or 0.10 pound of PM per ton (lb/ton) of metal charged, or 0.0005 gr/dscf of total metal HAP, or 0.008 lb of total metal HAP per ton of metal charged, AND 20 ppmv of volatile organic HAPs (VOHAP)
Pouring area /station	0.010 gr/dscf of PM, or 0.0008 gr/dscf of total metal HAP
Scrap preheater (in lieu of works practice standard)	20 ppmv of VOHAP
Fugitive emissions	20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 27 percent opacity

New Iron and Steel Foundries

Source	New
Cupola furnace	0.002 gr/dscf of PM, or 0.0002 gr/dscf of total metal HAP, AND 20 ppmv of VOHAP
Electric arc furnace	0.002 gr/dscf of PM, or 0.0002 gr/dscf of total metal HAP
Electric induction furnace Scrap preheater	0.001 gr/dscf of PM, or 0.00008 gr/dscf of total metal HAP
Pouring area station	0.002 gr/dscf of PM, or 0.0002 gr/dscf of total metal HAP
Scrap preheater (in lieu of works practice standard)	20 ppmv of VOHAP
Fugitive emissions	20 percent (6-minute average), except for one 6-minute average per hour that does not exceed 27 percent opacity

<u>Work Practice Standards:</u>

Metallic scrap management program:

1. <u>Restricted metallic scrap</u>: Prepare and operate at all times according to written material specifications for the purchase and use of only metal ingots, pig iron, slitter, or other materials that do not include post-consumer automotive body scrap, post-consumer engine blocks, post-consumer oil filters, oily turnings, lead components, chlorinated plastics, or free liquids.
2. <u>General iron and steel scrap</u>: Prepare and operate at all times according to written material specifications for the purchase and use of only iron and steel scrap that has been depleted (to the extent practicable) of organics and HAP metals in the charge materials used by the iron and steel foundry.

Mercury requirements:

1. <u>Site-specific plan for mercury switches</u>:
    i. Include a requirement in scrap specifications for removal of mercury switches from vehicle bodies used to make the scrap;
    ii. Prepare and operate according to a plan demonstrating how the facility will implement the scrap specification for removal of mercury switches.

NESHAP for Secondary Aluminum Production: 40 CFR Part 63, Subpart RRR (R3)

The NESHAP for Secondary Aluminum Production (40 CFR Part 63, Subpart RRR (R3)) was promulgated in March 2000 and was amended in December

2002 and again in December 2005. This MACT standard affects new and existing sources at secondary aluminum production facilities with the following NAICS Code numbers: 331312, 331314, 331315, 331316, 331319, 331521, and 331524. R3 regulates emissions of PM, total hydrocarbons (THC), and hydrochloric acid (HCl) from the following sources: aluminum scrap shredder, thermal chip dryers, scrap dryer, delacquering or decoating kiln, group 2 (i.e., processing clean charge only and no reactive fluxing) furnace, sweat furnaces, dross-only furnace, and rotary dross cooler. R3 also limits emissions of dioxin and furans (D/F) from thermal chip dryers, scrap dryers/delacquering kilns/decorating kilns, and sweat furnaces; and from secondary aluminum processing units from area source facilities. Based on NAISC Code numbers, at least nine metal melting and processing facilities in the District may be subject to this NESHAP, including ECS Refining, CASS, California Casting, Metech Recycling, Roto Metals, Tomra Pacific, J & B Enterprises, Kearney Pattern Works and Foundry, and Castco.

Emission Standards:

Source	Existing
Sweat furnace	3.5×10^{-10} gr of D/F toxic equivalents (TEQ) per dscf @ 11 percent O_2
Dross-only furnace	0.30 lb of PM per ton of feed/charge 10% opacity
Scrap dryer/delacquering kiln/decoating kiln (major source)	0.06 lb of THC, as propane, per ton of feed/charge 0.08 lb PM per ton of feed/charge 3.5×10^{-6} gr of D/F TEQ per ton of feed/charge 0.80 lb HCl per ton of feed/charge
Scrap dryer/delacquering kiln/decoating kiln (Alt. limits if equipped with afterburner)	0.20 lb of THC, as propane, per ton of feed/charge 0.30 lb per ton of feed/charge 7.0×10^{-5}gr of D/F TEQ per ton of feed/charge 1.50 lb HCl per ton of feed/charge
Aluminum scrap shredder	0.010 gr/dscf of PM 10 percent opacity

NESHAP for Electric Arc Furnace Steelmaking Facilities: 40 CFR Part 63, Subpart YYYYY

The NESHAP for Electric Arc Furnace Steelmaking Facilities: 40 CFR Part 63, Subpart YYYYY (Y5) was promulgated on December 28, 2007, and addresses emissions from area source steelmaking facilities using electric arc furnaces (EAF). The Y5 requirements are additional to those of other NESHAPs that affect ferrous metal melting operations. This MACT standard has requirements for large and small facilities. A large facility is defined as having a production rate of at least 150,000 tons per year of stainless or specialty steel. A small facility produces less than 150,000 tons of steel annually. At least six metal melting and processing facilities in the District may be subject to this NESHAP, including Western Forge and Flange Company, Berkeley Forge, USS-POSCO Industries, Steve Zappetini & Son Inc, Stoltz Metals Inc, and Almaden Welding.

Emission Standards:

Source	Limits
Furnace (Existing)	0.8 lb PM per ton or 0.06 lb/ton of metal charged
Furnace (New)	0.1 lb PM per ton or 0.008 lb/ton of metal charged
Visible emissions (VE)	6 percent opacity

NESHAP for Iron and Steel Foundries: 40 CFR Part 63, Subpart ZZZZZ

The NESHAP for Iron and Steel Foundries: 40 CFR Part 63, Subpart ZZZZZ (Z5) was promulgated January 2, 2008, and affects all area source[iv] iron and steel foundries. This MACT standard has requirements for large and small facilities that are non-major sources. There are different criteria defining large and small facilities, depending on whether the facility is new or existing. A large, existing facility is defined as one with a production rate of at least 20,000 tons per year of stainless or specialty steel. A small, existing facility produces less than 20,000 tons of steel annually. For new facilities, a large facility produces at least 10,000 tons annually and small, less than 10,000 tons. This regulation may affect at least five metal melting and processing facilities in the District, including AB&I, US Pipe, PSC, PCC Structurals, and Ridge Foundry.

Emission Standards:

Pollutant	Limits
PM	0.0052 gr/dscf (if less than 150,000 tons/yr: 0.8 lb/ton of steel or 0.0052 gr/dscf)
Visible emissions (VE)	6 percent opacity

NESHAP for Area Source Aluminum, Copper, and Other Nonferrous Foundries: 40 CFR Part 63, Subpart ZZZZZZ

The NESHAP for Area Source Aluminum, Copper, and Other Nonferrous Foundries: 40 CFR Part 63, Subpart ZZZZZZ (Z6) was promulgated on June 25, 2009 and addresses emissions of HAPs from area source aluminum, copper and other nonferrous foundries (NAICS Codes: 331524, 331525, and 331528). Under this MACT standard, an affected area source:

1. Emits less than 10 tons per year of a single HAP or less than 25 tons of any combination of HAPs;

[iv] Area sources are defined by EPA as sources that emit less than 10 tons of a single hazardous air pollutant (HAP) or less than 25 tons of a combination of HAPs annually.

2. Has an annual metal melt production of 600 tons or more; and
3. Uses material that contains, as appropriate:
    - Aluminum foundry HAP: any material containing greater than 0.1 percent by weight beryllium, cadmium, lead, or nickel or greater than 1.0 percent by weight manganese;
    - Copper foundry HAP: any material containing greater than 0.1 percent by weight lead or nickel or greater than 1.0 percent by weight manganese; or
    - Other nonferrous foundry HAP: any material containing greater than 0.1 percent by weight chromium, lead, or nickel.

At least three metal melting and processing facilities in the District are subject to this NESHAP: CASS, Kearney Pattern Works and Foundry, Inc. and Castco.

Emission Standards:

Source	PM Limits
Existing large foundry	95% control or 0.015 gr/dscf
New large foundry	99% control or 0.010 gr/dscf

4. Federal Air Quality Regulations Affecting Metal Recyclers

Solvent Cleaning (degreasers), 40 CFR Part 63 Subpart T, The National Emission Standards for Hazardous Air Pollutants regulates Halogenated Solvent Cleaning. This applies to any halogenated solvent cleaning machine which uses solvent containing methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, or chloroform, or any combination of these halogenated HAP solvents, in a total concentration greater than five percent by weight, as a cleaning or drying agent. Cleaning machines with a capacity of less than two gallons are exempt from the NESHAP. Auto recyclers sometimes use solvent degreasers to clean metal prior to resale.

Refrigerant Reclamation, 40 CFR Part 82 Subpart F. This is the federal regulation that addresses refrigerant recycling. This regulation requires that refrigerants be reclaimed before dismantling vehicles, refrigerants only be sold to certified dealers, and recovered refrigerants be properly labeled. This regulation does allow the use of the refrigerant in other cars owned by the dismantler. This regulation is based on Title VI of the 1990 Clean Air Act, Section 608.

III. TECHNICAL REVIEW

A. Emissions from Metal Melting, Processing, and Recycling Facilities

The District has identified numerous metal melting and processing facilities in the Bay Area. There are at least 17 facilities that engage in metal melting and processing activities, such as metal melting and casting (foundries) and heat treatment of metals (forges). There are an additional 100 facilities that engage in scrap metal recycling, three of which operate auto shredders. All of these operations have associated with them some degree of emissions, such as particulate matter, including metals; VOCs (including odorous compounds, such as phenols and cresols); and/or toxics compounds. These emissions data and other compliance information allow these facilities to be segregated into sources of three types of emissions:

- Criteria pollutants and precursors:
  - VOCs
  - PM
- Toxic Emissions
- Nuisance / Odors
  - Phenol and associated compounds
  - Creosol and associated compounds

The casting of molten metals is the primary emission source of PM and odorous substances, such as phenolic compounds, at metal melting facilities. These emissions occur when the hot molten metals contact the molds and cores that are often formulated with binders that contain organic compounds, including phenols, urethane, furan or other organics. Metal forges emit PM and odorous substances. Operations at metal recycling facilities result in the emissions of PM and visible emissions from metal management and shredding operations, including resultant shredder residue. Table 2 lists the most common stages of production at metal melting and processing facilities and the types of emissions associated with those stages.

Table 2
Major Metal Melting, Processing and Recycling Process Stages, Description and Emissions

Process*	Description	Emissions
Metal Management	Compilation, collection, storage and sorting of metals for metal management and the handling of byproduct and wastes.	PM (metals), visible emissions (VE)
Shredding	Grinding and sizing of scrap metal from cars and appliances into fist-sized chunks or metal using a hammermill and screens.	PM (metals), visible emissions (VE)
Charging	Preheating the furnace and adding metal, flux, fuel and other compounds to furnace	PM (metals)
Furnace / Oven Operations: Metal Melting	Heating until the metal mixture is molten and reaches the proper temperature and metallurgic properties.	PM (metals), VOCs, CO, NOx, TACs
Tapping	Molten metal is poured from furnace into a ladle for transfer to the casting area.	PM (metals)
Casting / Pouring	The tapped metal is transferred to the casting area and poured into the molds to form castings.	PM (metals), VOCs,
Cooling	The cast metal is allowed to cool to close to ambient temperatures. While cooling, the metal cast shrinks often pulling away from the mold.	PM (metals), VOCs,
Shake Out	Removing the casting from the mold – which can often involve destruction of mold.	PM (metals), VOCs,
Grinding / Finishing	Once the casting is removed from the mold, it may have to be finished by grinding excesses of metal.	PM (metals)
Mold / Core Making	Making the mold / core from sand and binders and other substances such as clay, starch, charcoal.	PM (silica), VOCs, TACs

* The listed metal melting processes – metal management through grinding / finishing – are sequential steps in the production of cast metal parts. Mold / core making, however, is an essential parallel process that is not specifically a sequential step in the production of cast metal parts.

B. Various Metal Management Practices

The methods used to reduce the emission of pollutants from any source or operation fall into three main categories: 1) emissions abatement from point sources, such as an exhaust stack from a furnace or engine, through the use of a control such as carbon adsorption systems or fabric filters; 2) fugitive emission reduction through enhanced capture techniques; and 3) pollution prevention practices that can be used to prevent the emissions of a pollutant, such as reformulations and the reuse or recycling of by-products of production.

IV. DRAFT RULES

The District is drafting two new rules that would address fugitive emissions of PM and odorous substances from metal melting and metal recycling / shredding facilities in the Bay Area: Draft Regulation 12, Rule 13: Metal Melting and Processing Operations (Rule 12-13) and Draft Regulation 12, Rule 14: Metal Recycling and Shredding Operations (Rule 12-14). Both of these draft rules would rely on the implementation of management procedures through the development of Emissions Minimization Plans (EMP) to minimize emissions. The reliance on the development of an EMP allows each facility to tailor its approach to reducing or minimizing emissions to the unique conditions and configuration of its affected operations. Development of an EMP also encourages innovation and challenges the industry to look for more efficient, cost-effective methods of emissions control, minimization and prevention. Further, requiring the development of and compliance with an EMP also allows an exchange of information via the District's review and recommendations on the procedures received and through discussions between affected industry directly or via industry associations.

Draft Rule 12-13 would address fugitive emissions from several general processes of metal melting and casting and associated operations, including:

- Mold and core making;
- Furnace / oven (including tapping);
- Heat treatment of metals;
- Casting and cooling;
- Shake out;
- Finishing;
- Sand reclamation;
- Dross and slag management; and
- Metal management.

Draft Rule 12-14 would focus on reducing fugitive emissions from metal recycling facilities that compile, shred, and sort scrap metal for resale, including the following operations:

- Metal management,
- Shredding operations, including minimization of automotive shredder residue (ASR) or "fluff."

A. Draft Rule 12-13: Metal Melting and Processing Operations

Draft Rule 12-13: Metal Melting and Processing Operations would affect metal melting and processing operations that occur at foundries and forges. The draft rule primarily relies upon the development and implementation an EMP that would include practices and procedures to minimize fugitive emissions of PM and visible emissions. The EMP would ensure that affected facilities employ the best means available to address fugitive emissions and point source emissions that are not fully addressed by the applicable NESHAPs.

1. Applicability

Draft Rule 12-13 would affect the facilities that either melt metals (foundries) or heat treat metals (forges). The rule would apply to metal melting and processing operations that require a District permit. Facilities with an annual metal throughput (metal charged to a furnace or heated in an oven) of 1,000 tons or more would be subject to all of the requirements of the rule; those facilities with a throughput between than one and 1,000 tons would only be required to keep records on their annual metal throughput. This applicability would address those facilities with the greatest potential for emissions of PM and odorous substances. Table 3 lists permitted metal melting facilities and their 2010 reported annual metal throughput, their PM emissions, and the locations of the facilities relative to impacted Community Air Risk Evaluation (CARE) areas.[v]

v Under the Community Air Risk Evaluation (CARE) program, the District has identified six most at-risk communities in the Bay Area based on maps of toxic air emissions and sensitive populations, including Concord, eastern San Francisco, western Alameda County, Redwood City/East Palo Alto, Richmond/San Pablo, and San Jose. These six communities are deemed CARE areas.

Table 3
Metal Melting Facilities 2010 Annual Metal Throughput, PM Emissions, and Proximity to a CARE Area[a]

Facility Name	City	Annual Metal Throughput (tons)	Annual PM Emissions (tons)	CARE Area
USS-POSCO Industries	Pittsburg	1,028,974	16.30	no
United States Pipe & Foundry	Union City	56,700	8.12	no
A B & I Foundry	Oakland	39,500	8.74	yes
Pacific Steel Casting	Berkeley	28,460	54.2	yes
CASS	Oakland	14,700	0.01	yes
Metech Recycling	Gilroy	788	0	no
PCC Structurals	San Leandro	668	0.14	yes
Berkeley Forge & Tool	Berkeley	305	0.5	yes
Ridge Foundry	San Leandro	252	0.15	yes
Xstrata Copper	San Jose	182	0.08	no
Memry Corporation	Menlo Park	69	0.01	no
Aalba Dent	Fairfield	63	0	no
ECS Refining	Santa Clara	28	0.08	yes
California Casting	Richmond	3	0.01	yes
J & B Enterprises	Santa Clara	1	0	yes
Castco	San Leandro	n/a[b]	0.59	yes

a. This information presented in this table comes from facility-reported permit data on annual throughput and estimated emissions.
b. Annual metal throughputs were not reported for these facilities.

2. Emission Limits

Draft Rule 12-13 would contain no emissions limits. The District would rely upon the emissions limits already contained in Regulation 11: Hazardous Pollutants, Rule 15: Airborne Toxic Control Measure for Emissions of Toxic Metals from Non-Ferrous Metal Melting and the five applicable NESHAPs that affect metal melting operations:

1. Subpart RRR—National Emission Standards for Hazardous Air Pollutants for Secondary Aluminum Production.
2. Subpart EEEEE—National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries.
3. Subpart YYYYY—National Emission Standards for Hazardous Air Pollutants for Area Sources: Electric Arc Furnace Steelmaking Facilities
4. Subpart ZZZZZ—National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.
5. Subpart ZZZZZZ—National Emission Standards for Hazardous Air Pollutants: Area Source Standards for Aluminum, Copper, and Other Nonferrous Foundries.

The District believes that the emissions limits contained in these various regulations effectively address process emissions of PM. The District will seek delegation from the US EPA, so that the District would be the enforcing agency for these regulations.

3. Development and Implementation of the Emissions Minimization Plan

Draft Rule 12-13 would require affected facilities to develop and submit to the District for approval an Emissions Minimization Plan (EMP) that would detail the practices that have been or will be implemented to minimize fugitive emissions from the following operations and materials:

1. Mold and core making;
2. Metal melting and tapping;
3. Heat treatment of metals;
4. Casting and cooling;
5. Shake-out;
6. Finishing;
7. Sand reclamation;
8. Dross and slag management;
9. Metal management, including, scrap metal acceptance and handling (to minimize contaminants such as lead, mercury, PCBs, and plastics).

Draft Rule 12-13 would require that affected facilities submit an EMP to the District within six months of the adoption of the rule or within six months of becoming subject to the rule. Smaller facilities would be allowed up to one year following rule adoption to submit an EMP.

4. Evaluation of the EMP

Within 30 days of receiving a draft EMP, the District will determine if the EMP is complete, i.e., whether it has addressed all the relevant areas for the facility. If the EMP is not complete, the District would notify the facility that the EMP is not complete and the basis of this determination. Upon receipt of notification of an incomplete EMP, the facility would have 30 days to correct any deficiencies and resubmit the draft EMP. If the District determines that the deficiencies are not corrected, the District would disapprove the EMP. If the EMP is complete, the District would make it available for 30 days for public comment. Within 30 days of the close of the public comment period, the District would consider comments submitted by the public and may make recommendations – based on technical and economic feasibility – for further revisions to the EMP by the facility to reduce or prevent fugitive emissions.

5. Revision and Approval of the Final EMP

After receiving any District recommendations, the facility would have 30 days to resubmit a revised final EMP reflecting the recommended changes or (in the absence of incorporating the recommendations) an EMP accompanied by written reasons explaining why each specific recommendation was not incorporated into the EMP. Within 30 days of the receipt of the final EMP, the District would review the EMP and determine whether or not it meets the requirements of the Rule. If the District determined that the EMP provides emissions minimization procedures for all affected operations and includes all required elements, the EMP would be approved. If it were determined that all elements were not included, the District would notify the facility of its decision and the basis. The facility would have 30 days to correct the deficiencies in the EMP and resubmit it for approval. If the District finds that that facility failed to correct the deficiencies, the District would disapprove the EMP.

If the District determines that the EMP meets the requirements of the Rule, the District would approve the EMP and provide written notice to the facility of the approval. Then the facility would have 90 days to implement the provisions of the approved EMP. The elements of the EMP would become enforceable under the Rule.

6. Reporting Requirements

Intended Emission Reduction Projects

Along with the EMP, affected facilities would be required to report to the District any equipment, processes or procedures that would be installed or implemented within the next five years to reduce or prevent fugitive emissions along with a schedule of implementation. This report would be independent of the EMP and considered a forecast of efforts intended by the facility and may be subject to change by the facility.

Reporting Requirements for Emissions Capture/Collection Systems Required Under the NESHAPs or Non-Ferrous Metal Melting ATCM

Facilities subject to the Non-Ferrous Metal Melting ATCM or one of the four federal NESHAPs that require the installation of an emissions capture/collection system capable of meeting "accepted engineering standards, such as those published by the American Conference of Governmental Industrial Hygienists" would be required to report to the District which of the NESHAP and ATCM provisions and the manner in which these requirements are met. The specific sections are:

- 40 CFR Part 63, Subpart RRR: NESHAP for Secondary Aluminum Production, Section 63.1506(c)(1) through (c)(3) Capture/collection systems design, installation, and operation;
- 40 CFR Part 63, Subpart EEEEE: NESHAP for Major Source Iron and Steel Foundries, Section 63.7690(b)(1);
- 40 CFR Part 63, Subpart YYYYY: NESHAP for Area Sources: Electric Arc Furnace Steelmaking Facilities, Section 63.10686;
- 40 CFR Part 63, Subpart ZZZZZ: NESHAP for Iron and Steel Foundries Area Sources, Section 63.10895(b);

- Regulation 11: Hazardous Pollutants, Rule 15: Airborne Toxic Control Measure for Emissions of Toxic Metals from Non-Ferrous Metal Melting, Sections 11-15 (b)(1) and (b)(3).

Reporting Requirements for Operation and Maintenance Plans

The draft rule also requires facilities subject to one of the five federal NESHAP that require the development of operation and maintenance (O&M) plans to submit a copy of those approved O&M plans to the District within six months of the adoption of the Rule. The specific sections are:

- 40 CFR Part 63, Subpart RRR: NESHAP for Secondary Aluminum Production, Section 63.1510(b);
- 40 CFR Part 63, Subpart EEEEE: NESHAP for Major Source Iron and Steel Foundries, Section 63.7710(b);
- 40 CFR Part 63, Subpart YYYYY: NESHAP for Area Sources: Electric Arc Furnace Steelmaking Facilities, Section 63.10685(a) and (b);
- 40 CFR Part 63, Subpart ZZZZZ: NESHAP for Iron and Steel Foundries Area Sources, Section 63.10896;
- 40 CFR Part 63, Subpart ZZZZZZ: NESHAP: Area Source Standards for Aluminum, Copper, and Other Nonferrous Foundries, Section 63.11550(a)(3).

Review of Alternative Binder Formulations

Affected facilities that use mold and core binders made with odorous substances, such as phenol, would be required to investigate the availability and efficacy of alternative binders that produce fewer emissions of odorous substances than currently used at that facility. The facility would have to complete and report the results of this investigation to the District no later than two years after the adoption of the Rule and again before the two year anniversary of the receipt of the initial report.

7. Recordkeeping

The draft proposal would require affected facilities to maintain records on the monthly throughput of each type of metal processed, which includes metal melted, heated, or scrapped; the monthly throughputs of the type(s) of binder systems and sand used; and for those facilities that qualify for the clean aluminum exemption, the certification on the quality of aluminum.

8. Clean Aluminum Exemption

Die casting facilities that melt only aluminum that certifiably contains less than 0.004 percent cadmium and 0.002 percent arsenic would be exempt from the EMP development and all other requirements, except certain reporting requirements of the proposal. However, to retain this exemption, the facilities must maintain records certifying the cleanliness of the aluminum used. This exemption is intended to duplicate an exemption in the Non-Ferrous Metal Melting ATCM.

B. Draft Rule 12-14: Metal Recycling and Shredding Operations

Draft Rule 12-14: Metal Recycling and Shredding Operations would also rely upon the development and implementation an EMP that would include practices and procedures to minimize fugitive emissions of PM and visible emissions. However, draft Rule 12-14 differs from draft Rule 12-13 in that it applies specifically to scrap metal recycling and shredding operations and focuses on those operations and materials specific to this industry.

1. Applicability

Draft Rule 12-14 would apply to scrap metal recycling facilities that receive at least 1,000 tons of scrap metal per year. Metal recycling facilities with an annual metal throughput of 50,000 tons of more would be subject to the general requirements of the rule; those recycling facilities with an annual metal throughput between 50,000 and 1,000 tons would only be required to keep records of their annual metal throughput. Based on this applicability, the general requirements of Draft Rule 12-14 would apply to only three Bay Area metal recycling operations: Schnitzer Steel at the Port of Oakland and Sims Metals at the Port of Redwood City and their facility at the Port of Richmond. Two of these facilities operate large-scale shredders that size and sort scrap metal and the other is a large-scale metal recycling operation.

Table 4
Metal Recycling & Shredding Facilities 2010 Annual Throughput and Proximity to a CARE Area*

Facility Name	City	Annual Metal Throughput (tons)	Annual PM Emissions (tons)	CARE Area
Schnitzer Steel	Oakland	529,000	0.14	yes
Sims Metal Management	Redwood City	374,000	5.41	yes
Sims Metal Management	Richmond	360,000	n/a	yes

2. Emission Limits

Like draft Rule 12-13, draft Rule 12-14 does not contain emission limits – there are no federal NESHAPs that apply to this industry, with the exception of the Subpart T—National Emission Standards for Halogenated Solvent Cleaning and the Subpart B—Servicing of Motor Vehicle Air Conditioners for refrigerants which are currently addressed in District Regulation 8, Rule 16: Solvent Cleaning Operations and Regulation 12, Rule 7: Motor Vehicle Air Conditioner Refrigerant, respectively. These rules would only apply to these facilities if they operate solvent cleaning apparatus using one of the six regulated chemicals or remove air conditioning refrigerant from automobiles. However, the shredding operations are subject to District Regulation 6, Rule 1: Particulate Matter, General Requirements and have permit limits that address process PM emissions from these operations.

3. Development and Implementation of Emissions Minimization Plans

Like draft Rule 12-13, Section 12-14-401 of draft Rule 12-14 would require affected facilities to develop and implement an EMP that would detail the practices and equipment that have been or will be implemented to minimize fugitive emissions from the following operations, areas, and materials:

1. Roadways and other trafficked areas;
2. Scrap metal, including:
    a. Handling and storage operations,
    b. Crushing operations,
    c. Sorting operations,
    d. Shredding / hammermill operations;
3. Receipt of scrap metal from providers;
4. Auto shredder residue;
5. Lead batteries;
6. Polychlorinated Biphenyl capacitors;
7. Mercury switches; and
8. Sodium azide canisters.

4. Evaluation of the Emissions Minimization Plan

Within 30 days of receiving a draft EMP, the District will determine if the EMP is complete, i.e., whether it has addressed all the relevant areas for the facility. If the EMP is not complete, the District would notify the facility that the EMP is not complete and the basis of this determination. Upon receipt of notification of an incomplete EMP, the facility would have 30 days to correct any deficiencies and resubmit the draft EMP. If the District determines that the deficiencies are not corrected, the District would disapprove the EMP. If the EMP is complete, the District would make it available for 30 days for public comment. Within 30 days of the close of the public comment period, the District would consider comments submitted by the public and may make recommendations – based on technical and economic feasibility – for further revisions to the EMP by the facility to reduce or prevent fugitive emissions.

5. Revision and Approval of the Final EMP

After receiving any District recommendations, the facility would have 30 days to resubmit a revised final EMP reflecting the recommended changes or (in the absence of incorporating the recommendations) an EMP accompanied by written reasons explaining why each specific recommendation was not incorporated into the EMP. Within 30 days of the receipt of the final EMP, the District would review the EMP and determine whether or not it meets the requirements of the Rule. If the District determines that the EMP provides emissions minimization procedures for all affected operations and includes all required elements, the EMP would be approved. If the District determines that not all requirements were met, the District would notify the facility of its decision and the basis. The facility would have 30 days to correct the deficiencies in the EMP and resubmit it for approval. If the District finds that that facility failed to correct the deficiencies, the District would disapprove the EMP.

6. Reporting

Intended Emission Reduction Projects

Along with the EMP, affected facilities would be required to report to the District any equipment, processes or procedures that would be installed or implemented within the next five years to reduce or prevent fugitive emissions along with a schedule of implementation. This report would be independent of the EMP and considered a forecast of efforts intended by the facility and maybe be subject to change.

7. Exemptions: Regulation 12, Rule 13: Emissions Minimization Plans:

Metal recycling facilities that would have to comply with the EMP requirements of Draft Rule 12-13: Metal Melting and Processing Operations would not have to develop a separate EMP for the Metal Recycling and Shredding rule provided the requirements for an EMP under draft Rule 12-13 and Section 12-14-402 were met.

8. Limited Exemption: Low Throughput Recycling Facilities:

Metal recycling facilities with an annual metal throughput of 50,000 tons or less would not be required to develop and implement a District-approved EMP. These facilities however, would be required to maintain records on their metal throughput and provide the basis for the throughput determination.

C. Eliminate the Permit Exemption for Mold Making Equipment

Staff also proposes to eliminate the permit exemption for heated shell core and shell mold manufacturing machines in District Regulation 2, Rule 1: General Requirements (Rule 2-1). Currently, shell core and shell mold manufacturing machines are exempt from permits under Section 2-1-122.3. Because these machines are sources of emissions of PM and odorous substances and would be regulated under proposed Rule 12-13, their exemption from permit requirements should be removed. The proposed amendment to Rule 2-1 would read as follows:

2-1-122 Exemption, Casting and Molding Equipment: The following equipment is exempt from the requirements of Sections 2-1-301 and 302, provided that the source does not require permitting pursuant to Section 2-1-319.

122.1 Molds used for the casting of metals.
122.2 Foundry sand mold and core forming equipment, including shell core and shell-mold manufacturing machines, to which no heat is applied, except processes utilizing organic binders yielding in excess of 0.25% free phenol by weight of sand.
~~**122.3** Shell core and shell-mold manufacturing machines~~.
122.~~4~~3 Equipment used for extrusion, compression molding and injection molding of plastics. The use of mold release products or lubricants is not exempt unless the VOC content of these materials is less than or equal to 1 percent, by weight, or unless the total facility-wide uncontrolled VOC emissions from the use of these materials are less than 150 lb/yr.
122.~~5~~4 Die casting machines.

When a source becomes subject to permit requirements by a change in District rules, the operator of that source has 90 days to submit a permit application. Unlike a new source, an Authority to Construct is not required.

V. EMISSIONS AND EMISSIONS REDUCTIONS

This draft proposal would address fugitive emissions of particulate matter (including toxic metals) and odorous substances. The implementation of various federal, state, and District regulations has addressed emissions of pollutants from most point and some fugitive sources located at metal melting and processing facilities and metal recycling facilities. (Point sources include exhaust from furnaces, ovens, shredders, and core and mold making apparatus.) However, the degree of control of fugitive sources varies. Fugitive emissions from the metal melting and processing operations comprise a significant portion of the overall emissions from these facilities. Most fugitive emissions are released at ground level. Modeling indicates that these ground level fugitive emissions may have a disproportionately greater impact on nearby receptors than stack emissions. It also follows that reductions in fugitive ground-level emissions would have a beneficial effect on associated risk relative to an equivalent reduction in stack emissions of the same pollutant. Because stack emissions are currently subject to a high degree of control, these rules are specifically aimed at reducing fugitive emissions that may not be sufficiently addressed.

The proposal addresses these fugitive emissions through the identification and implementation of site-specific management practices detailed in the Emission Minimization Plan (EMP) developed by each affected facility. While it may be apparent from a qualitative perspective that these management procedures could reduce fugitive emissions, accurately quantifying those emission reductions may prove difficult.

A. Particulate Matter

The seven largest potentially affected facilities (foundries, forges, and recyclers) by metal throughput emit, collectively, about 509 pounds of particulate matter per day or 93 tons/year. Particulate matter (PM) is a mixture of suspended particles and liquid droplets. PM includes elements such as carbon and metals; compounds such as nitrates, organics and sulfates and complex mixtures such as diesel exhaust and wood smoke. PM is a leading health concern. A large body of evidence suggests that exposure to PM, particularly fine PM, can cause a wide range of health effects, including aggravation of asthma and bronchitis, an increase in visits to the hospital with respiratory and cardio-vascular symptoms, and a contribution to heart attacks and deaths. The Bay Area is not in attainment of the California standards for either PM of 10 microns or less aerodynamic diameter (PM10) or PM of 2.5 microns or less aerodynamic diameter (PM2.5); or of the national 24-hour PM2.5 ambient air quality standard.

In addition, most of the facilities proposed to be regulated are located in or near BAAQMD Community Air Risk Evaluation (CARE) communities. Reducing PM2.5 emissions, which also contains toxic metals, in these communities will help improved health and air quality in these communities.

Point source emissions of PM at various metal melting and processing facilities are subject to stringent controls. Source test results show that PM control levels range from 0.0005 to 0.078 grains per dry standard cubic feet. This level of control of point sources is due to permit conditions based on current District, State, and federal regulations. However, fugitive emissions of PM are not always adequately addressed and there are, therefore, additional opportunities to further reduce PM emissions by further addressing fugitive emissions from these industrial sectors. Additionally, PM emissions from foundries, forges, and metal recycling operations contain toxic metals, the emissions of which would also be reduced by targeting fugitive emissions of PM.

The requirement of the EMP is aimed at minimizing PM emissions. The draft proposal allows each facility can identify its practices for reducing fugitive emissions according to the needs and capabilities of their operations. Accordingly, an estimation of emission reductions due to the adoption of this proposal would be difficult to determine precisely. However, over time, the District may be able to make qualitative comparisons of the effectiveness of the practices that promote better capture or the minimization of fugitive emissions from those sources for which emissions factors are available. Understanding the various practices implemented at each facility will assist the District to better understand the benefits of such practices in certain operations and under certain conditions (in consideration of technical and economic feasibility).

B. Odorous Substances

When the District receives complaints about these facilities, the complaints are usually based on odors. The proposal would also minimize the emission of odorous substances by requiring the facilities to evaluate various methods currently employed to address fugitive emissions and evaluate additional and alternative means. Further, facilities are tasked to periodically research alternatives to binders formulated with phenols or other odorous substances. Although, currently, not all casting jobs can be performed using low phenolic binder, manufacturers are constantly developing and testing new formulations that may allow foundries to replace binders formulated with phenol. Such replacements could greatly reduce, if not eliminate, the emissions of phenolic compounds which contribute to odorous emissions.

VI. SUMMARY OF ECONOMIC IMPACTS

Compliance with the two draft rules would be two-fold. First, affected facilities would have to develop an EMP, and second, implement the elements of the EMP. There are at least five metal melting and processing and three metal recycling (two with shredders) facilities that would potentially be required to develop and implement an Emissions Minimization Plan.

A. EMP Development

The cost of developing an EMP is dependent on the number of subjects that must be addressed that are applicable to an affected facility. For each of the subject areas that are applicable, a facility must conduct an evaluation to determine whether the practices and equipment currently in place are adequate enough to ensure emissions minimization. Staff estimates that an evaluation of each subject area would require two to four man-hours. This estimation includes:

- Identifying which operations would be subject to procedure development requirements;
- Determining the emissions minimization practices currently employed;
- Analyzing those practices to determine their efficacy in minimizing emissions; and
- Identifying and incorporating best practices for those subjects for which the current practice is inadequate.

The number of subject areas range between five and ten for each potentially affected facility. Using a value of $75 per man-hour for the hourly cost (including wages and benefits) of an environmental engineer,[20] the cost of developing an EMP would range between $750 and $3000 if done by facility personnel.

B. EMP Implementation

The cost of implementing an EMP would depend on several parameters:

- Whether the practice is being implemented;
- The equipment needed to implement a new practice;
- Permitting cost (if necessary);
- The time required to properly train personnel in the new practice; and
- Any ongoing materials (such as energy, filters, or activated carbon) or additional labor needed to implement a new practice.

Following are two case studies illustrating the potential cost of emission minimization options that may be employed to reduce PM emissions.

<u>Case Study 1: Minimization of Air Drafts for Metal Finishing Operations</u>

One potential emissions minimization option to reduce fugitive emissions is the construction of an enclosure to minimize air drafts. Staff has assumed that an enclosure 20 feet long, ten feet wide and ten feet tall would be the minimum needed to address metal finishing operations. It is also assumed that at least two walls of the enclosure would already exist;[vi] therefore, the enclosure would require two panels (ten by ten feet; ten by 20 feet) with a ceiling (ten x 20 feet). An enclosure of this size would cost about $25,000 based on an approximate cost of $50 per square foot of installed material.[21] Site-specific evaluations at each facility would be required to improve cost estimates associated with this proposal.

This cost could be reduced if finishing operations were relocated to an area already protected from uncontrolled drafts.

<u>Case Study 2: Shakers to Reduce Trackout onto Public Roadways</u>

One metal recycling facility has installed a series of shakers to reduce trackout of mud (that may contain metal contaminants and fluff) onto public roadways, and the subsequent re-entrainment of PM-causing materials. The shakers are three feet by 15 feet in size and are arrayed in series with two dedicated to the right side of the tires and two dedicated to the left. The cost of installation totaled $5,000.[22]

Although it would be very difficult to determine in advance which practices or equipment an individual facility may select for emissions minimization. The District would only recommend additional measures that are technically and economically feasible.

[vi] These are the approximate dimensions and conditions of the cooling areas for several of the metal melting facilities visited by District staff.

VII. RULE DEVELOPMENT / PUBLIC CONSULTATION PROCESS

Throughout the development of this workshop proposal, staff has engaged in an extensive public consultation process. Staff has hosted numerous meetings, held two workshop on an initial draft proposal that was published in June 2011, and has received a considerable amount of feedback from stakeholders.

A. Meetings and Publications

The process involved:

- Workshops;
- Multiple meetings with stakeholders, including:
  - Facility owners / operators and industry association representatives,
  - Community groups,
  - Public officials and their staff members,
- Attendance at multiple community meetings;
- Correspondence and telephone conferences with the following governmental agencies:
  - US EPA,
  - SCAQMD,
  - ARB,
  - Maricopa County Air Quality Department, Arizona,
  - Regional Water Quality Control Boards, and
  - Bay Area Certified United Program Agencies;
- Facility visits (number of visits):
  - PSC – Berkeley (3),
  - CASS – Oakland (3),
  - AB&I – Oakland (2) ,
  - US Pipe – Union City (2),
  - A&B Die Casting, Rodeo (1),
  - USS / POSCO, Pittsburg (1),
  - Schnitzer Steel, Oakland (2),
  - Sims Metals, Richmond (1),
  - Sims Metals, Redwood City (1)
- Conference calls;
  - Binder manufacturers,
  - Industry association representatives.

District staff published a first draft of Rule 12-13: Metal Melting and Processing Operations on June 23, 2011 and hosted two workshops (one in Oakland on July 27 and another in Redwood City on July 28, 2011) to present, discuss, and receive comments on the June draft regulation. Both workshops were well attended and numerous comments were received. The following is a general summary of the comments received, both in writing and at the workshops.

B. General Comments Received on the June Draft Proposal

- The District has not fully demonstrated a need for regulation of metal melting and processing facilities.
  - Baseline emissions and impacts have not been fully evaluated.
  - These industries are already sufficiently regulated by federal, state and local regulations.

- The draft proposal is a one-size-fits-all approach to regulate a disparate industry.

- The rule should be bifurcated – one rule for foundries and forges and another for recycling and shredding operations.

- Emissions limits are too stringent and not appropriate for the metal melting industry.

- It has been established in the development of the ferrous NESHAPs that enclosing metal melting operations and processes to the degree required by the proposal is not feasible or practical.

- The cost analysis in the workshop report is inadequate and underestimates the actual cost of compliance:
  - The economic impacts of this proposal will result in the closure of these businesses that employ many blue- and green-collar workers;
  - Cost effectiveness and socioeconomic analyses have not been performed.

- Schedule for completion of this rulemaking is too short.

- The compliance schedule is far too aggressive and does not allow adequate time for permitting, contracting, engineering designs, and implementation of new equipment.

- Monitoring for odors should occur more frequently than once every five years.

- Exemptions should be based on emissions in consideration of cumulative impacts, especially in CARE areas, not on metal throughput.

- The District should define the types of information that is not confidential or confidential.

In response to the comments received on the initial draft of the proposal, staff has revised and published this second workshop package, which contains the two draft rules and this workshop report.

The next step in the rule development process is to conduct one or more public workshops to receive additional input on the draft proposals. During the workshop(s), staff will describe information presented in this Workshop Report and the draft regulatory language of the proposed rule, respond to questions, and receive public comments. Based on the input received at the workshop and during the associated public comment period, staff will assess whether further changes to the proposal are necessary prior to preparing final proposed rules for consideration at a public hearing before the District's Board of Directors.

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