LIA14787

Lead Industries Association, Inc.

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November 30, 1972

SUBJECT: NEW SOURCE PERFORMANCE STANDARDS FOR THE PRIMARY LEAD AND ZINC SMELTING INDUSTRIES

TO THE MEMBERS OF THE LEAD INDUSTRIES ASSOCIATION, INC.

Attached is a report from the ILZRO/LIA Environmental Health Department on a meeting of the EPA National Air Pollution Control Techniques Advisory Committee held November 1, 1972. This was the first meeting of this group to consider New Source Performance Standards for the primary lead and zinc smelting industries. No effort was made here to pinpoint specific lead and zinc emission standards, however, a 163 page document proposing such standards was circulated. (See summary attached).

For your information, a list of the members of the Advisory Committee, as well as invited specialists, and EPA's estimate of new source emission control economics for the lead and zinc industries is also attached.

A follow-up meeting is scheduled for December 14, 1972 at which time New Source Performance Standards will be discussed and possibly recommended for the lead, zinc and copper industries.

Sincerely,

Jerome F. Smith

Jerome F. Smith
Secretary & Manager

JFS:lm
Enclosures

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MEETING REPORT

Date:	November 1, 1972
Location:	Department of Commerce Building
Attended By:	D. R. Lynam, ILZRO/LIA
Persons Present:	Members U.S. Environmental Protection Agency National Air Pollution Control Techniques Advisory Committee (see attached list - Appendix 1). Invited Specialists to National Air Pollution Control Techniques Advisory Committee (see attached list - Appendix 2). EPA staff including (see Agenda-Appendix 4): Don Walters, Director, Special Projects Staff-Chairman Bruce Hogarth, Special Projects Co-ordinator - Executive Secretary Don Godwin, Director, Standards Development and Implementation C. H. Darvin, Project Engineer for Lead & Zinc Industries W. F. Hamilton, Economic Analysis Branch G. W. Walsh, Office of Technical Planning and Co-ordination Jim Crowder, Special Projects Staff, Responsible for Non-ferrous Regulations.
Report By:	D. R. Lynam, ILZRO/LIA
Subject:	U.S. Federal New Source Performance Standards for the Primary Lead and Zinc Smelting Industries.

On November 1, 1972, Donald R. Lynam attended a meeting of the EPA National Air Pollution Control Techniques Advisory Committee, which was considering development of New Source Performance Standards for the primary lead and zinc smelting industry. "Standards of Performance for New Stationary Sources" are authorized in section 111 of the Clean Air Act Amendment of 1970. The stated purpose of section 111 of the Act is to prevent the general occurence of new air pollution problems by requiring the installation of the best control techniques during initial construction. The standards are not to be applied to existing sources but refer to modifications and new construction which is commenced after the publication of proposed regulations. Modification is defined as any physical change in the method of operation of a stationary source which increases the amount of any air pollutant emitted by the source or which results in the emission of any air pollutant not previously emitted. EPA interprets section 111 as mandating best control as opposed to normal, conventional, or good control. Consideration of cost is applied as a modifier to avoid extremes.

This meeting was described by EPA officials as a preliminary session. A 163 page draft document entitled, "New Source Performance Standards, Technical Report - Copper, Lead and Zinc Smelters," October 1972, has, however, been prepared by EPA and distributed to the Members of the Advisory Committee, prior to the meeting. Because of the volume of this document, only the "outline" has been enclosed as part of this meeting report. However, we have a copy of the complete document. (see Appendix 3).

The approach which EPA has taken in arriving at NSPS for the lead and zinc smelting industry is to control SO_2 emissions. It was stated that if the gas stream was cleaned up sufficiently for an acid plant operation, then the particulates would be adequately controlled. Therefore, the control strategy revolves around control of SO_2 emissions.

Lead Smelting

C. H. Darvin, EPA staff, (see agenda, Appendix 4), reviewed the domestic lead smelting processes and emissions, status of existing emission control, and process alternatives that generate SO_2 streams. He stated that they had visited 6 facilities in the U.S. (3 in Missouri, 1 in Idaho, 1 in Texas, and 1 in Montana) and 4 facilities abroad (Sweden, Germany, France, and ?). He indicated that there was a slight indication of growth in the lead industry. The following emission figures were quoted for lead smelting operations:

SO_2 - 265,000 Tons (7% of total SO_2 emissions in U.S.)
Particulates - 67,000 Tons

The control approach was to be concentrated on the sintering operation which was listed as constituting 90+% of the emissions. Two recommendations of best control procedures were made:

1. Gas recirculation in the sintering operation. It was recommended that the first gas stream (the gas stream at the beginning of the sintering operation) go to an acid plant and that a second gas stream (at the end of the sintering operation) be recirculated. It was stated that the second gas stream would require a separate particulate collection system.

2. Use of Electric Furnace.

The following economic analysis was presented by W. F. Hamilton:

Structure - ASARCO (29% of '71 market), St. Joe (34%), Missouri Lead Operating Co. (17%), Bunker Hill (20%).

Production - 1966	1971	5 Year Annual Growth Rate
458,000 Tons 765,000 Tons capacity in 1971	649,000 Tons	Approx. 7%

Consumption 1971 -	Percent of Market	Annual Growth Rate '66 - '71
Storage Batteries	47%	+ 8%
Gasoline Additives	18%	+ 1%
Pigments	6%	- 8%
Ammunition	6%	+ 2%
Solder	5%	- 2%
Other	18%	- 7%

Estimated Costs of Control to Meet NSPS for the Domestic Lead Industry - The EPA estimated costs of control, as presented at the meeting, are reproduced from the report, "New Source Performance Standards Technical Report-Copper, Lead and Zinc Smelters," and are attached as an addendum to this meeting report (see Appendix 5).

G. W. Walsh, EPA listed the important issues as follows:

1. How to produce a strong SO_2 gas stream.
2. Recirculation system seems to be best approach.
3. Should SO_2 emissions from blast furnaces be considered.
4. Use of electric furnaces.

The general consensus seemed to be that there should be no limit on emission of particulates. EPA indicated that an elaborate SO_2 control system would also control particulate emissions.

The opinion was also expressed that Pb should not be regulated under part 2 of Section 111 which deals with health effects. Such action would require the states to set standards for all existing facilities.

EPA representatives stated that the Penarroya facility utilized complete recirculation in the sintering operation. EPA representatives also quoted from "Lead Smelter Operation at N.V. Metallurgic Hoboken S.A., Hoboken, Belgium," which appeared in AIME World Symposium on Mining and Metallurgy of Lead and Zinc, Volume 11 Extractive Metallurgy of Lead and Zinc, 1970, where the following statement was made: "By recirculating the gases, at least 99% of the sulfur eliminated can be recovered." It appeared that the EPA representatives interpreted the 99% removal figure as applying to total sulfur in the concentrate rather than 99% of the sulfur eliminated in the sintering operation as being recovered. This interpretation was corrected by the invited specialists.

Zinc Smelting

C. H. Darvin, EPA staff, reviewed the domestic zinc smelting processes and emissions status of existing emission control, and process alternatives that generate concentrated SO_2 streams. Eight U.S. facilities were visted (2 in Pennsylvania, 1 in Ohio, 2 in Oklahoma, 2 in Texas, 1 in Idaho) and 3 non-U.S. facilities were visted (2 in Germany and 1 in France). The U.S. production capacity was listed as 815,000 metric tons. The growth potential was listed as stable.

It was stated that NSPS should concentrate on the control of SO_2 emissions from the roasting and sintering operations. The following production alternatives or equipment modifications which can be used to facilitate the control of SO_2 emissions from zinc smelter operations were listed by EPA.

1. Use of fluid-column roaster system which eliminates the requirement for sintering.
2. Use of a combination roast-sintering machine with gas recirculation to yield a strong SO_2 effluent stream which can be subjected to high-efficiency SO_2 removal.
3. Use of a electrolytic zinc extraction technique after pre-roasting by modern equipment which generates a strong SO_2 stream.

W. F. Hamilton, EPA, presented a review of zinc smelter economic profile.

Year	No. of Firms	Annual Production Capacity
1968	10	1,300,000 Tons
1975 (estimated)	6	684,000 Tons
		47% Reduction in capacity

Consumption: 1971 Use

Galvanizing	29%
Brass Products	9%
Other Alloys	31%
Other Slab Uses	7%
Other Uses	24%

Annual Trends in Slab Zinc Production and Imports for the U.S. 1966 - 1971

	Domestic Ores	Foreign Ores	Total Primary	Scrap Recycling	Total Smelter Production of Slab Zinc	Net Imports
1966	38%	36%	74%	6%	80%	20%
1971	35%	31%	66%	7%	73%	27%

Estimated Costs of Control to Meet NSPS for the Domestic Zinc-Industry

The EPA estimated costs of control, as presented at the meeting, are reproduced from the report, "New Source Performance Standards Technical Report - Copper, Lead and Zinc Smelters," and are attached as an addendum to this meeting report (see Appendix 6).

A review of sulfur oxides emission control devices was presented by T. A. Kittleman, EPA. The presentation included:

1. Dimethylaniline (DMA) Scrubbing
2. Sodium sulfite-bisulfite Scrubbing
3. Calcium-based Scrubbing
4. Ammonia Scrubbing

Status

The general position of the advisory committee relating to NSPS for lead and zinc at the end of the meeting was that EPA had not obtained sufficient data from emission testing of the types of control systems which they had recommended. It was stated that sufficient emission test data on recommended control systems were required in order to evaluate appropriateness of such systems as well as providing EPA with sufficient documentation should a NSPS be challenged by court action. Several members of the committee also suggested that the economic considerations were not studied in sufficient detail.

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List of Invited Specialists

National Air Pollution Control Techniques Advisory Committee

November 1 and 2, 1972

1. Mr. Kenneth J. Rogers, Program Manager, RC/Bahco System
   Research-Cottrell, Bound Brook, N.J.
   (Limestone scrubbing)

2. Mr. J. M. Henderson, Research Superintendent
   ASARCO, South Plainfield, N.J.
   (DMA system)

3. Mr. John B. Rinckhoff
   Wellman - Power Gas, Inc., Lakeland, Florida
   (Acid plants and sodium sulfite-bisulfite scrubbing systems)

4. Mr. Guy Bridgstock, Senior Staff Engineer
   The Lummus Co. of Canada Ltd., Ontario, Canada
   (Flash smelters)

5. Mr. E. R. Marble, Jr., Consulting Engineer
   Metuchen, New Jersey
   (Electric furnaces)

6. Mr. E. G. N. Player
   Cominco Ltd., Trail, B. C., Canada
   (Ammonia scrubbing)

7. Mr. George H. Carr, Environmental Engineer
   Missouri Lead Operating Co., Boss, Missouri
   (Lead smelters)

8. Mr. Gary E. Welch, Director of Environmental Control
   St. Joe Mineral Corporation, Monaca, Pennsylvania
   (Zinc smelters)

9. Mr. Richard R. Hyde, Vice President
   Inspiration Copper Company, Inspiration, Arizona
   (Copper smelters)

10. Mr. Gene Baker, Manager-Plant Engineer
    Bunker Hill Company, Kellogg, Idaho
    (AMC representative)

11. Mr. W. Howard Winn, General Manager, Nevada Mines Division
    Kennecott Copper Corporation, McGill, Nevada
    (AMC representative)

12. Mr. James T. Dunham, Staff Metallurgist
    U. S. Bureau of Mines, Washington, D. C.
    (SO_2 control systems)

Annotated Outline for Technical Report -
Copper, Lead, and Zinc Smelters

This document is a preliminary draft. It has not been formally released by EPA and should not at this stage be construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

1. SUMMARY OF THE PROPOSED STANDARDS

This section will summarize the intent and requirements of the standards. If concentration standards are proposed, for example, the allowable SO_2 emissions (in ppm) from specified component smelting processes, or combinations of these, would be stated. If the proposed standards limit sulfur emissions from complete smelting facilities, statements of the maximum allowable percentage of smelter input sulfur which can be emitted, along with requirements for measuring specified material input and emission streams, would be appropriate.

This section will also summarize the conceptual basis of the standards. Primary objectives are the use of processes which eliminate weak SO_2 streams and the application of sulfuric acid plants, mist eliminators, and elemental sulfur plants. The absence of particulate standards, in those cases where sulfur dioxide emission limitations will simultaneously require effective particulate control, will be noted.

2. DOMESTIC SMELTING TECHNOLOGY AND EXISTING EMISSION CONTROL

The purpose of this section is to provide an overview of domestic smelting operations, i.e., smelter locations, age of plants, origin and shipment of ore concentrates, metal production figures, types of equipment used, functions of component smelting processes, sources and quantities of sulfur dioxide emissions, particulate emissions, and existing emission control devices. A discussion of the availability of well-controlled domestic smelting operations as sites for emission tests which would establish a data base for performance standards will be included.

3. DEMONSTRATED TECHNOLOGY FOR THE CONTROL OF EMISSIONS

The applicability of sulfuric acid plants (single and double absorption), elemental sulfur plants, and scrubbing systems to the control of SO_2 emissions from smelters will be discussed. The scrubbing systems, which can be applied to weak SO_2 streams, include calcium-based, ammonia, sodium sulfite-bisulfite, and dimethylaniline types. Achievable SO_2 emission limits for the control devices will be documented.

Several component smelting processes, which have been commercially demonstrated and which are amenable to high efficiency SO_2 emission control, will be described separately for copper, lead, and zinc smelters. The relationships of these alternatives to conventional smelting operations, including process advantages and disadvantages of the alternatives, will be indicated.

4. RATIONALE FOR THE PROPOSED STANDARDS

The purpose of this section is to examine smelter control strategies and to illustrate resultant SO_2 emission levels by means of model grass-roots smelters. Differences in emissions, investment costs, and emission control costs between model smelters and smelters representative of current domestic technology will be developed; the alternatives will include single absorption acid plants, double absorption acid plants, and scrubbing of weak SO_2 streams generated by conventional process equipment. Finally, the several methods of expressing smelter standards will be examined.

5. EXISTING EMISSION CONTROL REGULATIONS

A discussion of existing state control regulations for smelters, and smelter sulfuric acid plants, will be presented. Compliance dates and federal requirements proposed through state implementation plans will be included. The bearing of occupational hygiene SO_2 regulations on the control of fugitive emissions will be discussed.

The relationships among the proposed performance standards, existing regulations applicable to modified sources which would be covered by the proposed standards, and ambient air quality standards will be considered.

6. ECONOMIC IMPACT OF THE PROPOSED STANDARDS

This section will discuss the economic impacts of the proposed standards on the following items:

1. Mining Operations.
2. Sulfuric acid prices.
3. Copper prices.
4. Decisions to construct new smelters or modify existing facilities.
5. Competition of copper with other metals.
6. Sulfur tax.
7. Financial position of the non-ferrous smelting industry.
8. Competition with foreign copper producers.
9. Prices of typical consumer goods.

Appendix 4

ENVIRONMENTAL PROTECTION AGENCY

AGENDA

National Air Pollution Control Techniques Advisory Committee

November 1 and 2, 1972

Department of Commerce Building
Room 4830
14th and Constitution Avenue, S. W.
Washington, D. C.

November 1, 1972

8:30 A. M. - 9:00 A. M.	Call to order. Introduction of new members, guests, and staff. (Mr. D. F. Walters)
9:00 A. M. - 9:15 A. M.	Introduction on program for development of smelter emission standards. (Mr. D. R. Goodwin)
9:15 A. M. - 9:35 A. M.	Review of domestic lead smelting processes and emissions, status of existing emission control, and process alternatives that generate concentrated SO_2 streams. (Mr. C. E. Darvin)
9:35 A. M. - 9:50 A. M.	Review of lead smelter economic profile. (Mr. W. F. Hamilton)
9:50 A. M. -11:30 A. M.	Discussion of issues - lead smelters. (Mr. G. W. Walsh)
11:30 A. M. -12:30 P. M.	Lunch.
12:30 P. M. -12:50 P. M.	Review of domestic zinc smelting processes and emissions, status of existing emission control, and process alternatives that generate concentrated SO_2 streams. (Mr. C. E. Darvin)
12:50 P. M. - 1:05 P. M.	Review of zinc smelter economic profile. (Mr. W. F. Hamilton)
1:05 P. M. - 3:00 P. M.	Discussion of issues - zinc smelters. (Mr. G. W. Walsh)
3:00 P. M. - 4:30 P. M.	Committee executive session. (Mr. D. F. Walters)

Appendix 4

November 2, 1972

8:30 A. M. - 9:00 A. M.	Role of National Air Pollution Control Techniques Advisory Committee in EPA activities. (Dr. Robert L. Sansom, Assistant Administrator for Air and Water Programs)
9:00 A. M. - 9:30 A. M.	Review of domestic copper smelting processes and emissions, status of existing emission control, and process alternatives that generate concentrated SO_2 streams. (Mr. F. L. Porter)
9:30 A. M. - 9:45 A. M.	Review of copper smelter economic profile. (Mr. F. L. Bunyard)
9:45 A. M. -11:30 A. M.	Discussion of issues - copper smelters (Mr. G. W. Walsh)
11:30 A. M. -12:00 Noon	Review of sulfur oxides emission control devices (Mr. F. L. Porter and Mr. T. A. Kittleman)
12:00 Noon - 1:00 P. M.	Lunch
1:00 P. M. - 3:00 P. M.	Discussion of issues - application of emission control devices to copper, lead and zinc smelters. (Mr. G. W. Walsh)
3:00 P. M. - 4:00 P. M.	Committee executive session. (Mr. D. F. Walters)
4:00 P. M.	Adjourn.

PRELIMINARY ESTIMATE OF NEW SOURCE EMISSION CONTROL ECONOMICS
FOR THE DOMESTIC LEAD INDUSTRY

A preliminary estimate has been prepared by EPA personnel in order to assess the cost of controlling the emissions of SO_2 from a typical new source in the domestic lead industry. The basic control device utilized for this estimate is the single contact acid plant. The acid plant would operate on SO_2 emissions from lead sintering machines that produce a single strong stream of SO_2. Estimates have been prepared for two model plants—one that has an annual capacity of 113,000 tons per year of refined lead and another with a capacity of 175,000 tons per year. The results are as follows:

Plant Size	113,000 tons/yr	175,000 tons/yr
SO_2 Concentration	7%	7%
H_2SO_4 Production	311 tons/day	482 tons/day
Investment Cost (1)	$3,100,000	$4,200,000
Operating Cost (2)		
-Annual	$951,000/yr	$1,273,000
-Per Pound of Lead	.42¢/#	.364/#
-Per Ton of Acid	$9.27/Ton	$8.01/Ton
-Per Pound of Sulfur Treated	1.39¢/#	1.20¢/#

(1) Investment costs include the cost of the acid production section as well as the wet cleaning section, site preparation, acid storage facilities, and off-site facilities.

(2) Operating costs include direct labor, maintenance, utilities, depreciation, and interest on borrowed capital.

An emission control system that utilized a dual absorption acid plant for control of the sintering machine and a lime scrubber on the lead blast furnace would increase the total investment costs by approximately 20%. Operating costs would increase by a similar amount.

In the event that a new source did not install a sintering machine that produced a single strong stream of SO_2 then it would be necessary to install some type of weak gas scrubbing system to treat the weak SO_2 stream from the sintering machine. This system would be in addition to the acid plant needed to control the strong stream from the sintering machine. In this case it is estimated that total investment costs will be approximately 2-½ times as much as the cost for a system that would be used in conjunction with a sintering machine producing a single strong streams. Operating costs would also increase in a similar fashion.

PRELIMINARY ESTIMATE OF NEW SOURCE EMISSION CONTROL ECONOMICS FOR THE DOMESTIC ZINC INDUSTRY

A preliminary estimate has been prepared by EPA personnel in order to assess the cost of controlling the emission of SO_2 from a typical new source in the domestic zinc industry. The basic control device utilized for this estimate is the single contact sulfuric acid plant. The acid plant would operate on SO_2 emissions from zinc roasters that are capable of roasting sufficient feed for a final product output of 98,000 tons per year of refined zinc. Two estimates have been provided—one for a roaster that produces an SO_2 concentration of 6% and another for a roaster producing an SO_2 concentration of 12%. The results are as follows:

SO_2 Concentration	6%	12%
H_2SO_4 Production	477 tons/day	477 tons/day
Investment Cost (1)	$4,700,000	$2,900,000
Operating Costs (2)		
-Annual	$1,400,000/yr	$930,000/yr
-Per Pound of Zinc	.72¢/#	.48¢/#
-Per Ton of Acid	$8.91/Ton	$5.90/Ton
-Per Pound of Sulfur Treated	1.34¢/#	.89¢/#

(1) Investment costs include the cost of the acid production section as well as the wet cleaning section, site preparation, acid storage facilities, and off-site facilities.

(2) Operating costs include direct labor, maintenance, utilities, depreciation, and interest on borrowed capital.

An emission control system that utilized a dual absorption acid plant for control of the zinc roaster and a lime scrubber for control of the sintering machine would increase the total investment cost by approximately 20%. Operating costs would increase by a similar amount.