

WORK PRACTICES AND ADMINISTRATIVE CONTROLS - LESSONS  
LEARNED FROM BATTERY MAKING AS APPLIED TO SMELTING

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ABSTRACT

The author has drawn a parallel between the need for effective work practices that he experienced during his career in battery making with the need that exists in smelters. In battery making operations he found through observation of workers with low breathing zone and blood lead levels that these individuals appeared to be more aware of potential hazards than other workers and worked in such a way as to minimize those hazards. A study at General Battery Corp. is cited documenting real differences in air and blood leads among workers rotated through similar jobs.

Identification of specific work practices which are effective is made difficult because of the masking effect of respirators and the variability inherent in sampling the workplace air.

Effective engineering controls should not be pursued while excluding research into work practices because any future engineering improvements which the author anticipates at this time could be undone by poor work practices. Work practices will only be effective if management is committed to providing a safe and healthy workplace and stressing to the workers the need for following good practice.

INTRODUCTION

I have been in the battery business for thirty years and have been associated with secondary smelters for fifteen years. I don't have solid data on the effectiveness of work practices in controlling blood lead levels in smelting which I could present to you and for some reason my experience in smelting didn't produce solutions to lead exposure problems the way it did in battery making so I was reluctant at first to give this presentation. When I learned that others weren't anxious to take on this task it occurred to me that I probably wasn't the only one who lacked data. In thinking about this I discovered that there are reasons why the effectiveness of work practices in reducing air and blood concentrations of lead is so difficult to document and evaluate. In this presentation, besides stressing the importance of work practices in achieving control of lead, I will cite some of the complicating factors in the evaluation of their effectiveness.

## WORK HABITS ARE KEY

Twenty-five years ago after repeated visits to 20 or more battery plants, I decided that if I could have my choice of people from all the plants I could run a plant with minimal ventilation and have few lead absorption problems. For unexplained reasons some people seemed less susceptible to lead than others, and/or they were cleaner than others and/or they worked more carefully than others and didn't generate as much dust or absorb as much lead. Personal air sampling has shown that these same people breathe less air contamination so it seems that while susceptibility and hygiene may be important, work habits are the key. My personal observations also bear out this conclusion.

In one case I became aware that there was a problem with high lead in air when plates were being burned in forming tanks in preparation for the charging process. Yet one of the people doing this burning had consistently low lead in his breathing zone and in his blood. I decided to go out and watch this man and stay with him until I found the reason. He used the same equipment as everyone else and seemed to work in a normal manner. After observing from all angles I suddenly noticed that this man, when he breathed out, pursed his lips slightly and blew the smoke away. Any lead or arsenic fume was also blown away and was sufficiently diluted by the air in the room to be at safe levels.

A room full of forming tanks requires complex and expensive local exhaust ventilation which wasn't needed when the OSHA Permissible Exposure Limits (PEL) for lead and arsenic were 200 and 500  $\mu\text{g}/\text{m}^3$ , respectively. It isn't needed now if we could institute the proper work practices. Unfortunately, it may be asking a little too much of work practices to expect the operator to supply his own dilution ventilation!

A further example of the effectiveness of work practices in reducing lead exposure was presented by Dr. Ralph Smith for the General Battery Corp. (GBC) at the OSHA lead standard hearings. John Bitler, Vice President of GBC, had studied 17 identical (as far as can be measured) stack and burning stations. The stack and burn crews rotated among the stations and measurements were made of all crews at different stations. It became obvious that certain stackers and burners had high air or blood leads no matter which stations they used. Others could work at any station and maintain low air and blood leads. The engineering controls were satisfactory for most people but a few were doing things which the ventilation could not control.

## EFFECTS OF WORK PRACTICES HIDDEN AMONG OTHER VARIABLES

It was in thinking about this stack and burn report that I suddenly realized why we have a problem in analyzing for effects of work practices in secondary smelting. No one lines up 17 identical blast furnaces and rotates furnace crews among them. I have had experience with four or five furnaces but there were enough differences among them that any effects of work practices were hidden.

Another problem in isolating effective work practices is the use of respirators. Air lead levels have been high in smelters and respirators have been used routinely. If a respirator is worn properly it will mask much of the effect on blood lead levels of varying work practices.

John Tibbels, of Exide's Refined Metals Corporation, is now investigating the case of a furnace crewman who has maintained a blood lead level in the 40's ( $\mu\text{g}/100\text{ml}$ ) for months when others are lucky to be at 60 or 70 and some go to 80 and have to be removed from exposure. In this and other similar situations, the effects of respirator usage must be sorted out and then studies made which will pin-point the beneficial work practices.

It was a disappointment to me to see OSHA make respirator use mandatory when breathing zone lead levels exceed  $50 \mu\text{g}/\text{m}^3$ . Blood lead can be controlled to 70 or 80  $\mu\text{g}/100\text{ml}$  with air leads closer to  $200 \mu\text{g}/\text{m}^3$  than to  $50 \mu\text{g}/\text{m}^3$  and we were getting to the point where  $200 \mu\text{g}/\text{m}^3$  looked possible. There is very little benefit in reducing air lead to  $200 \mu\text{g}/\text{m}^3$  as far as respirator usage time is concerned when the time-weighted average (TWA) exposure has to be kept below  $50 \mu\text{g}/\text{m}^3$ . At  $200 \mu\text{g}/\text{m}^3$  the respirator must be worn for more than six hours of an eight-hour shift to reach a TWA of  $50 \mu\text{g}/\text{m}^3$ .

As more air samples are taken the effects of work practices are going to become more evident. But it will take a great many samples because air sampling is so highly variable. The same amount of variability does not occur in blood sampling provided minimal precautions are taken against contamination. The principal errors are usually associated with the analysis. In air lead measurements, on the other hand, the principal variability is associated with the lead content of the air, which varies widely.

#### EFFECTIVENESS OF ENGINEERING CONTROLS IS TIED TO WORKER INVOLVEMENT

There is a lot of work to be done in the area of effective work practices and one can ask, why bother? Wouldn't it be better to concentrate on studying and improving engineering controls? I think that in the foreseeable future, any engineering improvements I can visualize will be capable of being undone by poor work practices. There is no way present day safety, health and environmental requirements can be met without the full cooperation of the smelter worker. In a reasonably well-engineered smelter the worker can do more to control blood lead level than can any of the foremen, engineers or plant managers. The first step is to get every smelter worker interested in what his or her blood lead level is and which way it is going. However, to do this the worker must first be given a reasonably clean place in which to work. There is no use exhorting everyone to work safely in poorly maintained, dirty plants. But not only does the worker have to have a decent working environment, the worker must also be convinced that it is decent. If the worker is not, it will affect attitude and work practices. The worker should be consulted on what he or she thinks can be done to reduce exposure and blood lead. Often management will have to explain why a particular idea won't work or is impractical or too expensive, but it gives management the opportunity to explain why certain things have or haven't been done. On the other hand, when ideas are

freely exchanged between workers and management, the potential for new solutions is always there.

#### MANAGEMENT COMMITMENT TO SAFETY AND HEALTH

I have had the opportunity to spend some time in a very finely engineered smelter - one of the Bergsoe smelters. I was there with Mr. Bergsoe and during our visit he noticed a violation of a minor safety practice. He immediately went over and very briefly counseled the man about this safety practice. Here was something extremely important. To this worker there was no question that in the Bergsoe organization commitment to safety starts at the very top.

It is important for managers to ask themselves how committed they and their company are. When there is a breakdown and a choice must be made between lead exposure and producing a product, what does the furnace crewman think the choice will be? I fully agree that our objective is to produce a product because it puts "bread on my table" and sends my kids to college too but this objective has to be tempered by other important concerns, especially for the health and well-being of workers. It can't be, "make lead at any cost" because without a properly motivated, cooperative workforce, it will be more difficult and expensive (if not almost impossible) to achieve the mandated legal requirements.

#### QUESTIONS, ANSWERS AND COMMENTARY

Question (M. Lane, Davy McKee Corp):

Have you noticed any correlation between the people who have good work practices and low blood lead levels with the fact that they smoke or not?

Answer (W. Pallies):

I've seen information on both sides of that question. In a presentation later, Don Lynam is going to present some very interesting correlations between exposure to another metal and smoking. Certainly there is something to it.



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