U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 75-82-224

BOKAN BROTHERS CORPORATION
SACRAMENTO, CALIFORNIA
OCTOBER 1975

I. TOXICITY DETERMINATION

It has been determined that a health hazard from Lead and Antimony does not exist at the Bokan Brothers plant at the concentrations measured during normal operating conditions. This determination is based upon environmental measurements made on May 6, 1975, analysis of medical interview forms, consultation with a consulting physician at the plant, study of work practices, and available information regarding the toxicity of lead and antimony.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are available upon request from the Hazard Evaluation Services Branch, NIOSH, U.S. Post Office Building, Room 508, Fifth and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

a. Authorized representative of employees.
b. Bokan Brothers Corporation, Sacramento, California.
c. U.S. Department of Labor - Region IX.
d. NIOSH - Region IX.

For purposes of informing the approximately 30 "affected employees" the employer will promptly "post" the Determination Report in a prominent place(s) near where exposed employees work for a period of 30 calendar days.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The National Institute for Occupational Safety and Health (NIOSH) received such a request from an authorized representative of employees regarding exposure of workers to lead at the Bokan Brothers Corporation plant in Sacramento, California.

IV. HEALTH HAZARD EVALUATION

A. Introduction

The Bokan Brothers plant in involved in the rebuilding of internal combustion engines of all types. This includes all phases of rebuilding from tearing down old engines to touch-up painting of newly rebuilt engines. Approximately 30 employees are involved in the plant processes. On May 6, 1975, NIOSH investigator, Melvin T. Okawa, conducted an opening conference with representatives of management and employees.

B. Plant Process - Conditions of Use

At Bokan Brothers, the engine assembly section of the plant was the primary area of concern since the lead pot was located in this area. However, since residual levels of tetraethyl lead can remain on engine parts, workers throughout the plant may be exposed to some lead. The engine assembly room is about 100' X 100' and has 10 employees. In one corner of the room, a small lead pot (1 foot in diameter and 2 feet deep) is part of a work table and is located under a canopy hood. The local exhaust ventilation was installed early in 1975 prior to this investigation when the potential health hazards associated with the use of lead came up for discussion at Bokan Brothers.

A single employee has been designated the responsibility of operating the lead pot. Whenever older model cars with engines requiring "rebabbitted" bearings instead of rod inserts are brought in for repair, the lead pot is put into operation so that the bearings can be cast with lead babbitt. Since newer cars don't require this process, the lead casting job can be accomplished in 4 hours per week. Currently, rebabbitting is done on Saturdays while most of the employees are not at the plant. Other workers in the engine assembly room are involved in various phases of final assembly of rebuilt engines. Other than the lead pot worker, the nearest employees to the lead pot are further than 10 feet.

Peripheral operations located away from the engine assembly room and the lead pot include engine cleaning, valve grinding (Head Department), and crankshaft grinding. Additionally, 2-3 workers are responsible for touch-up painting of rebuilt engines. Painting each engine requires a small can of spray paint which takes 5 minutes to apply. A worker may paint 10-30 engines per day. Prior to NIOSH's survey, spray painting was done inside the engine assebly room but currently it is done outdoors.

C. Evaluation Criteria

Lead is the major component of the babbitt used at Bokan Brothers. The babbitt also contains a small amount of antimony. The important routes of absorption of lead by man are inhalation and ingestion. Man absorbs lead in small amounts from his food, water, and air. Although these small amounts don't usually lead to poisoning but result in the "normal" body burden for lead, they add to any lead absorbed from occupational sources.

Excess absorption of lead can interfere with the synthesis of heme which may result in anemia. The symptoms of anemia include fatigue, irritability, and pallor. Gastrointestinal effects of lead poisoning include intestinal colic, nausea, and constipation. Peripheral and central nervous system effects can occur in cases of severe poisoning. Additionally, excess absorption can result in kidney dysfunction.

NIOSH recommends that occupational exposure to inorganic lead be controlled so that workers are not exposed to a workroom air concentration greater than 0.15 milligrams per cubic meter of air (mg/m^3) determined as a time-weighted average (TWA) exposure for an 8-hour workday.[1] The U.S. Department of Labor's standard for inorganic lead established under the Occupational Safety and Health Act of 1970 is 0.2 mg/m^3 TWA over an 8-hour day (Federal Register, Part 1910.93, Volume 39, No. 125, p. 23543, June 27, 1974). No biological standards have been established for lead under the Occupational Safety and Health Act of 1970. However, according to the latest information in the literature, blood lead levels exceeding 60 micrograms (ug)/100 grams (g) of blood is evidence of an unacceptable degree of occupational exposure to lead.

Antimony exposure has been associated with an increase in heart abnormalities. Over exposure to antimony fumes contaminated with arsenic has been reported to cause upper respiratory irritation, pneumonitis, vomiting, dizziness, and skin rash.[2] The U.S. Department of Labor's standard for workroom air concentration for antimony is 0.5 mg/m^3 TWA for an 8-hour day.

D. Worksite Evaluation

On May 6, 1975, Mr. Okawa continued his investigation by conducting a worksite evaluation for lead and antimony. The lead pot was turned on and cutting and machining of bearings was conducted for approximately 4 hours. The work normally reserved for Saturday was done during this investigation.

1. "Criteria for a Recommended Standard . . . Occupational Exposure to Inorganic Lead," NIOSH, 1972.

2. "Antimony and Its Compounds", Hygienic Guide Series, American Industrial Hygiene Association, December, 1969.

E. Evaluation Methods

The workers' exposures to lead and antimony were measured via personal air sampling equipment. All samples were taken in the breathing zones of the employees using MSA Model G personal sampling pumps fitted with Millipore membrane filters fo pore size 0.45 microns. The sampling rate was 1.8 liters per minute and the sampling times ranged from 1 hour 35 minutes to 2 hours 45 minutes per sample. The filters were sealed and mailed to NIOSH laboratories in Salt Lake City for analysis.

All the employees in the engine assembly area and a majority of workers in other parts of the plant were administered non-directed medical questionnaires. The responses would be analyzed by physicians in NIOSH's Medical Services Branch in order to make a determination whether adverse effects from substances in the worksite were occurring in employees.

F. Evaluation Results

The results of the environmental samples are listed below:

Sample Area	Sample Period	Lead Conc. (mg/m^3)	Antimony Conc. (mg/m^3)
Lead Pot Assembler	9:05-11:50 A.M.	<0.006	<0.02
Lead Pot Assembler	12:30- 2:15 P.M.	0.18	<0.02
Engine Assembler	9:05-11:40 A.M.	<0.006	<0.02
Engine Assembler	12:31- 2:14 P.M.	<0.006	<0.02
Crankshaft Grinder	9:00-11:38 A.M.	<0.006	<0.02
Valve Grinder (Head Dept.)	12:33- 2:10 P.M.	0.10	<0.02

Two samples were collected on the lead pot assembler while he worked normally with lead babbitt. One sample was negative (less than (<) the limits of detection for the method used i.e. 0.006 mg/m^3) and the other showed 0.18 mg/m^3. The average exposure over the approximate 4 hour that lead was cast calculates out to 0.07 mg/m^3. Two samples taken on engine assemblers nearest the lead pot assembler showed lead levels below the limits of detection. One sample was taken in the crankshaft grinding area. The lead level was below the limit of detection. One sample wa taken in the Head Department on a valve grinding operation. The lead level was 0.10 mg/m^3. Antimony levels in all 6 samples were below the limits of detection (0.02 mg/m^3) for the method used.

Twenty-two employees were administered a medical questionnaire in a non-directed manner. Ten employees were in the engine assembly room. Dr. Robert Ligo of NIOSH also conferred with Dr. A.L. Kuntz who was hired as a consultant by the State Compensation Insurance Fund to investigate the alleged lead hazard at Bokan Brothers. Dr. Kuntz could not find any

signs of lead poisoning among the employees he examined. However, one worker gave a history of symptomatology compatible with lead poisoning. These symptoms occurred prior to changes in the plant ventilation. This worker was reported by Dr. Kuntz to be now free of these symptoms. Thirteen workers in the plant submitted blood samples to a private physician who had the blood analyzed for lead content. The results of the blood tests were made available to NIOSH. The lead levels in blood ranged from 18-44 ug/100 g of blood.

V. DISCUSSION

The results of the environmental investigation indicated that lead and antimony levels in the workroom air were below generally accepted safe limits. Antimony could not be detected in any of the samples. Lead was found in two out of six samples. In the Head Department, one sample showed a lead level of 0.10 mg/m^3. This finding is below NIOSH's recommended safe limit of 0.15 mg/m^3 (TWA). The lead pot assembler showed in one sample an environmental lead level of 0.18 mg/m^3. This value is above the 0.15 mg/m^3 (TWA) recommended safe limit. However, the average over the 4-hour sampling period calculates out to 0.07 mg/m^3 which is below the limit for an 8-hour day. Since the lead pot assembler works with lead babbitt for about 4 hours per week, his total exposure to lead is relatively low.

The consulting physician employed by the State Fund found no evidence of lead poisoning among the workers he examined. The blood lead levels from samples submitted to an independent testing source ranged from 18-44 ug/100g. These levels are well below the 60 ug/100 g figure at which health effects may begin to occur.

VI. CONCLUSIONS

It is concluded that on the basis of all the environmental and medical data, a health hazard from lead or antimony does not exist at the Bokan Brothers plant under the conditions observed at the time of the investigation (May 6, 1975). However, since there is some exposure to lead and other substances, efforts should be made to keep workers' exposures to these potentially toxic substances at a minimum.

VII. RECOMMENDATIONS

Workroom air concentrations of lead were found to be below generally accepted safe limits, but efforts should be made to keep workers' exposures low as possible. It is recommended that:

1. Casting with lead babbitt should be concentrated in one area of the plant, i.e., under the canopy hood with the mechanical ventilation operating.

2. The mechanical ventilation system should be maintained regularly.

3. Food preparation and eating should be prohibited in lead work areas.

4. Workers should be made aware of the fact that lead can be absorbed from contaminated cigarettes or food.

5. Periodic medical examination for lead exposure should be made available to the lead pot assembler.

VIII. AUTHORSHIP

Evaluation conducted and report prepared by:

Melvin T. Okawa
Regional Industrial Hygienist
NIOSH - Region IX

Originating Office:

Jerome P. Flesch
Chief, Hazard Evaluation Services Branch
NIOSH
Cincinnati, Ohio