California Environmental Protection Agency

Air Resources Board

Proposed Airborne Toxic Control Measure For Emissions Of Toxic Metals From Non-Ferrous Metal Melting

Release Date: October 23, 1992

State of California
Air Resources Board
Stationary Source Division

TITLES 17 AND 26. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER THE ADOPTION OF AN AIRBORNE TOXIC CONTROL MEASURE FOR EMISSIONS OF TOXIC METALS FROM NON-FERROUS METAL MELTING.

The Air Resources Board (the "Board" or "ARB") will conduct a public hearing at the time and place noted below to consider adoption of a statewide airborne toxic control measure for emissions of arsenic, cadmium, and nickel from non-ferrous metal melting.

DATE: December 10, 1992

TIME: 9:30 a.m.

PLACE: Air Resources Board
Board Hearing Room, Lower Level
2020 L Street
Sacramento, CA

This item will be considered at a two-day meeting of the Board, which will commence at 9:30 a.m., December 10, 1992, and will continue at 8:30 a.m., December 11, 1992. This item may not be considered until December 11, 1992. Please consult the agenda for the meeting, which will be available at least 10 days before December 10, 1992, to determine the day on which this item will be considered.

INFORMATIVE DIGEST OF PROPOSED ACTION

Sections Affected: Proposed adoption of a new section 93107, Titles 17 and 26, Subchapter 7.5, Airborne Toxic Control Measures, California Code of Regulations (referred to hereinafter as "CCR"): "Airborne Toxic Control Measure for Emissions of Toxic Metals From Non-ferrous Metal Melting".

Cadmium was identified as a toxic air contaminant (TAC) by the Board in January 1987. Inorganic arsenic was identified by the Board as a TAC in July 1990. Nickel was identified by the Board as a TAC in August 1991. Each of these TACs was determined to be a carcinogen without an identifiable threshold exposure level below which no significant adverse health effects are anticipated.

After cadmium, inorganic arsenic, and nickel were identified by the Board as TACs, the Board's Executive Officer, with the participation of air pollution control and air quality management districts (districts), and in consultation with affected sources and the interested public, prepared a report on the need and appropriate degree of regulation for cadmium, inorganic arsenic, and nickel from non-ferrous metal melting. This report, which constitutes the Staff Report and Technical Support Document for the proposed airborne toxic control measure, specifically addresses the issues listed in Health and Safety Code section 39665 as they relate to the control measure for emissions of cadmium, inorganic arsenic, and nickel from non-ferrous metal melting.

State law establishes how TAC emission reductions must be achieved through control measures the Board designs and adopts (Health and Safety Code section 39666). For TACs such as cadmium, inorganic arsenic, and nickel for which the Board has not specified a threshold exposure level, the control measure must be designed in consideration of the factors specified by Health and Safety Code section 39665, to reduce emissions to the lowest level achievable through application of best available control technology or a more effective method unless, based on an assessment of risk, an alternative level of emission reduction is determined to be adequate or necessary to prevent an endangerment to public health. (Health and Safety Code section 39666(c)). The Staff Report contains the analysis required by the Health and Safety Code.

If adopted by the Board and districts, the proposed airborne toxic control measure (ATCM) would require facilities melting certain non-ferrous metals to apply best available control technology to capture and reduce the mass emitted to the atmosphere of particulate matter containing cadmium, arsenic, and nickel. Measures to reduce fugitive emissions are also required. The control measure requires specified emission reductions or control efficiencies which must be achieved, but does not dictate the type of control equipment to be used. Source testing is required to demonstrate compliance with these requirements. Facilities that melt certain metals very low in cadmium and arsenic, and facilities that melt no more than specified quantities of specific types of metals, are exempt from the emission control and fugitive emissions reduction measures, and source testing requirements. All facilities that use furnaces to melt lead, copper, cadmium, zinc, arsenic, aluminum, or their alloys are subject to the measure's reporting provisions, however.

If the Board adopts this ATCM, Health and Safety Code section 39666(d) requires the districts to adopt the ATCM or an equally effective or more stringent measure. In either case, the districts must propose regulations enacting an ATCM within 120 days of the date the Board adopts this ATCM and must adopt implementing regulations no later than six months after the date the Board adopts this ATCM.

The Board staff held four public workshops to solicit input from the public and affected industries during the development of this control measure. Copies of the materials distributed at the workshops may be obtained from the appropriate contact person listed below.

AVAILABILITY OF DOCUMENTS AND CONTACT PERSON

The Board staff has prepared a Staff Report which includes the initial statement of reasons for the proposed action and a summary of the environmental impacts of the proposal, if any. Copies of the Staff Report, which contains the full text of the airborne toxic control measure, may be obtained from the Board's Public Information Office, 2020 L Street, Sacramento, CA 95814, (916) 322-2990 at least 45 days prior to the scheduled hearing. The Board staff has compiled a record which includes all information upon which the proposal is based. This material is available for inspection upon request to the contact person identified immediately below.

Further inquiries regarding this matter should be directed to Cliff Popejoy, Manager of the Process Evaluation Section, Stationary Source Division, at (916) 322-8521.

COSTS TO PUBLIC AGENCIES AND TO PERSONS AND BUSINESSES AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred in reasonable compliance with the proposed airborne toxic control measure are presented below.

The Executive Officer has determined that the proposed airborne toxic control measure will not create costs or savings, as defined in Government Code section 11346.5, to any state agency or in federal funding to the state, costs or mandate to any school district whether or not reimbursable by the state pursuant to Part 7 (commencing with section 17500) Division 4, Title 2 of the Government Code, or other nondiscretionary savings to local agencies. The Executive Officer has also determined that the proposed ATCM does not impose a mandate on local school districts.

The Executive Officer has determined that the proposed airborne toxic control measure will impose a mandate upon and create costs to the districts, because the districts will be required to implement the control measure. However, the mandate does not require state reimbursement pursuant to Government Code sections 17500 et seq., and section 6 of Article XIIIB of the California Constitution, because the districts have the authority to levy fees sufficient to pay for the mandated program (see Health and Safety Code section 42311). These fees are intended to recover the full costs of district activities mandated by Health and Safety Code section 39666. The aggregated costs to all affected districts in implementing the control measure are estimated to be $136,000 for the first year and $45,000 annually thereafter. For individual districts the costs are estimated to range from no cost for districts having no facilities affected by the proposed control measure, to $75 to $105,450 for the first year and from $40 to $37,000 annually thereafter.

In developing the proposal, the staff has determined there is a potential cost impact on private persons or businesses directly affected by the proposed ATCM. The Executive Officer has also determined that adopting the proposed ATCM may have a significant adverse economic impact on small businesses, based on an assessment of the evidence available in the record.

Accordingly, the following information is provided pursuant to Government Code section 11346.53:

(A) Identification of the types of small businesses that would be affected

Some non-ferrous metal melting facilities will incur costs to comply with the requirements of the proposed airborne toxic control measure. These facilities include non-ferrous foundries, smelters, galvanizers, battery manufacturers, aircraft parts manufacturers, or other facilities that carry out non-ferrous metal melting.

(B) Description of the projected reporting, record keeping, and other compliance requirements that would result from the proposed action.

The proposed ATCM requires covered facility owners or operators to: install and operate emission collection and control equipment; develop and carry out a district-approved maintenance plan to reduce fugitive dust emissions from certain areas and processes; conduct emission testing of air pollution control equipment to demonstrate compliance with the requirements; secure district permits; and keep certain records. Owners or operators of exempt facilities would be required to test the metals processed to demonstrate compliance with exemption conditions and secure an exemption from the district. Records of testing for both exempt and non-exempt facilities must be maintained at the facility for a period of two years.

For facilities defined as small businesses, the annualized costs of compliance with the proposed measure are estimated to range from $500 to $50,000. The low end of the range represents estimated costs for an exempt facility, and the high end represents estimated maximum costs for a covered facility to purchase and operate emission control equipment, develop and implement a fugitive dust control plan, test to verify compliance, secure district permits, and keep required records. Some covered facilities already have in place equipment or practices that may address the requirements of the proposed measure. For these facilities, the median annualized cost is estimated to range from $7,000 to $37,000.

(C) The ARB finds that the adoption of this airborne toxic control measure may have a significant adverse economic impact on small businesses. The ARB has considered proposed alternatives that would lessen any adverse economic impacts on small businesses. The ARB invites you to submit proposals. Submissions may include the following considerations:

(i) the establishment of differing compliance or reporting requirements or timetables which take into account the resources available to small businesses;

(ii) consolidation or simplification of compliance and reporting requirements for small businesses;

(iii) the use of performance standards rather than prescriptive standards;

(iv) exemption or partial exemption from the regulatory requirements for small businesses.

In addition, before taking final action on the proposed airborne toxic control measure, the Board must determine that no alternative considered by the agency would be more effective in carrying out the purpose for which the action is proposed and less burdensome to affected private persons than the proposed action.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing. To be considered by the Board, written submissions must be addressed to and received by the Board Secretary, Air Resources Board, P.O. Box 2815, Sacramento, CA 95812 or 2020 L street, 5th Floor, Sacramento, CA 95814, no later than 12:00 noon, December 9, 1992, or received by the Board Secretary at the hearing.

The Board requests but does not require that 20 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing. The Board encourages members of the public to bring any suggestions for modification of the proposed regulatory action to the attention of staff in advance of the hearing.

STATUTORY AUTHORITY AND HEARING PROCEDURES

This ATCM is proposed under the authority granted to the Board in sections 39600, 39601, 39650, 39655, and 39666 of the Health and Safety Code. The ATCM is proposed to implement, interpret, and make specific sections 39650 and 39666 of the Health and Safety Code.

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Title 2, Division 3, Part 1, Chapter 3.5 (commencing with section 11340) of the Government Code.

Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with nonsubstantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the modifications are sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted. The public may request a copy of the modified regulatory text from the Air Resources Board Public Information Office, 2020 L Street, Sacramento, CA 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

James D. Boyd
Executive Officer

Date: October 13, 1992

State of California
California Environmental Protection Agency

Air Resources Board
Stationary Source Division
P.O. Box 2815
Sacramento, CA 95812

Initial Statement of Reasons for Proposed Airborne Control Measure for Emissions of Toxic Metals from Non-Ferrous Metal Melting

Date of Release: October 23, 1992
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Acknowledgments

We wish to acknowledge the participation of the metal melting industry in the development of this proposal. The assistance and suggestions of foundrymen, smelter operators, industry association representatives and consultants, and others in the industry were invaluable.

In developing regulatory proposals, the ARB staff worked with the staff of interested air districts through the Technical Review Group. As a Committee of the Technical Review Group, several air districts participated in the development of this proposed regulation. Those districts include the following:

Bay Area Air Quality Management District
San Diego County Air Pollution Control District
San Joaquin Valley Unified Air Pollution Control District
South Coast Air Quality Management District.

Also, the technical expertise of staff from several work units in the ARB was necessary to prepare this report. The following units contributed:

Engineering Evaluation Branch, Monitoring and Laboratory Division
Modeling Support Section, Technical Support Division
Emission Inventory Branch, Technical Support Division
Program Assessment Branch, Compliance Division
Economic Studies Section, Research Division.

We gratefully acknowledge their contributions to this effort.

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SUMMARY AND RECOMMENDATION

A. SUMMARY

1. What is the purpose of this report?

In this report, we present a proposed control measure designed to reduce emissions of cadmium, arsenic, and nickel from non-ferrous metal melting operations in California. Cadmium, arsenic, and nickel have been identified as toxic air contaminants (TACs). State law directs the Air Resources Board (ARB or Board) to control TACs that have been identified. If adopted, the control measure will also reduce emissions of lead which is currently being evaluated for identification as a TAC.

The proposed control measure requires that emissions from melting and pouring operations at facilities which melt non-ferrous metals in a furnace or other container be captured and vented to a particulate matter control device. Activities to reduce fugitive emissions are also required. Facilities covered by the proposed control measure include smelters, foundries, solder pots, and galvanizing operations. The text of the proposed control measure is included as Attachment A.

In the following report, we summarize the information on sources, emissions, and potential cancer risk on which we base our assessment of the need to regulate. We also discuss existing control technology, the proposed control measure, and the costs and benefits of the proposed control measure. These comprise our assessment of the appropriate degree of regulation for these sources of cadmium, arsenic, and nickel. Last, we review the legal basis for this control measure.

We have also published a Technical Support Document (TSD) which gives the details of emission calculations, exposure estimation, and

cost estimates. The TSD also reviews the behavior and persistence of arsenic, cadmium, and nickel in the ambient air, and other sources of emissions of arsenic, cadmium, and nickel.

2. How do the Air Resources Board, the districts, and the affected sources work together to regulate toxic air contaminants?

In California, under California Health and Safety Code sections 39002 and 40000, air pollution control districts and air quality management districts (districts) have primary responsibility for regulating stationary sources of air pollution. The districts are primarily responsible for adopting, implementing, and enforcing air quality regulations. The districts implement and enforce regulations by issuing permits to operate sources of air pollution and required pollution control equipment and by routinely inspecting the affected sources.

For TACs, the ARB is responsible for the development and adoption of statewide control measures pursuant to the requirements of California Health and Safety Code section 39666. In the process, the ARB staff works closely with the districts, affected sources, and the public.

After the ARB has adopted a control measure, the state Office of Administrative Law (OAL) reviews the regulatory package for compliance with administrative procedural requirements (Government Code 11340 et seq.). Upon approval by OAL, the regulation is filed with the Secretary of State. The regulation becomes effective 30-days after it is filed with the Secretary of State unless the adopting agency requests a different effective date. Pursuant to the requirements of Health and Safety Code section 39666(d), the districts have six months from the effective date of the regulation to adopt a regulation at least as stringent as the ARB's toxic control measure. A district may adopt a more stringent regulation and may also choose to adopt a regulation sooner than required by law.

Once a district has adopted a regulation, affected sources must work with the district to meet the requirements of the regulation. These requirements may include securing a permit(s) for the project, installing control equipment, carrying out maintenance and recordkeeping activities, and testing emissions to demonstrate compliance.

3. What is the origin, nature, and amount of toxic metals emitted from non-ferrous metal melting facilities?

Cadmium, arsenic, nickel, and lead are present as contaminants or are added to impart desirable properties to many non-ferrous metals. When these metals are melted and poured, cadmium, arsenic, nickel, and lead may be emitted. Nickel and lead are emitted directly as

particulate matter due to physical processes such as agitation. Cadmium, arsenic, and lead may become volatilized from the molten metal. As these vapors cool, they condense into or on small particles. At end-of-stack temperatures, these metals are mainly emitted as small particles.

At some facilities, particulate matter emissions from the melting and occasionally from pouring operations are collected and emitted from a stack either directly or through an air pollution control device. These emissions are referred to as stack emissions.

Particulate matter that escapes the collection system, from unvented operations, from open storage piles, and from traffic in dusty areas is known as fugitive emissions. Fugitive emissions cause higher ground level concentrations of pollutants than stack emissions because the stack emissions are more dispersed by the time they reach ground level.

We estimate that statewide, 2,000 pounds per year of cadmium, 480 pounds per year of arsenic, and 2,100 pounds per year of nickel are emitted from approximately 280 facilities. In addition, we have estimated lead emissions from these facilities at over 300,000 pounds per year. Our estimates indicate that of those emissions, approximately 42 percent (840 pounds) of the cadmium, 7 percent (35 pounds) of the arsenic, 17 percent (360 pounds) of the nickel, and 44 percent (132,000 pounds) of the lead are fugitive emissions. The fraction of emissions that are fugitive varies because of differences among facilities in the amount of emissions of the various pollutants and the degree of control of process emissions.

Approximately 80 percent of the facilities are located in the South Coast district. These include most of the largest facilities. Facilities are also located in the Bay Area, San Joaquin Valley, and San Diego County districts and about four percent are distributed over nine other districts.

These estimates are based on data gathered in a survey we conducted in 1991. We received responses from about 40 percent of the facilities statewide. These estimates of emissions are based on the assumption that the facilities that returned surveys are representative of those that did not return their surveys.

The number of facilities and amount of metal processed is expected to track general industrial activity. Overall, we expect the level of metal melting activity to remain the same over the next decade.

4. What are the potential health effects associated with cadmium, arsenic, and nickel exposure?

The ARB has identified cadmium, arsenic, and nickel by regulation as toxic air contaminants. In making this identification, the Board took into account the findings and recommendation of The Office of Environmental Health Hazard Assessment (OEHHA)[1/] and the Scientific Review Panel (SRP).

During the process of identifying cadmium, arsenic, and nickel as TACs, the carcinogenic and non-cancer health effects of these compounds were evaluated by the OEHHA and the SRP. Public comments were solicited and considered in the OEHHA recommendation and SRP findings given to the ARB. The OEHHA staff concluded that, at the ambient levels of each, adverse health effects other than cancer would not be expected.

The International Agency for Research on Cancer (IARC) has concluded that there is sufficient evidence of carcinogenicity in animals and that, for practical purposes, cadmium should be regarded as if it presents a carcinogenic risk to humans. The staff of the OEHHA and the SRP concur in these conclusions. Inhalation of cadmium may lead to an increased risk of contracting lung cancer. The OEHHA, SRP, and ARB determined that cadmium has no identifiable threshold exposure level below which carcinogenic effects are not anticipated to occur.

The OEHHA has found strong evidence that inorganic arsenic is a human carcinogen. (All arsenic emissions from metal melting operations are inorganic, so within this report, the term arsenic will refer to inorganic arsenic.) Studies of workers in the smelting industry and in pesticide manufacturing plants have found strong associations between respiratory cancer mortality and arsenic exposure. In addition, IARC has included arsenic and arsenic compounds in the group of chemicals which are "causally associated with cancer in humans." The OEHHA, the SRP, and the ARB were unable to identify a threshold exposure level below which no carcinogenic effects are expected to occur.

1/ In 1990, the functions of the Epidemiological Studies and Surveillance Section of the Department of Health Services in support of the toxic air contaminant control program were transferred to the OEHHA which is part of the California Environmental Protection Agency (Cal/EPA).

The DHS and IARC have included nickel compounds in the group of chemicals found to be "causally associated with cancer in humans" and metallic nickel as "possibly carcinogenic to humans." OEHHA, the SRP, and ARB found that all nickel compounds as well as metallic nickel should be considered potentially carcinogenic to humans and that insufficient evidence was available to support identifying a threshold exposure level.

5. What are the potential health effects associated with lead exposure?

Lead is emitted from some of the same facilities that emit arsenic, cadmium, and nickel. Lead has been designated as a probable cancer causing compound by the U.S. Environmental Protection Agency. The ARB staff is currently evaluating lead for identification as a TAC. It appears to be a weak carcinogen (relative to cadmium or arsenic), but it is emitted in relatively large quantities by some facilities.

The health studies on lead have documented that children are at greater risk of harm from lead exposure because they retain more lead in their bloodstream than adults. In children, the effects of lead exposure include damage to the central nervous system and damage to the body's ability to reproduce red blood cells. In adults, as well as children, exposure to lead adversely affects other major systems such as the liver, brain, kidney, and reproductive organs.

Based on public health concerns, both the ARB and the EPA have established ambient air quality standards for lead. Lead is no longer added to motor gasoline in California. Therefore, industrial sources represent the highest potential for causing the standard to be exceeded.

6. What are the potential cancer risks associated with non-ferrous metal melting facilities?

When arsenic, cadmium, and nickel were identified as TACs, the OEHHA made an estimate of carcinogenic potency. The potency factor relates the observed number of cancer cases in a studied population (either experimental animals or exposed workers) over a lifetime to the level of exposure. We use this factor, with estimates of exposure to the general population, to estimate the potential health effects due to emissions of the TACs.

Lead has not yet been formally identified as a TAC under Health and Safety Code section 39662. However, the California Air Pollution Control Officers Association has published a carcinogenic potency factor for lead in its report entitled Air Toxics "Hot Spots" Program Risk Assessment Guidelines.

The carcinogenic effects are expressed in two ways: as maximum individual risk and as cancer burden. The maximum individual risk is the probability, or chance, that a person exposed for a lifetime to a carcinogen (typically near the source) may get cancer as a result of that exposure. The cancer burden is the number of potential cancer cases expected in a population exposed over a lifetime (assumed to be 70 years) to the estimated levels of cadmium, arsenic, and nickel.

We estimate that the maximum individual risk due to cadmium, arsenic, nickel, and lead emissions ranges from less than 1 in a million to over 800 in a million. At about 12 percent of the non-ferrous metal melting facilities that responded to our survey, we predict the maximum individual risk to be over 100 in a million. Among facilities where cadmium, arsenic, and nickel are the major causes of maximum individual risk, we estimate that the highest maximum individual risk is about 700 in a million. Cadmium, arsenic, and nickel emissions contribute about 90 percent of the estimated risk in most cases. However, at one battery manufacturer where the metal melting and pouring is not currently controlled, we estimate that lead emissions contribute 97 percent of the maximum individual cancer risk (800 in a million).

We estimate that the emission of cadmium, arsenic, and nickel from non-ferrous metal melting facilities results in a potential statewide cancer burden of 102 excess cancer cases over 70 years. In addition, the lead emissions from these facilities translate to another 9 potential cases over 70 years.

We estimate that approximately thirty-five facilities that melt non-ferrous metals and emit lead will not be affected by this proposed control measure. Lead emissions from these facilities are estimated to range from one-half pound per year to 24 pounds per year, and total 230 pounds per year. The probability that these lead emission levels will cause cancer does not exceed 1 in a million. However, the non-cancer effects of lead may have a greater impact on public health than cancer impacts. If the ARB identifies lead as a TAC, we will evaluate the need for regulations for these facilities and other sources of lead emissions.

7. <u>What types of metal melting facilities have been evaluated?</u>

The ARB staff's evaluation has primarily focused on facilities where non-ferrous metals are melted in furnaces because of the facilities' potential to emit arsenic and cadmium. These include the following: foundries melting brass, bronze, zinc, aluminum, lead, and precious metals; brass, bronze, aluminum, lead, and zinc smelters; and galvanizing operations.

To develop the information used for evaluating emissions, the staff conducted a survey in February 1991. The districts provided lists of non-ferrous metal melting facilities for the survey. We

estimate that there are about 280 such facilities in California. The data from the survey indicate that, overall, thirty percent of the furnaces in these facilities are currently equipped with emission control devices.

There is evidence that ferrous and other types of metal melting operations such as those processing iron, nickel, chromium, and their alloys may emit cadmium, arsenic, nickel, or hexavalent chromium (also an identified TAC). However, additional information is needed to evaluate these operations. In the future, we intend to evaluate the need to regulate ferrous metal melting operations.

8. What would this proposed control measure require of non-ferrous metal melting facility operators?

For non-threshold TACs such as cadmium, arsenic, and nickel, state law requires that control measures be designed to reduce emissions to the lowest level achievable through application of best available control technology (BACT), in consideration of potential risk and cost.

Therefore, we designed this proposed control measure to require BACT to reduce emissions from melting and pouring operations from non-ferrous metal melting facilities. We believe that BACT for the facilities includes: efficient fume collection hoods followed by control devices; storage and handling methods that do not generate dust for feed, waste, and products; and, good housekeeping practices to minimize dust re-entrainment.

The proposed control measure requires that the emission collection system conform to guidelines published by the American Conference of Governmental Industrial Hygienists (ACGIH) to ensure that the emission collection system is as effective as possible. The ACGIH guidelines are published in Industrial Ventilation, a common reference manual used by engineers designing ventilation systems which maximize collection efficiencies to minimize human exposure. This reference recommends minimum airflows and volumes for the maximum collection of a given material and includes criteria specific to high temperature processes like metal melting.

We are proposing that the control device to which the collected emissions are routed must be capable of demonstrating at least a 99 percent removal efficiency for particulate matter. There are several types of control devices which are capable of attaining 99 percent removal efficiency for particulate matter and are effective for fine particulate matter. Specifying a removal efficiency provides maximum flexibility to source operators to choose the device best suited to their needs.

In addition, we are proposing that facilities be required to employ methods for storage, handling, and transfer of materials that

prevent fugitive emissions to the air. To minimize re-entrainment of settled dust, we are proposing that facilities use good housekeeping practices such as periodically cleaning surfaces subject to foot or vehicular traffic.

Recordkeeping and reporting provisions are also proposed to support the control requirements. Facilities have 24 months from the date the district adopts a regulation to demonstrate that they are in compliance.

9. Are there any exemptions?

The proposed control measure would exempt certain operations from some control requirements. A facility where the total of all covered non-ferrous metals melted is less than one ton per year would be exempt. We are also proposing a process-rate limited exemption for facilities melting certain metals. Finally, an unlimited exemption may be obtained for facilities or equipment melting alloys with very low concentrations of cadmium and arsenic. We estimate 180 of the 280 facilities would be eligible for these exemptions. Facilities eligible for an exemption must apply to the district within six months from the date the district adopts a regulation.

10. Are there any district regulations that will affect emissions of nickel, cadmium, arsenic, or lead from non-ferrous metal melting facilities?

Each district has individual particulate matter and visible emission regulations. However, none of the districts have regulations establishing emission limits specifically for arsenic, cadmium, or nickel.

The Bay Area Air Quality Management District has a regulation establishing a lead emission limit of 15 pounds per day. This regulation also prohibits facilities from exceeding the state ambient air quality standard for lead.

In September 1992, the South Coast Air Quality Management District adopted Rule 1420 - Emission Standard for Lead. The basic provisions of the rule prohibit sources from emitting lead or lead compounds that may cause an exceedance of the state ambient air quality standard for lead of 1.5 ug/m^3 over a 30 day average. The regulation requires emission collection and control equipment and fugitive emission control at facilities that process more than two tons of lead per year and emit more than 0.5 pounds of lead per day. For certain facilities it also requires monitoring or modeling of air concentrations of lead at the fenceline of the facility.

In general, Rule 1420 will apply to more types of facilities than the proposed control measure. We estimate that at least one-half of the facilities affected by our proposed control measure would also be

affected by Rule 1420. A precise determination can not be made at this time because facilities are exempted from Rule 1420 on a different basis than from the proposed control measure. In addition, we do not have sufficient data to estimate lead emissions from all facilities covered by the proposed control measure. We do not expect Rule 1420 to affect facilities that are minor sources of lead such as aluminum smelters which are affected by our proposed control measure.

The SCAQMD staff worked closely with us during the development of Rule 1420 and consequently the emission control requirements of the district rule are consistent with those in the proposed control measure. Thus for those facilities where both rules apply, if a facility is in compliance with the requirements of this proposed control measure, we expect that there will be no additional controls required to comply with the emission control or housekeeping requirements of Rule 1420, unless there is a predicted or measured exceedence of the ambient air quality standard for lead (see page 36).

11. Have pollution prevention approaches been considered?

Yes. We have identified operational changes which could minimize emissions at the source for this industry. These changes consist of melting the metal under cover of an inert gas or using alloys that contain very low concentrations of toxic metals. The proposed control measure does not preclude the use of a gas cover instead of emission collection and control equipment. However, we have not required that technology because it is relatively costly. The proposed control measure specifically exempts equipment used exclusively to melt metals with concentrations of cadmium and arsenic no more than 0.004 percent and 0.002 percent, respectively. This provides a pollution prevention incentive by exempting facilities able to use such materials that result in lower emissions.

12. Are there other control alternatives?

We considered eight alternatives to the proposed control measure for reducing toxic metal emissions from smelters, foundries, and galvanizers. They ranged from no action to requiring closed system operations to contain pollutants. They are listed and discussed in Chapter III of this report and Chapter V of the accompanying Technical Support Document. We evaluated them from the standpoint of compliance with our responsibilities under the statutory mandate and applicable sections of the Administrative Procedures Act regarding consideration of small business impact. We believe the proposed control measure meets the Health and Safety Code's mandated objective of reducing emissions to the lowest level achievable through the application of BACT, considering risk and cost. We believe that none of the alternatives considered meets that legal mandate and is as effective at less cost or is less burdensome to small business.

13. How will small businesses be affected?

The proposed control measure applies to small businesses. Because these are manufacturing concerns, the following definition of small business applies: an independently owned or operated company with fewer than 250 employees. Of the 280 facilities melting non-ferrous metals, about 190 are estimated to be small businesses. We anticipate that approximately 115 will qualify for an exemption. About 75 small businesses that do not qualify for an exemption will be required to control emissions using BACT.

For small businesses that responded to our survey, we have analyzed the financial impact on profitability of complying with the proposed control measure. This analysis employed data on profitability from nationwide average facilities in the affected standard industrial classification (SIC) codes. The impact on profitability for individual California businesses may be different. Prior to the Board hearing on the proposed control measure, we intend to contact several affected California small businesses to characterize specific impacts on these facilities more accurately.

The costs associated with the proposed control measure are expected to result in a decrease in profitability of greater than 10 percent for some small businesses. On the basis of this analysis, it appears bronze foundries and aircraft parts manufacturers would be most adversely affected. The staff finds that it is not feasible to exempt small businesses from the proposed control measure because small businesses do not necessarily have low emissions. We have proposed exemptions for facilities where emissions and potential risk are likely to be low.

There are two government loan programs available to small businesses. One is administered through the California Office of Small Business and the California Pollution Control Financing Authority. The other is a loan guarantee program operated by the South Coast Air Quality Management District. Further details of these loan programs are presented in section IV E of the Technical Support Document.

Despite the proposed exemptions and loan programs however, some small businesses, especially those with little or no profitability, may experience a significant adverse impact from the adoption of this proposed airborne toxic control measure (ATCM).

14. What are the benefits of the proposed control measure?

If adopted, the proposed control measure would reduce statewide emissions of cadmium, arsenic, nickel, and lead from the affected facilities as shown in Table I.

Table I

SUMMARY OF EMISSION REDUCTIONS

Pollutant	Pounds Fugitive Reduced	Overall Pounds Reduced	Overall Percentage Reduction
Cadmium	700	1,400	70
Arsenic	20	50	11
Nickel	360	500	25
Lead*	97,000	140,000	45

* From sources of cadmium, arsenic or nickel emissions

The calculated reductions reflect reductions from current emission levels. Some facilities have complete or partial emission control. Also, the types and quantities of metals differ for each of the facility types (for example, aluminum smelters, brass smelters, etc.). Therefore, the actual reductions differ from pollutant to pollutant. Taking into account the overall effectiveness of the proposed control measure, an emission reduction of about 95 percent is achievable relative to an uncontrolled facility. This reflects the performance of both emission collection and control equipment, and the effectiveness of fugitive control measures.

The overall potential cancer burden from exposure to emissions from these facilities will be reduced by about 55 percent, from the current level of 111 cases to about 52 cases over 70 years. We predict these reductions will cost an average of $2 million per potential lifetime cancer case avoided. This is within the range of cost-effectiveness of airborne toxic control measures previously approved by the Board. Other control measures approved by the Board have had a predicted cost effectiveness ranging from $0.1 million/case to $70 million/case. The maximum individual cancer risk near a high-emitting facility would decline from 800 in a million to 300 in a million. Table II shows the change in the distribution of maximum individual risk from facilities melting non-ferrous metals.

Table II

DISTRIBUTION OF MAXIMUM INDIVIDUAL RISK

Risk (cases/million)	Number of Facilities	
	Pre-ATCM	Post-ATCM
Less than 10	178	220
10 to 49	32	22
50 to 99	18	8
Greater than 100	32	10

15. What will the proposed control measure cost?

Facilities will incur capital costs for site evaluation and building modification, purchase and retrofit of control equipment, and initial costs for permits and source testing. Operation and maintenance expenses will be ongoing. Nearly half of the facilities that responded to our survey and do not qualify for exemption, currently have control equipment capable of meeting the requirements of the proposed control measure if properly maintained. These facilities will incur initial costs for source testing of about $4,000 per control device.

For those facilities that we anticipate will need to install or upgrade existing equipment, the capital and initial costs are expected to range from $6,000 to $190,000. The range in this estimate reflects the fact that some facilities currently have control equipment that will partially satisfy the requirements. The median initial cost for these facilities is $35,000. The median for all affected facilities is $13,500. The total capital and initial costs for all facilities, excluding operation and maintenance, are estimated to be about $3.6 million.

All facilities will have operation and maintenance costs (even those not expected to incur initial out of pocket costs for equipment). These are reflected in the estimate of annualized cost to facilities. This estimate is the result of annualizing the initial cost over 10 years, including interest, adding operation and maintenance expenses, and adjusting for the associated tax savings. The annualized costs of compliance are anticipated to range from $500 to $50,000, and the median for all covered facilities is expected to be $10,000 per year. The total annualized cost for all facilities in the state is about $1.7 million per year.

There are several options available to affected facilities. Some may be able to use an alternate feed material that will qualify for exemption. Those that can not take advantage of the exemptions may be able to either absorb the costs or pass them on, in part or total, to the consumer. We estimate that passing the total cost on to the consumer will cause an average price increase of about one percent. However, because costs vary, a larger or smaller price increase could occur.

Districts will incur costs for such activities as reviewing control equipment plans, conducting inspections, reviewing records, and source testing. These costs are expected to be recovered as fees to the facility. Our estimates of compliance costs include such fees.

16. <u>What are the environmental impacts of the proposed control measure?</u>

The environmental benefits will be a reduction in potential cancer cases and the reduction of airborne concentrations of lead. The indirect environmental benefits may be reduced worker exposure to these pollutants and reduced water pollution. Worker exposure will be reduced because emissions from more processes will be vented to a control device than is currently the practice. Water pollution will be reduced because the airborne pollutants from the affected facilities which would have settled on land and been washed into the water, and that would have settled onto the water, will be removed by the control device or housekeeping practice.

There are several potential adverse impacts on the environment from this proposed control measure. One potential but unlikely adverse impact is an increase in quantities of metal contaminated water from dust control activities (if facilities opt to use wet cleaning practices). Other impacts include increased criteria pollutant emissions from generating the electricity to run the pollution control equipment and increased particulate matter or sludge collected by the air pollution control equipment.

The potential for water pollution from wet dust control activities is not considered significant because few or no people are expected to use wet methods for dust control. The potential for additional emissions due to additional power generation for operating pollution control equipment is not considered to be significant for two reasons. First, new power plants must comply with new source review rules that require BACT and the use of offsets, and second, the additional power that would be needed is very small compared to current energy usage.

With respect to increased waste, in some cases hazardous particulate captured in the pollution control equipment can be recycled. If it can not be recycled, particulate matter classified as hazardous waste must to be conveyed to a hazardous waste disposal

site. Proper disposal in a complying hazardous waste disposal site constitutes mitigation for this environmental impact.

17. About this report and its authorship

The ARB staff prepared this report in consultation with the districts through interaction with the Technical Review Group Metal Melting Committee and other representatives of interested districts. The proposed control measure was developed in consultation with, and represents the consensus of, the district representatives on the Committee.

During the evaluation of metal melting facilities and development of the proposed control measure, the staff consulted with facility operators and their industry association. In addition, the staff consulted with various government agencies including: the United States Environmental Protection Agency (EPA), the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA), the State Water Resources Control Board, the Integrated Waste Management Board, the California Occupational Safety and Health Administration, and the California Environmental Protection Agency's Department of Toxic Substance Control (DTSC). Vendors of control equipment and currently controlled sources also provided information used in the formulation of this proposed control measure.

During the development of the proposed control measure and the Technical Support Document, four public consultation meetings were held. Comments received from the public at these meetings were considered during the development of this proposal. We have toured facilities and held many meetings and conversations with facility operators or their representatives. We have published for comment a draft and a revised draft of the ATCM and Technical Support Document and solicitated comments on the methods and results of our technical analyses. In addition, we addressed four semi-annual meetings and one annual meeting of the California Cast Metals Association (CCMA). The comments that we recieved have been given full consideration, and many have helped frame this proposal. We gratefully acknowledge the comments provided and assistance rendered by these people and organizations.

B. RECOMMENDATION

We recommend that the Board adopt the proposed control measure shown in Attachment A. This proposed control measure would reduce emissions of toxic metals from non-ferrous metal melting facilities including smelters, foundries, and galvanizers. The proposed control measure would require these facilities to use the best available control technology to reduce melting and pouring emissions, and good engineering/housekeeping practices to reduce fugitive emissions.

I.

EMISSIONS OF CADMIUM, ARSENIC, NICKEL, AND LEAD FROM NON-FERROUS METAL MELTING FACILITIES AND RESULTANT PUBLIC HEALTH RISK

This chapter presents a discussion of sources and emissions, a description of our emissions calculation methods, and an estimate of the potential cancer risk due to emissions of cadmium, arsenic, nickel, and lead from non-ferrous metal melting facilities.

The staff is proposing to control emissions of TACs from non-ferrous metal melting operations in order to reduce the potential cancer risk to California's population. Non-ferrous metals include lead, copper, zinc, cadmium, arsenic, aluminum and their alloys. The pollutants emitted from non-ferrous metal melting operations which contribute to potential cancer risk are cadmium, arsenic, nickel, and lead.

For TACs such as cadmium, arsenic, and nickel which have been identified with no identifiable threshold exposure level, control measures must be designed to reduce emissions to the lowest level achievable through application of best available control technology. The threshold exposure level is a concentration below which carcinogenic effects are not expected to occur. Control measures for compounds with an identified threshold level must reduce emissions to the levels at which exposures will not exceed the threshold.

Because lead has not yet been identified as a TAC (though it is currently being evaluated for identification) the focus of this proposed control measure is the reduction of emissions of arsenic, cadmium and nickel. Control of lead is an additional benefit because lead is emitted from some of the same facilities and is controlled by the same equipment and practices.

A. SOURCES AND EMISSIONS

In February 1991, we sent a survey to about 350 metal melting facilities identified by the districts to obtain necessary data for developing this proposed control measure. Approximately 70 of the surveyed facilities informed us that they did not melt non-ferrous metals, were closed, did thermal spraying, or did not meet our definition of non-ferrous metal melting. We received responses from 116 facilities. We estimate the facilities that responded to our survey comprise 40 percent of the facilities. We have assumed that those who responded to the survey were representative of the industry as a whole. We used the survey results to estimate how many facilities melt non-ferrous metals and estimate pollutant emissions. The Technical Support Document contains details and analyses of the survey.

We estimate that there are about 280 non-ferrous metal melting facilities statewide. Table III shows the number of facilities by district, based on district permit records. The types of facilities that melt non-ferrous metals include: smelters, foundries, die casters, metal coating processes and miscellaneous processes such as metal powder production. Both primary and secondary smelters operate in California. The only primary smelters operating in California produce gold on a relatively small scale. Other smelters in California process secondary metals. Table IV presents some of the differences in these processes.

Table III

FACILITIES BY DISTRICT

District	Estimated Number of Facilities
Bay Area AQMD	20
Butte County APCD	1
El Dorado County APCD	2
Feather River AQMD	1
Lake County APCD	1
Monterey Bay Unified APCD	2
Northern Sierra AQMD	1
Sacramento Metro. AQMD	1
San Diego County APCD	10
San Joaquin Val. Un. APCD	14
Shasta County APCD	1
South Coast AQMD	223
Ventura County APCD	3
Total	280

Table IV

METAL MELTING PROCESSES

Type of Facility	Feed	Product
Primary Smelter	Ore	Primary Ingot
Secondary Smelter	Scrap	Secondary Ingot
Foundry	Primary or Secondary Ingot	Castings
Lead Oxide Producer	Primary or Secondary Ingot	Lead Oxide Powder
Galvanizer	Zinc Ingot	Coated Castings, wire, sheet, etc.

Using the survey response rate we projected the emissions from facilities that responded to derive an estimate of statewide emissions from the 280 facilities that melt non-ferrous metals. Emission estimates were based on an emission factor, the quantity of metal melted, the current level of control, and the fugitive emission estimate. The total emissions estimate from the facilities that returned surveys was adjusted by the survey return rate (40 percent) to derive the statewide emissions estimate.

We have assumed that the facilities that returned surveys are representative of those that did not respond to the survey. We checked this assumption by isolating two segments of the industry, battery manufacturing, and lead smelters, then obtaining independent data on facility size or emissions, and checking the validity of the assumption about representativeness. We found support for the assumption both in terms of numbers and emissions.

Facilities are located in 23 counties for a potential exposed population of 22.3 million people statewide. Eighty-four percent of the facilities are in the South Coast Air Basin. Table V gives a breakdown of emissions by district.

TABLE V

EMISSIONS BY DISTRICT

District	Emissions (pounds/year)			
	Cadmium	Arsenic	Nickel	Lead
South Coast AQMD	780	180	830	120,000
Bay Area AQMD	4	4	0.2	450
San Diego APCD	2	0.8	0.1	80
El Dorado County APCD	0.4	0	0.01	5
San Joaquin Valley AQMD	0.6	0.3	0.01	2
Shasta County AQMD	0.5	0	0.01	0.6
Sacramento Metro. AQMD	0.04	0	0	0.7
Butte County APCD	0.01	0.01	0	0.01
Not assigned*	1,200	300	1,270	179,500
Total**	2,000	480	2,100	300,000

* emissions projected based on survey data (see page 17), and therefore not assigned to a specific district.

** figures rounded

Emissions fit into two general categories, point source (or stack emissions) and fugitive emissions. Stack emissions are collected using hoods and ducts and are either directed to an air pollution control device or are released directly to the ambient air. Fugitive emissions include those which escape capture by the hoods, settled particulate matter which is resuspended by traffic within the plant, and emissions from open storage piles. Because of the variability among facilities both in terms of pollutants emitted and levels of control, the fraction of emissions that is fugitive is not the same for each pollutant. Our estimates indicate that fugitive emissions make up 840 pounds of the 2,000 pounds per year of cadmium emitted, 35 of the 480 pounds of arsenic emitted, 360 of the 2,100 pounds of nickel emitted, and 132,000 of the 300,000 pounds per year of lead emitted. On a pound-for-pound basis, fugitive emissions can have a greater impact on public health than stack emissions because they are released at ground level.

The staff obtained emission factors for the various activity types by several means. The emission factors were either calculated from an analysis of baghouse dust, derived from source test results, or taken from U.S. EPA publications. The emission factors for brass smelters, aluminum smelters, zinc smelters, brass foundries, and bronze foundries are based on baghouse dust analyses. The emission factors for the lead smelters and aluminum foundries are based on source tests. The emission factors for lead casting and lead oxide production are from the published literature. Details about the emission factors used can be found in Table E-1 of the Technical

Support Document. Fugitive emissions were calculated as a fraction of uncontrolled stack emissions.

B. PUBLIC EXPOSURE TO CADMIUM, ARSENIC, NICKEL, AND LEAD AND POTENTIAL PUBLIC HEALTH RISK

When a pollutant is identified as a TAC, an assessment is done of the potential for adverse health effects from exposure to the pollutant. Potential adverse health effects are divided into non-cancer and cancer effects.

For substances that are carcinogens, a carcinogenic potency factor is developed. This factor relates observed health effects to exposure levels in exposed populations (typically animals or workers) and is used to predict potential cancer cases that may result from public exposure to the pollutant.

Cadmium, arsenic, and nickel have been identified by the Board as TACs. Their potency factors are published in the respective identification reports and are listed in Table VI. Lead is in the evaluation process for identification as a TAC. Consequently, the potency factor for lead listed in Table VI is one published by the California Air Pollution Control Officers Association in the AB 2588 (Air Toxics Hot Spots Inventory and Information Act) Risk Assessment Guidelines, and is from the open literature rather than from the OEHHA.

For cadmium, arsenic, and nickel, the non-cancer health effects are not expected at the ambient concentrations predicted. For lead, however, non-cancer health effects may occur at the ambient concentrations predicted.

Table VI

CARCINOGENIC POTENCY FACTORS FOR METALS WHICH MAY BE EMITTED BY NON-FERROUS METAL MELTING OPERATIONS

Pollutant	Carcinogenic Potency Factor*
Cadmium	4.2
Arsenic**	3.3
Nickel	0.26
Lead	0.008

* chances/million from a 70-year exposure to 1 ng/m^3, based on the cancer potency "best value"

** has multi-pathway exposure potential (see page 21)

The cancer burden and maximum individual risk (MIR) are two ways of expressing the impact on public health due to emissions of a carcinogenic TAC. The cancer burden is an estimate of the potential impact on people in a large area; the maximum individual risk is an estimate of the potential impact on people near a specific source or sources. Both indices of risk are based on the carcinogenic potency of the TAC and on estimates of public exposure due to emissions of the pollutant into the ambient air.

1. Cancer burden

The cancer burden is the sum of the potential individual risk to all the people in a given area exposed to a compound from a specific source or sources. At the current emission levels of cadmium, arsenic, nickel, and lead, the total potential statewide cancer burden from non-ferrous metal melting facilities is estimated at 111 cases over 70 years.

Based on air quality modeling, we estimate that the approximately 2,000 pounds of cadmium emitted per year will have the potential to result in a statewide cancer burden of about 60 cases over 70 years. The arsenic emissions of about 500 pounds per year translate to 40 potential cancers over 70 years. The cancer burden due to nickel emissions of about 2,000 pounds per year from non-ferrous smelters and foundries is 2 cases over 70 years. We estimate lead emissions of 300,000 pounds per year from facilities which also emit one of the other toxic metals result in 9 potential cancer cases statewide over 70 years.

2. Maximum individual risk

The MIR is defined as the probability that an individual may develop cancer as a result of exposure to the maximum ground-level annual average concentration of a compound (over 70-years).

The MIR calculated for one uncontrolled battery manufacturing plant was approximately 800 per million. This MIR was the highest found among the facilities that responded to the survey. Table VII shows the distribution of MIR based on survey data.

Table VII

DISTRIBUTION OF MAXIMUM INDIVIDUAL RISK

Risk (cases/million)	Number of Facilities
Less than 10	178
10 to 49	32
50 to 99	18
Greater than 100	32

Notes: 1. Risk for some facilities could not be estimated.
2. Assumes survey respondents are representative of all.

3. Risk from exposure to airborne metals through multiple pathways

Toxic metals emitted to the ambient air can cause exposure through several pathways: inhalation, dermal (skin) exposure, and soil ingestion (particularly important for young children). Of the metals listed as TACs and emitted from non-ferrous metal melting facilities, only arsenic has properties that lead to increased risk through non-inhalation exposure pathways.

The Health Risk Assessment program developed by the staff from ARB and OEHHA calculates the increase in risk from air emissions that contribute to exposure through pathways other than inhalation. This program is explained in detail in section D of Chapter III of Air Toxics "Hot Spots" Program - Risk Assessment Guidelines which the California Air Pollution Control Officers Association published in January 1992. The program produces a factor to relate the total risk due to emissions of toxic compounds to the air including exposure through multiple pathways, to inhalation risk. This factor is used to allow a more complete characterization of risk from exposure to arsenic and is referred to as the non-inhalation dose factor. To calculate the total risk for arsenic, inhalation exposure or inhalation risk is multiplied by the non-inhalation dose factor (5.6) to determine the total risk from all pathways. The estimates of the potential impact of arsenic emissions presented in this document reflect this multi-pathway risk factor.

4. Health effects of lead exposure

IARC has designated lead as a possible human carcinogen. The EPA designates lead as a probable human carcinogen. In their preliminary health assessment for lead, the OEHHA finds that a threshold of effect cannot be identified for cancer. We estimate that the lead emissions from facilities that also emit cadmium, arsenic, or nickel account for 9 potential excess cancer cases.

Exposure to lead can also result in non-cancer health effects, of which the best known is neurological impairment. The OEHHA, in its preliminary health assessment for lead, was unable to identify a threshold for adverse health effects such as neurodevelopmental effects in children, or cardiovascular effects in adults. Thus, any reduction of lead emissions and resulting exposure will benefit public health.

II.

EMISSION CONTROL TECHNOLOGY

This chapter discusses the available control technology that can reduce toxic metal emissions, followed by our determination of best available control technology for these emissions.

A. EXISTING CONTROL DEVICES OR TECHNIQUES

We evaluated methods of control for metal melting operations based on the characteristics of emissions. Some existing melting and pouring operations are equipped with air pollution control equipment. Few facilities have effective fugitive emissions control. For melting and pouring processes, the key components of an effective emission control system are a collection system capable of capturing the emissions and a control device capable of removing them from the captured gas stream with a high level of removal efficiency for small particles.

1. Emission collection techniques for melting and pouring emissions

Industrial Ventilation, published by the American Conference of Governmental Industrial Hygienists (ACGIH, 1988), specifies system air flow, including duct velocities, and hood and conveying mechanism design, including minimum hood volume. The book is a common reference source for engineers designing ventilation systems.

The hood must be designed to have a sufficient intake velocity and be located at an appropriate distance from the source to ensure it effectively captures the escaping pollutants. Once the pollutants are

captured, the air velocity inside the ducts must be great enough to prevent the particles in the stream from settling in the ducts enroute to the collection device.

2. Emission control technology for melting and pouring emissions and fugitive dust sources

Several technologies are currently available to control the fine particulate matter emissions from melting and pouring operations. They include fabric filters (baghouses), ionizing wet scrubbers (IWSs), and electrostatic precipitators (ESPs). Several of these are used at metal melting operations in California.

These control technologies, when properly designed and operated, can be used to reduce emissions from metal melting operations, as discussed below. However, the physical and chemical conditions of, and constituents in, the exhaust stream, and the effect they have on the control process determine which control technology or technologies can be applied to a specific operation.

The data show that an overall particulate matter control efficiency of at least 99 percent is achievable using baghouses. Because baghouse control efficiency varies with particle size distribution, the effective removal of submicron particles will be sightly lower. Because arsenic, cadmium, and lead are found predominantly on (or as) smaller particles, a 99 percent particulate matter removal efficiency translates to approximately a 98 percent removal efficiency for the metals addressed by this proposed control measure.

On the basis of the mode of operation of ESPs and the nature of metal melting emissions, the particulate matter control efficiency of ESPs in foundry applications, where the physical and chemical conditions in the emission stream allow their use, is expected to exceed 99 percent. There is no theoretical lower limit to the size of particles that can be collected.

At the present time, the staff is unaware of any foundry or smelter in California using an IWS system. The performance data on IWS systems are not currently available for these applications. IWS systems can be made more efficient by the installation of additional stages. Based on their application on incinerators, and the particle size distribution of smelter and foundry emissions, the staff expects that particulate matter emission reductions in a three stage IWS system could exceed 99 percent.

For reasons other than air pollution control, some metals are melted under cover of an inert gas. We believe the use of an inert gas cover will act to prevent emission of metals to the air. No information is available to indicate the effectiveness of this technology in reducing emissions. However, a furnace on which this

technology was being used would not be considered an emission point for the purposes of this proposed control measure because molten metal would not be in contact with air.

Emissions from processes that are not equipped with a collection system, and emissions of particulate matter that escape capture in an inadequate emission collection system, will behave like fugitive emissions. These emissions can be reduced by effective collection of melting and pouring emissions.

Fugitive emission control activities should be designed for the specific fugitive emission sources at the facility. Material storage areas and conveyors can be covered to reduce the amount of metal-bearing dust that is generated. To prevent re-entrainment of settled dust, areas can be vacuumed, washed, or wet-mopped on a regular basis.

B. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

California Health and Safety Code section 39666 requires that control measures adopted for TACs with no identified threshold, such as cadmium, arsenic, or nickel, be designed to reduce emissions to the lowest achievable level by applying BACT, in consideration of risk and cost.

Because there are several suitable control technologies to control stack emissions, we are proposing a specific control level, or measured pollutant removal efficiency, across a control device (BACT level). Defining BACT levels, rather than a technology, allows a facility owner/operator to select the control technology that is most appropriate for that facility. These BACT levels are based on the following criteria: control device applicability, commercial availability of the equipment, and demonstrated control efficiency.

We concluded that the lowest emission rate achievable is 99 percent reduction of particulate matter, based on the nature of emissions from metal melting operations and on demonstrated performance of baghouses and projected performance of ESPs on metal melting emissions. We believe a limitation of stack gas temperature into the control device of 360°F (182°C) is necessary to ensure that the pollutants are in the solid phase so that a particulate matter control device will effectively collect them.

For the fugitive emission sources present at metal melting facilities, there are many kinds of control strategies available. We are proposing to allow the facility owner/operator and air districts the maximum flexibility regarding the methods of control by defining BACT in terms of the result, i.e. no visible emissions from storage and handling of materials. We have defined "no visible emissions" as no emissions that equal or exceed 10 percent opacity for more than

three minutes in an hour. Similarly, to reduce the potential for re-entrainment of settled particulate matter by traffic within the facility, the proposed control measure requires that the facility develop and carry out a dust control plan, subject to the district's approval.

We anticipate that the facility operator would survey the facility to identify emission points or operations that could exceed the standard for fugitive emissions. The appropriate options for reducing the emissions would depend on the nature of the source. For instance, transferring feed to the furnace with a covered conveyor could result in lower fugitive emissions than using a skip loader. Enclosure of storage piles or use of other dust suppression techniques could also reduce fugitive emissions.

The required 99 percent reduction in particulate matter across the control device will result in differing overall emission reductions for individual facilities depending on their current level of control. Taking into account the effectiveness of the collection equipment and the control equipment, and the effectiveness of fugitive control measures, an overall effectiveness of about 95 percent can be achieved relative to an uncontrolled facility.

III.

THE PROPOSED CONTROL MEASURE

This chapter includes a description of the proposed control measure and control alternatives, a discussion of lead emissions, and a summary of other regulations pertinent to metal emissions from these facilities. (Attachment A is a copy of the proposed control measure.)

A. DESCRIPTION OF THE PROPOSED CONTROL MEASURE

We are proposing to regulate arsenic, cadmium, and nickel emitted to the atmosphere from non-ferrous metal melting processes. Because lead is emitted from the same processes and controlled by the same technology, this proposed control measure will also reduce lead emissions from the regulated facilities.

1. What would the control measure do?

For melting and pouring operations at facilities which melt non-ferrous metals in a furnace or other container, the proposed control measure requires that emissions be captured and vented to a particulate matter control device. To control fugitive emissions, facilities are required to employ methods for storage, handling, and transfer of materials that prevent visible emissions to the air. By visible emissions we mean those that cause or contribute to a discharge darker than 10 percent opacity or one-half of number 1 on the Ringlemann chart. To minimize the re-entrainment of settled dust, facilities must develop a plan to periodically clean surfaces subject to foot or vehicular traffic. This fugitive emissions reduction plan must specify as a minimum the areas to be cleaned, the method to be

used and the required frequency of cleaning activities. In addition, it must specify a method of tracking compliance with the plan.

2. What kind of emission collection system is required?

The emission collection system must be designed and operated using the airflow and volume criteria published by the American Conference of Governmental and Industrial Hygienists in Industrial Ventilation, 20th edition (ACGIH, 1988). This organization has tested various hood sizes and configurations to develop recommended minimum airflows which will achieve maximum collection efficiencies. The systems designed in accordance with these guidelines will achieve high collection efficiencies. For the purpose of estimating the benefits of the proposed control measure, we assume hoods for furnaces can achieve 98 percent collection and hoods for pouring can achieve 90 percent collection.

3. What specifications must the control device meet?

The control device must be capable of demonstrating 99 percent removal efficiency for particulate matter. Because several types of control technology are effective for fine particulate matter, we are proposing an emission reduction (control) efficiency that must be achieved, without dictating the type of control equipment that must be used.

Ninety-nine percent control of particulate matter equates to 98 percent control of the arsenic, cadmium, nickel, and lead because they are more concentrated in the small particulate matter which is more difficult to control. Taking into account the collection efficiencies we expect 96 percent control of furnace emissions, 88 percent control of pouring emissions and 50 percent control of fugitive emissions. This would provide 95 percent reduction at an uncontrolled facility. Overall reductions depend on the current level of control in place at the facilities.

4. Does this control measure affect existing furnaces?

Yes. Both existing and new furnaces must be operated in compliance with the proposed requirements unless they meet one of the criteria for exemption.

5. What is the basis for the percent control efficiency requirements?

The requirements are technology-based. For TACs with no identified threshold, such as cadmium, arsenic, and nickel, state law requires that emissions be reduced to the lowest level achievable by applying BACT. The Board may determine on the basis of cost and risk that an alternate level of reduction is adequate or necessary to protect public health. The proposed control requirements are set at

the lowest achievable emission level, or BACT level, for toxic metals. The recommended exemptions represent an alternate level of control for sources where the estimated cost-effectiveness is unfavorable.

6. Is source testing required?

Yes. Facilities that melt less than two tons of non-ferrous metals are exempt from the control requirements. When the equipment is installed and at district discretion thereafter, a source test must be performed to demonstrate that the equipment meets the control efficiency requirements of the proposed control measure. This must be demonstrated by measuring the mass or concentration of particulate matter before and after the control device, using ARB Method 5. Method 5 is a method the ARB has adopted to measure particulate matter emissions from stationary sources.

7. Are there any exemptions?

Yes. Equipment used to melt metals, other than those listed in Table VIII, containing no more than 0.002 percent arsenic and 0.004 percent cadmium is exempt from the requirement to install emission collection and control equipment. In addition, we have provided exemptions for certain quantities of specific metals. Table VIII gives the metals and exempted process rates. For certain aluminum melting furnaces the combustion chamber is exempt but not the feed chamber. Aluminum pouring processes are also exempt.

Table VIII

PROPOSED EXEMPTIONS FOR SPECIFIC METALS

Metal	Exemption Limit (tons per year)
Pure Lead	400
Hard Lead	200
Aluminum Scrap *	125
Aluminum Alloys *	125
Solder	100
Zinc Scrap	30
Copper or copper-based alloys (except scrap) **	30
Type Metal (lead for linotype machines)	25

* Aluminum and aluminum alloys, as defined in substion (a)(1) of the proposed control measure (Attachment A), which contain more than 0.002 percent arsenic or 0.004 percent cadmium.

** Copper or copper-based alloys, as defined in subsection (a)(3) of the proposed control measure (Attachment A), which contain more than 0.002 percent arsenic or 0.004 percent cadmium by weight.

We based these exemptions on a consideration of emissions and resulting predicted impacts, and of cost-effectiveness. In general, the exemptions are intended to exempt from control facilities predicted to cause risks on the order of 10^{-6}. We are proposing these exemptions in response to public comments and in an effort to obtain the best cost-effectiveness consistent with our obligation to protect public health.

8. When would this control measure go into effect?

The compliance deadlines in the proposed control measure fix the date by which the facility must demonstrate compliance at 24 months after a district adopts a regulation implementing the statewide control measure. The districts have 120 days to propose and six months after the effective date of the statewide control measure to adopt a regulation no less stringent than the measure adopted by the ARB. If a district waits the full six months before adopting such a regulation and retains the 24 month compliance schedule we suggest, the date for compliance with the control requirements will be at least 30 months from the effective date of the control measure. A district may, however, choose to adopt a regulation sooner or establish an earlier compliance date. The facilities eligible for exemption must apply within six months after the district adopts the regulation implementing the statewide control measure.

B. CONTROL ALTERNATIVES

In developing the proposed control measure, we considered and rejected eight control alternatives because they did not meet the requirements for an ATCM or they were not technically or economically feasible. The eight alternatives include the following:

1. no additional control,
2. an emission standard based on mass/time or particulate matter (PM) concentration (that is more stringent than existing particulate matter standards),
3. a prescriptive standard,
4. a requirement to control furnace emissions only,
5. a performance standard based on the reduction of specified metals,
6. a requirement to use substitute compounds,
7. closed-system operations, and
8. exemption of small business from control requirements.

Each of the alternatives to the proposed control measure is discussed below.

1. No additional control

In general, existing particulate matter regulations of districts limit particulate matter emissions to 0.10 to 0.15 grains per dry standard cubic foot (gr/dscf), a concentration. The current particulate matter standards do not represent the lowest achievable emission rate for the following reasons. First, the control equipment is typically capable of achieving greater reductions. Second, a standard based on concentration can be met by dilution of the pollutant stream (increasing the ventilation rate without reducing the mass emitted), and third, fugitive emissions are not controlled by the current particulate matter standards.

2. Performance standard based on mass/time or concentration

We considered developing a performance standard for control equipment based on an emission rate (pounds per hour (lb/hr) or gr/dscf). The compliance costs for this approach would be lower than for a control efficiency-based performance standard because only an outlet source test would have to be performed. However, we found that emission rates for the different uncontrolled metal melting processes varied widely. For example, the emission rate for cadmium per ton of feed varied by three orders of magnitude. Emission rates for various metal melting facilities are found in Tables V-1 and E-1 of the Technical Support Document.

Several factors appear to affect the amount of particulate matter emitted, including the type of furnace used and the type of alloy or metal melted. Setting a performance standard based on a high emission rate would not result in the lowest achievable rate for smaller, inherently lower-emitting processes. Conversely, a performance standard based on a low emission rate would not necessarily be achievable by larger facilities. Because of the variability of the emissions within the industry, an emission rate-based performance standard (or standards) that satisfies the state law's requirement to achieve the lowest achievable emission rate could not be established.

3. Prescriptive standard

A prescriptive standard outlines minimum control equipment design and operating requirements for a required, or "prescribed", type of control equipment. This approach could reduce compliance costs by reducing source testing and control design costs. To ensure that the prescribed control device is providing the lowest achievable emission rate, there must be sufficient information available to relate device performance to both device design specifications and operating parameters. This is critical in the case of a prescriptive standard, because there will be no performance test of the system in operation.

Fabric filters (baghouses) are the most commonly used devices for particulate matter control in the metal melting industry. There are data that demonstrate that a properly designed and operated baghouse can meet and exceed 99 percent control efficiency. However, there is less data available on the relationship between control efficiency and design and operating parameters. We are not recommending a prescriptive approach because there are insufficient data to support this option. In addition, a prescriptive approach would reduce the flexibility of the regulation by precluding the use of an ESP or other control device.

4. Control of emissions from furnace operations only

In this approach, a control efficiency requirement for furnaces would be required to reduce particulate matter emissions from metal melting operations. However, in such an approach, emissions from sources other than furnaces (such as pouring and fugitive dust) would not be controlled. These sources contribute significantly to particulate matter emissions, exposure, and risk. Fugitive emissions at a typical facility where furnaces are controlled comprise 50 percent of the emissions and are estimated to result in over 90 percent of the MIR. A control measure which reduces emissions only from furnace operations would not meet the statutory directive to reduce emissions to the lowest achievable emission rate because it would not address other sources of emissions of metals at metal melting operations.

5. Emission limits for specific metals

An alternative to a performance standard for particulate matter emissions is to require a removal efficiency, by percent for each metal of interest. Multi-metal source test methods are being developed but are still in the validation stage. The source tests necessary to analyze each metal in the emissions stream would cost more than particulate matter emission testing. We are not recommending this approach because a particulate matter removal efficiency-based control measure is more cost-effective.

6. Use of substitute compounds

This approach would require that facilities use alloys with very low concentrations of arsenic and cadmium. There are two reasons for the presence of cadmium, arsenic, and nickel in other metals. They are either added to impart desirable properties to the alloy or they are present as contaminants in the ore or scrap from which the alloy was made. If cadmium, arsenic, or nickel is intentionally added, the use of substitute compounds will not result in the same alloy. In

some cases the producer may be able to identify an alternative alloy that is acceptable.

If cadmium, arsenic, and nickel are present as contaminants, in some instances metal refining processes can be used to remove them. This approach is available in some cases but not in all. In general, higher purity metals or alloys are more expensive. We have allowed an exemption for facilities that melt metals with concentrations of no more than 0.002 percent arsenic and 0.004 percent cadmium. However, we have not required it because it is not available to everyone.

7. Use of closed system facilities

Some metal melting facilities have been designed to enclose the operation completely. The air flow from the facility and process ventilation is passed through a control device. However, this approach is not practical for most facilities because the costs for rebuilding existing facilities and operating control systems to meet such a requirement would be high. Although this alternative would reduce all particulate matter emissions from a facility, it is only available to facilities in the design phase of development. The use of appropriate emission collection systems, control devices, and housekeeping practices on a statewide basis achieves ARB's goal of obtaining the lowest achievable emissions, and also reduces worker exposure.

8. Small business exemption

The exemption of small business from emission control requirements would minimize costs to those facilities. However, within the metal melting industry, a small business is not necessarily a small emitter. The "size" of the facility as defined by the "small business" definition (independently owned and operated and employing fewer than 250) does not necessarily relate to the amount of emissions or potential risk. Many factors (discussed previously in Chapter I) such as the type of feed and furnace used, determine the amount of pollutant emissions from a facility. Consequently, this option would not meet the requirement to reduce emissions to the lowest achievable emission rate.

However, the proposed control measure does include exemptions based on the consideration of cost-effectiveness and risk. Approximately 60 percent of the small businesses that returned our survey will qualify for these exemptions. In addition, the options available to small businesses to reduce the financial impact of compliance include two loan programs. One is operated by the South Coast Air Quality Management District and the other is a cooperative effort between the State Department of Commerce and the California Pollution Control Financing Authority.

Conclusion

We believe there is no alternative to the proposed control measure which achieves the lowest emissions and is less burdensome to small business. The proposed control measure meets the Health and Safety Code's mandated objective of reducing emissions to the lowest level achievable through the application of BACT while considering the cost-effectiveness.

C. OTHER REGULATORY ACTIONS

This section summarizes how emissions from metal melting operations are regulated by the federal government, state agencies other than ARB, and local air districts.

1. Federal

The Federal standards that apply to new metal-melting facilities in California are the New Source Performance Standards (NSPS) for particulate matter. Some facilities to which NSPS particulate matter standards apply are secondary lead smelters and secondary brass and bronze smelters. These standards are outlined at 40 Code of Federal Regulations (CFR) Chapter 1, part 60, subparts L and M, respectively. A standard for lead emissions from lead/acid battery manufacturing plants is outlined in 40 CFR Chapter 1, part 60, subpart KK. These standards pertain to grain loading and opacity for new major sources only. Fugitive emissions are not required to be controlled under these regulations. Table IX shows the relationship between facilities covered by NSPS and those covered by this measure.

If our measure is adopted as proposed, it will control emissions from both new and existing sources that are smaller in size than those covered by the federal regulation. Fugitive emissions from sources will also be controlled.

2. Other State Agencies

Facilities must comply with worker safety regulations, water pollutant limitations, and hazardous waste treatment and disposal standards. In Chapter IV of the Technical Support Document, we review regulations administered by the California Occupational Safety and Health Administration (Cal-OSHA), Cal/EPA's Department of Toxic Substances Control (DTSC), the Water Quality Control Board, and the Integrated Waste Management Board. Based on discussion with these other agencies and their review of our proposal, we conclude that there is no conflict between our proposed control measure and any other current or proposed state regulation.

Table IX

APPLICABILITY OF NSPS TO FACILITIES COVERED BY THE PROPOSED CONTROL MEASURE

Source Type	NSPS Applies	Notes
Secondary lead smelters	Y	For pot furnaces over 250 Kg capacity and reverberatory and blast furnaces at sources constructed or modified after June 11, 1973.
Secondary brass smelters	Y	For sources constructed or modified after June 11, 1973 with reverberatory or electric furnaces with capacities over 1000 Kg, or blast or cupola furnaces with capacities over 250 Kg per hour.
Secondary bronze smelters	Y	For sources constructed or modified after June 11, 1973 with reverberatory or electric furnaces with capacities over 1000 Kg, or blast or cupola furnaces with capacities over 250 Kg per hour.
Secondary zinc smelters	N	
Secondary aluminum smelters	N	
Lead acid battery manuf.	Y	For sources constructed or modified after Jan. 14, 1980 with production capacity over 6.5 tons per (24-hour) day.
Brass foundries	N	
Bronze foundries	N	
Lead foundries	N	unless part of a battery manufacturer.
Lead oxide producers	N	unless part of a battery manufacturer.
Galvanizers	N	

3. Districts

The Bay Area Air Quality Management District has a regulation specific to lead from stationary sources. This regulation requires attainment of the national and state ambient air quality standards for lead but it does not specifically address sources of toxic metals other than lead.

In September, 1992 the South Coast Air Quality Management District adopted Rule 1420 - Emission Standard for Lead. The basic provisions of the rule prohibit sources from emitting lead or lead compounds that will cause an exceedance of the state ambient air quality standard for lead. The regulation requires emission collection and control equipment and fugitive emission control at facilities that process more than two tons of lead per year and emit more than 0.5 pounds of lead per day. For certain facilities, it also requires monitoring or modeling of air concentrations of lead at the fenceline of the facility.

Each local air pollution control or air quality management district has a particulate matter standard or standards and has visible emission regulations. In general, particulate matter standards are based on grain loading or emission rates for high particulate matter emitting processes which consider the levels of control attainable using conventional control equipment. Such standards were not intended to be and therefore do not generally result in the lowest achievable emission levels. Examples of general particulate matter emission limits are given in Table IV-4 of the Technical Support Document.

IV.

BENEFITS, COSTS, AND IMPACTS OF THE PROPOSED CONTROL MEASURE

This chapter discusses the potential impacts of the proposed control measure, including the expected reduction in emissions and potential risk, the estimated costs, the fiscal impact for small businesses, and the potential environmental effects.

A. EMISSION AND POTENTIAL RISK REDUCTIONS

If implemented, the proposed control measure would reduce statewide cadmium emissions from the covered facilities by about 1,400 pounds per year, a reduction of about 70 percent. Arsenic emissions would be reduced by about 50 pounds per year for a reduction of 11 percent. Nickel emissions would be reduced by about 500 pounds for a 25 percent reduction, and lead emissions from these sources would be reduced by about 140,000 pounds per year, a 45 percent reduction. The overall potential cancer burden from exposure to emissions from these facilities will be reduced by about 55 percent, from the current level of 111 cases to about 50 cases over 70 years.

The predicted reductions in cadmium, arsenic, nickel, and lead are less than the required 99 percent control efficiency for particulate matter. This occurs because some furnaces have controls, and each type of source emits a different mixture of metals. Even at an uncontrolled facility, we do not predict an overall reduction of 99 percent. This level of reduction will not be achieved because the reductions we predict reflect the projected effectiveness of control equipment for small particles (which will be less than the 99 percent for particulate matter), and the collection efficiency of the collection system will differ between furnaces and pouring operations.

In addition, we predict that the fugitive emission control will have a different level of effectiveness than the capture and control of melting and pouring operations. Overall, we estimate that the requirements of the measure will result in a 95 percent reduction of emissions relative to an uncontrolled facility. For details of our assumptions about capture and control efficiency, see section D of Chapter IV of the Technical Support Document.

The reduction in the maximum individual cancer risk near a facility subject to the proposed control measure would depend on its current level of control. There are facilities with potential risks over 100 per million that would not be required to reduce emissions under this control measure because they are already controlled to what we conclude are BACT-levels. However, estimated risk near the facility with the highest current risk would be reduced from over 800 per million to less than 300 per million. The maximum individual risk from emissions of toxic metals at about 90 percent of the facilities would be less than 10 in a million after the proposed control measure is implemented. Table X gives a distribution of MIR before and after control.

Table X

DISTRIBUTION OF MAXIMUM INDIVIDUAL RISK

Risk	Number of Facilities	
(cases/million)	Pre-ATCM	Post-ATCM
Less than 10	178	220
10 to 49	32	22
50 to 99	18	8
Greater than 100	32	10

Notes: 1. Risk for some facilities could not be estimated.
2. Assumes survey respondents are representative of all.

B. ESTIMATED COST OF THE CONTROL MEASURE

This section summarizes the cost of the control measure to affected facilities, districts, and state agencies. The basis for each of the cost estimates is discussed in detail in Chapter 4 of the Technical Support Document.

1. Estimated cost to facilities

We estimated the cost of compliance for metal melting facilities which would be subject to the proposed control measure. The facilities fell into three general categories depending on their current level of control. For facilities with all the process control

equipment in place, the cost will be that associated with the fugitive control requirements and the source test to document control efficiency. For partially controlled facilities, there will also be some capital cost for equipment as well as additional operation and maintenance costs for the new equipment. Uncontrolled facilities will incur one-time costs such as capital equipment costs, installation, retrofit, and contingency costs, source testing fees, and initial district permit fees. In addition, they will incur recurring costs for operation/maintenance, including costs of disposing of the collected particulate matter, and annual permit renewal fees. The details of these estimates are given in Chapter IV of the Technical Support Document.

To estimate the total annualized cost of compliance, we amortized the one-time cost over 10 years at 10 percent interest and added the annual recurring cost of operation, maintenance, housekeeping, district permit fees, etc.

The total statewide initial cost of compliance (including capital, source testing and permit fees) for all facilities is about $3.6 million. For individual sources, initial costs are expected to range from $4,000 to $190,000 with a median of $13,500. The annualized statewide cost of compliance for all facilities is about $1.7 million per year. Table XI shows the median costs we estimated for a typical facility in each control category.

Table XI

ESTIMATED COST OF COMPLIANCE WITH THE PROPOSED CONTROL MEASURE FOR THE MEDIAN FACILITY IN EACH CONTROL CATEGORY BASED ON FACILITIES THAT RETURNED SURVEYS

Control Category	Initial Cost per Facility	Annualized Cost per Facility
Housekeeping	$ 4,000	$14,000
Additional Control	$ 26,000	$ 7,000
Complete	$112,000	$37,000

In the housekeeping category, the facility has all engineering controls in place. Therefore, the initial cost will be only the cost of source testing. However, housekeeping costs are related to the number of hours the facility operates, and a majority of the facilities in this category run many hours per year. These facilities are expected to incur relatively high housekeeping costs. In the categories required to install additional control equipment, i.e., the

additional and complete categories, facilities tend to operate for fewer hours per year and thus incur lower housekeeping costs. Housekeeping costs, the costs of operating the additional equipment, and the amortized cost of equipment and installation are included in the estimate of annualized cost.

The cost of compliance within a control category will vary depending on the number of furnaces, amount of metal melted, and physical layout of the facility. Estimates of the annualized costs for the facilities which returned surveys range from $500 to $50,000 per year. The median is $10,000 per year.

To evaluate the relative impact and effectiveness of the proposed control measure, we calculated the cost per cancer case avoided. The average cost per cancer case avoided is $2 million with a range of $6,000 to $17 million. For other airborne toxic control measures adopted by the Board, the cost effectivness has ranged from $0.1 to $70 million/case.

These costs of compliance can be expressed in terms of increased product cost. We have estimated the increase in product cost if the entire cost of compliance is "passed through" to the purchaser of the product of an affected facility. Our estimates are that the range of cost increase would be 0.1 to 7 percent. We have predicted that on the average, there would be an increase of one percent.

2. Estimated cost to small businesses

Because they are considered manufacturing concerns, metal melting facilities are legally defined as small businesses if they are independently owned and operated and have fewer than 250 employees (Government Code section 11342(e)). About 190 of the non-ferrous metal melting facilities in the state fit this definition. Of those, about 75 are expected to be affected by the proposed control measure and the rest are expected to be exempt. A facility classified as a small business does not necessarily have low emissions of arsenic, cadmium, nickel, or lead. Table XII shows the estimated emissions from the ten highest-emitting small businesses which responded to our survey.

Table XII

TOXIC METAL EMISSIONS FROM
THE TEN HIGHEST EMITTING FACILITIES
THAT ARE DEFINED AS SMALL BUSINESSES

Facility Type	Toxic Metal Emissions*, lb/yr
Lead Oxide Production	76,500
Brass Smelting	2,900
Battery Manufacture	1,300
Lead and Zinc Casting	380
Brass Casting	330
Zinc Smelting	280
Brass Smelting	270
Aluminum Smelting	170
Brass Casting	160
Brass Casting	140

* Sum of emissions of cadmium, arsenic, nickel, and lead

If the proposed control measure is adopted, facilities that are legally considered to be small businesses will be subject to the proposed control measure. To evaluate whether the proposed control measure, if adopted, will have a significant effect on small business, we compared the change the cost of compliance would have on the profitability of businesses that would be subject to the requirements. Details of this analysis are explained in Section E of Chapter IV of the Technical Support Document.

The proposed control measure may have a significant impact on some small businesses if they are not able to pass the costs on in the form of higher prices. For our evaluation, a significant impact was defined as an annualized compliance cost that would result in a decline of greater than 10 percent in annual profit. It appears that bronze foundries and aircraft parts manufacturers would be the most affected. In designing the proposed control measure, we incorporated several exemptions that are expected to reduce the impact of the proposed control measure on the small businesses. Assuming the facilities that responded to the survey are representative of those that didn't, about 45 facilities may see a decline in profitability of 10 percent or more.

Some small businesses melt large quantities of metal(s). The small business status or profitability of a facility does not correlate to the amount of metal melted or its purity, the resulting emissions and potential cancer risk, or technical feasibility of control. We have considered alternatives to the proposed control

measure that would lessen the financial impact on small businesses (as summarized in Chapter III, Section B of this report and in the Technical Support Document).

We have proposed exemptions that will provide some relief to small businesses. The exemptions will affect about 115 small businesses. They are designed to improve the cost-effectiveness of the proposed control measure to the extent that is consistent with the goal of protecting public health.

The affected small businesses may be able to mitigate the economic impact through small business loan programs. The South Coast AQMD is currently operating a loan guarantee program for small businesses. Small business loans are also available through a program administered by the California Office of Small Business and the California Pollution Control Financing Authority (CPCFA). This is a statewide program to make direct loans to small businesses that can not obtain conventional financing for pollution control equipment.

We believe that there is no alternative which is less burdensome to small business and which provides the lowest achievable emission rate through the application of BACT or an alternative level of emission reduction adequate to protect public health.

Overall, California small businesses seem to be able to absorb the costs of the proposed ATCM without significant adverse impact on their profitability. Although some small businesses would potentially experience a greater reduction in their profitability than others, the impact of the proposed ATCM appears to be generally absorbable. In addition, the actual cost impact of the proposed ATCM on the profitability of California small businesses is most likely to be less than we have estimated in this analysis because of the proposed exemptions and financing opportunities available. Nevertheless, this proposed ATCM may have a significant adverse impact on some small businesses. General economic conditions are adverse. Especially for small businesses operating with little or no margin of profitability, the proposed ATCM may result in significant adverse impacts.

3. Estimated cost to districts

For districts to implement the regulation enacting this proposed control measure, they will initially have to review permit applications from facilities for compliance with the requirements, inspect the facilities, and evaluate compliance source tests. After the initial permit is issued, districts will have to periodically renew the permit.

To estimate the maximum cost to each district in which non-ferrous metal melting facilities are located, we used the following approaches:

1) For districts that assess permit fees on the basis of staff time spent in reviewing the permit application and associated work, we contacted several districts for staff estimates of time needed for the tasks and the hourly charge rate. District costs were determined by multiplying the task hours by the hourly rate by the number of facilities in the district;

2) For districts that charge a flat fee to issue a permit for a specific type of control equipment, we contacted districts to learn what the permit fees were for a typical facility. District costs were determined by multiplying the permit fee by the number of facilities in the district.

We estimate that the 13 districts with known non-ferrous metal melting facilities will spend about $136,000 to implement the regulation. We estimate that the yearly permit renewal and enforcement will cost a total of $45,000 for the 13 districts. We expect that these costs will be recovered through permit fees, and we have included these fees in our estimates of costs to facilities.

4. Estimated cost to state agencies

Based on our survey of state facilities (such as schools) that may carry out non-ferrous metal melting, and follow up contact with state agencies, we estimate that there will be no costs to state agencies. We are not aware of any non-ferrous metal melting operations at state facilities that exceed the exemption levels; those not reported are likely to be below the proposed exemption levels.

C. ENVIRONMENTAL IMPACTS

In addition to the decrease in exposure to the TACs and lead, the proposed control measure may produce some indirect health and environmental benefits. The requirement for effective emission collection equipment and fugitive control should result in reduced worker exposure to arsenic, cadmium, nickel and lead. The fugitive control requirements will reduce the amount of polluted storm-water runoff from facilities. The control requirements will also reduce the contribution of airborne cadmium, arsenic, nickel, and lead from metal melting operations to soil and water pollution.

There are three potential environmental impacts that may occur if the proposed measure is implemented. These include the following:

- increased generation of metal-laden particulate matter requiring proper disposal. This increase is due to increased control efficiencies and additional processes that will be controlled;

- an increase in criteria pollutant emissions due to generation of increased electricity used to operate pollution control equipment; and

- a possible increase in metal-laden waste water that must be properly treated and disposed of if dust suppression methods that generate waste water are used for fugitive emissions control.

In many cases, the captured particulate matter can be recycled back to the furnace (as is done in lead melting) or can be sold to a recycler (under certain conditions). In other cases, it must be disposed of in accordance with waste disposal regulations. In some cases, the captured particulate matter can be disposed of in a non-hazardous waste landfill; in others, it must be disposed of in a "Class 1", or hazardous waste landfill. In estimating the cost of compliance, we have accounted for disposal costs as appropriate. We conclude that proper disposal of captured particulate matter in a complying hazardous waste disposal site constitutes mitigation for this potentially significant adverse environmental impact.

Little metal-containing wastewater is likely to be generated as a result of this proposed control measure. There are methods to control fugitive dust that do not generate wastewater (such as vacuuming), and we expect facilities to use these methods except in those cases where the facility already operates a wastewater pre-treatment plant and can properly treat the water before discharging it. Therefore, we conclude that there is no potential for significant adverse environmental impact from wastewater generation due to the measure.

Pollutants may be produced by the process of generating the energy used to power the pollution control equipment. However, the amount of energy used for this purpose is expected to be minimal in comparison to the total used in the state. There is no feasible way to mitigate this impact. If new power plants were needed to meet this demand, they would be subject to new source review rules which typically require the installation of BACT and the use of offsets.

V.

STATUTORY REQUIREMENTS

California law requires the ARB and the districts to propose and adopt airborne toxic control measures (ATCMs). Air pollution control districts are entitled to collect fees to recover district costs from businesses that would be controlled by any rule based on an adopted control measure. This chapter describes these requirements.

A. STATUTORY BASIS FOR REGULATION AT THE STATE LEVEL

1. Requirements for identification

Health and Safety Code sections 39660 through 39664 require the ARB to identify TACs. The ARB identified the following TACs on the following dates: cadmium in January 1987, arsenic in July 1990, and nickel in August 1991. They are listed by regulation as TACs in Title 17, California Code of Regulations (CCR) section 93000. The Board identified these three metals as toxic air contaminants for which insufficient evidence exists to specify a threshold exposure level below which no carcinogenic effects are anticipated (17 CCR section 93000).

2. Requirements for emission control

In this report, we propose an ATCM for emissions of cadmium, arsenic, and nickel from non-ferrous metal melting facilities pursuant to Health and Safety Code section 39665, et seq. Health and Safety Code section 39665 requires that the Executive Officer of the ARB develop control measures for substances identified as TACs, with the participation of the districts and affected industry sources. This

Staff Report and the accompanying Technical Support Document discuss in detail the issues associated with this proposed control measure.

The control measures discussed here must be designed in consideration of the issues listed at Health and Safety Code section 39665. Those issues follow:

(1) The rate and extent of present and anticipated future emissions and estimated levels of human exposure.

(2) The stability, persistence, transformation products, dispersion potential, and other physical and chemical characteristics of the substance when present in the ambient air.

(3) The categories, numbers, and relative contribution of present or anticipated sources of the substance, including mobile, industrial, agricultural, and natural sources.

(4) The availability and technological feasibility of airborne toxic control measures to reduce or eliminate emissions and the anticipated effect of airborne toxic control measures on levels of exposure.

(5) The approximate cost of each airborne toxic control measure and the magnitude of risks posed by the substances as reflected by the amount of emissions from the source or category of sources.

(6) The availability, suitability, and relative efficacy of substitute compounds of a less hazardous nature.

(7) The potential adverse health, safety, or environmental impacts that may occur as a result of implementation of an airborne toxic control measure.

These issues are addressed throughout the Staff Report and Technical Support Document.

Because the Board has not identified a threshold exposure level for these three contaminants, this control measure must be designed to reduce emissions to the lowest level achievable through the application of BACT (or a more effective control method) unless, based on a risk assessment, it is determined that an alternative level of emissions reduction is adequate or necessary to prevent endangering public health (Health and Safety Code section 39666(c)).

As discussed in other sections of this report, this proposed control measure in our view reduces emissions of cadmium, arsenic, and

nickel to the lowest level achievable based on BACT. It is considered the best available control alternative.

3. Requirement for district adoption

When the Board adopts an ATCM for a non-vehicular source of emissions, Health and Safety Code section 39666(d) requires the districts to propose the measure or an equally effective or more stringent measure within 120 days. The districts must adopt the measure by regulation within six months of the effective date of the ATCM.

The Board's ATCMs establish a minimum level of TAC control in this state (California Health and Safety Code sections 39650(k) and 39666(d), and Western Oil and Gas Association v. Monterey Bay Unified APCD (1989) 49 Cal.3d 408). Under Health and Safety Code section 39666(d), the districts may adopt more stringent requirements if they deem them necessary.

B. DISTRICT AUTHORITY TO COLLECT FEES

The proposed control measure will increase the workload of the districts. Health and Safety Code section 42311(f) authorizes district boards to adopt a schedule of annual fees to defray the costs districts have which are related to the ATCMs developed pursuant to Health and Safety Code section 39666.

This proposed ATCM will require districts to issue permits to operate air pollution control equipment or authorize exemptions for each owner or operator of a metal melting facility. The proposed control measure also requires that sources must employ source testing to demonstrate compliance with the control efficiency requirements.

C. PENALTIES

Health and Safety Code section 39674 provides that any person who violates any rule or control measure, emission limitation, or permit condition adopted as part of an ATCM is liable for a civil penalty not to exceed $10,000 for each day in which the violation occurs. Criminal penalties also apply. (See: Health and Safety Code sections 39675, and 42400, et seq.)

ATTACHMENT A

PROPOSED

AIRBORNE TOXIC CONTROL MEASURE FOR
EMISSIONS OF TOXIC METALS FROM NON-FERROUS METAL MELTING

Adopt new section 93107, Title 17, California Code of Regulations to read as follows:

93107 Airborne Toxic Control Measure for Emissions of Toxic Metals from Metal Melting

(a) Definitions. For the purposes of this section, the following definitions shall apply:

(1) "Aluminum and aluminum-based alloys" means any metal that is at least 80% aluminum by weight.

(2) "ARB Test Method 5" means the test method specified in Title 17, California Code of Regulations, section 94105.

(3) "Copper or copper-based alloy" means any metal that is more than 50 percent copper by weight, including but not limited to brass and bronze.

(4) "District" means the air quality management district or air pollution control district with jurisdiction over the facility.

(5) "Dust forming material" means any material containing more than 15 percent by weight of particulate matter less than 0.84 millimeter (mm) equivalent diameter as determined by ASTM C136-84a "Standard Method for Sieve Analysis of Fine and Coarse Aggregates" using a number 20 U. S. Bureau of Standards sieve with 0.84-mm square openings or an alternate method deemed acceptable by the district Air Pollution Control Officer or Executive Officer.

(6) "Emission collection system" means equipment which is installed for the purpose of directing, taking in, confining, and conveying an air contaminant and which conforms to specifications for design and operation given in Industrial Ventilation, Manual of Recommended Practices, 20th edition, 1988, published by the American Conference of Government and Industrial Hygienists, which is incorporated by reference herein.

(7) "Emission point" means any location where molten metal is or can be exposed to air, including but not limited to, furnaces, crucibles, refining kettles, ladles, tap holes, pouring spouts, and slag channels. A mold or die in which metal is cooling is not considered an emission point.

(8) "Enclosed storage area" means any space used to contain materials that has a wall or partition on at least three sides or three-quarters of its circumference and that screens the material stored therein to prevent emissions of the material to the air.

(9) "Facility" means any real or personal property being used for metal melting activities, which is located on one or more contiguous or adjacent parcels of property in actual contact or separated only by a public roadway or other public right-of-way, and owned or operated by the same person or persons, corporation, government agency, public district, public officer, association, joint venture, partnership, or any combination of such entities.

(10) "Fugitive emission control" means any equipment, activity, or process carried out to reduce emissions resulting either from the storage or handling of dust forming materials or material collected by a particulate matter control system or the removal of particulate matter from metal melting or pouring that has settled on the ground or other surfaces, or that has escaped from a properly designed and operated emission collection system.

(11) "Good Operating Practices" means specific activities necessary to maintain the original collection and control efficiencies of the air pollution control equipment as designed. These activities include but are not limited to verifying operating specifications such as cleaning cycles, air flow, and velocity; and inspecting equipment such as duct work, blowers, and components of the control equipment through a general maintenance and inspection program.

(12) "Hard Lead" means any alloy containing at least 90 percent lead and more than 0.001 percent arsenic by weight or 0.001 percent cadmium by weight.

(13) "Molten metal" means metal or metal alloy in a liquid state, in which a cohesive mass of metal will flow under atmospheric pressure and take the shape of a container in which it is placed.

(14) "Metal melting furnace" means any apparatus in which metal in a container is brought to a liquid state, including but not limited to reverberatory, cupola, induction, direct arc furnaces, sweat furnaces, and refining kettles. "Metal melting furnace" does not include any apparatus in which the metal is heated but does not reach a molten state such as a sintering furnace or an annealing furnace.

(15) "New sand" means any sand not exposed to the casting process.

(16) "Non-ferrous metal" means lead, copper, zinc, cadmium, arsenic, aluminum, and their alloys.

(17) "Particulate matter" or "PM" means any solid material, except uncombined water, which exists in a finely divided form at standard conditions of temperature and pressure (293 K and 760 mm mercury).

(18) "Particulate matter control system" means any device or series of devices designed and operated in a manner intended to remove fine particulate matter (< 10 um) from an air or gas stream.

(19) "Person" shall have the same meaning as defined in Health and Safety Code section 39047.

(20) "Process emission control" means any equipment installed and operated to control emissions of toxic metals from any emission point as defined in subsection (a)(7).

(21) "Pure Lead" means any alloy that is at least 90 percent lead and contains no more than 0.001 percent cadmium by weight and 0.001 percent arsenic by weight.

(22) "Ringlemann Chart" means the Ringlemann Chart published in the United States Review of Mine Information Circular No. 1C8333, (May 1967), as specified in Health and Safety Code section 41701(b).

(23) "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. "Scrap" does not include sprues, gates, risers, foundry returns, and similar material intended for remelting that has been generated at the facility as a consequence of casting but has not been coated or surfaced with any material containing cadmium, arsenic, or nickel.

(24) "Solder" means any metal in which the sum of the lead and the tin is greater than 50 percent by weight and which is used for the purpose of joining two metals or of joining a metal to any other material.

(25) "Type Metal" means any lead-based alloy used for linotype machines.

(b) Requirements

No person shall operate a non-ferrous metal melting furnace unless the facility is in compliance with all the requirements specified in subsections (b)(1) through (b)(3).

(1) Emission Collection System

(A) All emission points shall be equipped with an emission collection system designed and operated according to criteria specified in subsection (a)(6). The design criteria and operating parameters shall be specified as conditions of the authority to construct and the permit to operate granted by the district to the source for the equipment.

(B) Good operating practices shall be used by the facility, and demonstrated through a maintenance plan or procedures approved by the district, to maintain air movement and emission collection efficiency by the system consistent with the design criteria for the system. The maintenance plan shall specify at a minimum the following:

(i) Maximum allowable variation from designed values of operating parameters, such as air velocity in the hood and ducts and pressure drop across the control device.

(ii) Areas to be visually inspected, such as the clean side of the baghouse and ducts operating under positive pressure, and the required frequency of such inspections.

(iii) Methods of documenting compliance with these requirements such as a log of such inspections and records of observations and measurements.

(2) Process Emission Control

The gas stream from the emission collection system required by subsection (b)(1) shall be ducted to a particulate matter control device meeting the requirements of this section.

(A) The particulate matter control device shall reduce particulate matter emissions by 99 percent or more.

(B) The temperature of the gas stream entering any particulate matter control device that is part of an emission collection system shall not exceed 360 degrees F. A device to be used for making this measurement shall be maintained at the facility and shall be made available to a district representative upon his or her request.

(C) The owner or operator of the facility shall demonstrate compliance with subsection (b)(2)(A), by conducting an initial source test to verify the 99 percent reduction in particulate matter as determined by means of an emissions test conducted in accordance with ARB Test Method 5. The district Air Pollution Control Officer or Executive Officer may require additional source testing to verify continued compliance or when the process is changed. Particulate matter reduction shall be calculated using the following equation:

$$\left[\frac{\text{Mass in - Mass out}}{\text{Mass in}}\right] \times 100 = \text{particulate matter reduction}$$

where:

Mass in = Mass of particulate matter at the inlet to the control device

Mass out = Mass of particulate matter at the outlet of the control device

Mass = Sum of filter catch, probe catch, impinger catch, and solvent extract.

(D) Testing Access

The owner or operator of any facility subject to subsection (b)(2) of this regulation shall provide access and sampling ports sufficient to perform testing in accordance with ARB Test Method 5. Ducts and stacks shall have sampling ports so placed as to satisfy minimum requirements for method 5 testing with regard to flow disturbances, or acceptable alternative requirements as approved by the Air Pollution Control Officer or Executive Officer of the district.

(3) Fugitive Emission Control

(A) No activity associated with metal melting at a facility including furnace operation, casting, emission control system operation, and the storage, handling, or transfer of any materials (except new sand) shall discharge into the air any air contaminant, other than uncombined water vapor, for a period aggregating more than three minutes in any one hour which is:

(i) Half as dark or darker in shade as that designated as Number 1 on the Ringlemann Chart, as published by the United States Bureau of Mines, or

(ii) Of such opacity as to obscure an observer's view to a degree equal to or greater than smoke as described in subsection (b)(3)(A)(i) or 10% opacity.

(B) Dust-forming material including, but not limited to, dross, ash, or feed material shall be stored in an enclosed storage area or stored in a manner which meets the requirements of subsection (b)(3)(A).

(C) Material collected by a particulate matter control system shall be discharged into closed containers or an enclosed system that is completely sealed to prevent any dust from getting out.

(D) Surfaces that are subject to vehicular or foot traffic shall be vacuumed, wet mopped, or otherwise maintained in accordance with a district-approved maintenance plan. The plan shall specify, at a minimum: the areas to be cleaned, the method to be used, the required frequency of the cleaning activities, and a method of documenting the completion of the required activities. The plan shall be designed and carried out in a way which will meet the requirements of subsection (b)(3)(A).

(c) Exemptions

(1) Small Quantity Exemptions. Facilities are exempt from subsections (b)(1), (b)(2), and (b)(3) if they meet either of the following conditions:

(A) melt a total of no more than one ton per year of all metals, or

(B) melt no more than the listed quantities of any one of the specific metals listed in Table I.

Table I

Metal	Exemption Limit (tons per year)
Pure Lead	400
Hard Lead	200
Aluminum Scrap	125
Aluminum Ingot containing more than 0.004 percent cadmium or 0.002 percent arsenic	125
Solder	100
Zinc Scrap	30
Copper or copper-based alloys (except scrap) containing more than 0.004 percent cadmium or 0.002 percent arsenic	30
Type Metal (lead for linotype machines)	25

(i) For facilities melting more than one of the metals listed in Table I, eligibility for exemption shall be determined using the following calculation:

For each metal listed in table I, divide the quantity melted by the specific exemption limit listed.

Sum the resulting fractions for all the metals.

If the sum does not exceed 1.0, the facility qualifies for exemption under subsection (c)(1).

(2) Metal or Alloy Purity Exemption. Facilities or furnaces which do not melt scrap and which melt a metal or alloy (other than the metals listed in Table I) which is shown by the facility operator to have a content of no more than 0.004 percent of cadmium and no more than 0.002 percent of arsenic are exempt from subsections (b)(1), (b)(2), and (b)(3). A facility granted an exemption under subsection (c)(1)(B) may also be granted exemption for all metals that meet the purity limits in this section.

(3) Exemption for Aluminum Furnaces. The combustion chamber in a reverberatory furnace is exempt from the requirements of subsections (b)(1) and (b)(2) if the furnace meets both of the following conditions:

(A) The furnace is used solely to melt aluminum and aluminum-based alloys, and

(B) The furnace is constructed with a charging well or similar device in which feed is added to molten metal in a separate chamber.

(4) Aluminum Pouring Exemption. Ladles, launders or other equipment used to convey aluminum from a melting or holding furnace to casting equipment is exempt from the requirements of subsections (b)(1) and (b)(2).

(d) Compliance Schedule

(1) Application for exemption from control requirements. Facilities seeking exemption under subsections (c)(1) or (c)(2) shall apply and submit evidence of eligibility for exemption to the district no later than six months after the district adopts regulations enacting this control measure.

(2) Emission control requirements. Facilities subject to this section shall apply to the district for an authority to construct the emission collection system and the air pollution control equipment necessary to comply with subsection (b) within 12 months. These facilities shall be in compliance no later than 24 months after the district adopts the regulations enacting this control measure.

(e) Recordkeeping

(1) Facilities subject to subsection (b) shall maintain on site for a period of two years, and make available to a district representative upon request, a record of:

(A) The results of any source testing required by the district to demonstrate that the particulate matter control device(s) are operating as required by subsection (b)(2)(A).

(2) Facilities seeking exemption under subsections (c)(1) or (c)(2) or both shall maintain for two years a record of the amount and type of metal processed in those furnaces including results of analyses as required to support exemption under subsection (c)(2). These records shall be made available to a representative of the district upon request.

(f) Applicable Material Testing Methods.

One of the following methods or an alternate method deemed acceptable by the district Air Pollution Control Officer or Executive Officer and by the Executive Officer of the Air Resources Board shall be used.

Sampling for these methods shall comply with ASTM E 88, "Standard Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition".

(1) To determine the composition of alloys defined in section (a)(1) and to determine the cadmium content of aluminum alloys to evaluate eligibility for exemption under section (c)(2) one of the following shall be used:

(A) ASTM E 227, "Standard Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique";

(B) ASTM E 607, "Standard Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere"; or

(C) ASTM E 1251, "Standard Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Argon Atmosphere, Point-to-Plane, Unipolar Self-Initiating Capacitor Discharge".

(2) To determine alloy composition as defined in subsections (a)(12) and (a)(21), ASTM E 117 "Standard Method for Spectrographic Analysis of Pig Lead by the Point-to-Plane Technique" shall be used.

(3) To determine alloy composition as defined in section (a)(24), ASTM E 46, "Test Method for Chemical Analysis of Lead- and Tin-Base Solder" shall be used.

(4) To determine cadmium concentration in zinc and zinc alloys to evaluate eligibility for exemption under section (c)(2), ASTM E 536 "Standard Test Method for Chemical Analysis of Zinc and Zinc Alloys" shall be used.

(5) To determine cadmium concentration in copper and copper-based alloys to evaluate eligibility for exemption under section (c)(2), ASTM E 53, "Standard Test Methods for Chemical Analysis of Copper" shall be used.

(6) To determine arsenic concentration in copper or copper-based alloys to evaluate eligibility for exemption under section (c)(2), ASTM E 62 "Standard Test Method for Chemical Analysis of Copper and Copper Alloys" shall be used.

(7) To determine arsenic content in aluminum or zinc (or any other alloy in which determination of arsenic by spectrochemical methods is compromised by interference) to evaluate eligibility for exemption under section (c)(2), EPA method 7061, "Arsenic (Atomic Absorption, Gaseous Hydride)", U.S.EPA Test Methods for Evaluating Solid Waste Physical and Chemical Methods. First Update (3rd Edition), January, 1988; EPA/530/SW-846.3-1; PB 89-14876 shall be used in the following manner.

(A) For aluminum alloys, sample digestion shall employ the hydroxide digestion technique given in attachment A to this control measure.

NOTE: Authority cited: Sections 39600, 39601, 39650, 39655, and 39666, Health and Safety Code.

Reference: Sections 39650 and 39666, Health and Safety Code.

ATTACHMENT A

Digestion of Metal Aluminum Sample for Determining As

1. Introduction:

Metal Aluminum cannot react with nitric acid or concentrated sulfuric acid. It can dissolve in dilute sulfuric acid or hydrochloric acid. Active hydrogen, generated during the acid digestion process, will reduce arsenic to AsH_3, which will escape from solution, resulting in a low or negative arsenic value. The proposed method sets up a protocol to dissolve metal alumina without loss of arsenic.

2. Reagent:

3M NaOH , 10% $HgSO_4$ Solution, 30% H_2O_2

1:1 H_2SO_4, Concentrated HNO_3, Tiling Copper.

3. Procedure:

3.1. Dissolve

3.1.1. Dissolve using NaOH (Method 1).

Weigh 0.5g of metal aluminum sample to a 125ml Erlenmeyer flask, add 15ml of 3M NaOH solution, allow to react and dissolve about 20 min. Again add 10ml of 3M NaOH, continue reaction until no gas bubbles are present and the sample is dissolved completely.

3.1.2. Dissolve using $HgSO_4$. (Method 2)

Weigh 0.5g of metal Aluminum sample to a 125ml Erlenmeyer flask, add 10ml of 10% $HgSO_4$ solution and 5ml of 30% H_2O_2. After 20 min, add appropriate amount of $HgSO_4$. Allow reaction to continue until no gas bubbles are present. Add metal copper strips (large surface area) into the sample solution. After 10 min, withdraw the copper strips and add new copper strips. Repeat until the surface of copper strips in sample solution do not change to a silver color. Withdraw all copper strips from sample solution.

3.2. Digestion:

Add 3ml of concentrated HNO_3, 5ml of 1:1 H_2SO_4 into the sample solution obtained from 3.1.1 or 3.1.2. Heat slowly and evaporate the sample solution until SO_3 fumes are present for 5min. Cool and dilute the sample to 50.0ml.

Determined As by Atomic Absorption method.