

December 7, 1961

Mr. Robert P. Restrepo
Director of Manufacturing
Price Battery Corporation
Hamburg
Pennsylvania

Dear Mr. Restrepo:

I am sending, herewith, three copies of a memorandum which I have prepared for your information and that of your associates (as you may desire), following my visit with yourself and others of Price Battery Corporation on November 22. More time has passed than I would have wished since my visit, but other duties had to be attended to, and I've done the best I could in fulfilling my promise to advise you, as fully as possible, of my views of your situation.

You may come to the conclusion that I am somewhat harsh and unsympathetic in my appraisal of conditions in your plant, and of your needs in matters of industrial hygiene. This would not be a fair appraisal of my attitude. I was pleased by my visit with you and your associates, from the aspect of the openness of mind of your group, and I could wish that I need not be critical. The facts, however, are as they are, and I have attempted to represent them frankly. You do not want my sympathy, I am sure. Rather, you want and need advice, and this I have given.

Your plant is, in a number of respects, dangerous, and for this, you and your employees will suffer. Modern social, hygienic and legal attitudes are such that you will be penalized severely - increasingly severely as time goes on - for these shortcomings. They must, therefore, be recognized and corrected. This will be troublesome and costly, and I cannot deceive you in this matter without being guilty of gross professional dishonesty. It can, however, be done. It would be much easier to build the necessary improvements into a new, well-designed and well-engineered plant, but it can, with somewhat more difficulty and attention to details, be done in the present plant.

As the first step, I advise the sampling and analysis of the blood (and advantageously but not imperatively the urine also) of a group of employees whom you will select as the most representative (from the aspect of the duration of employment in specific jobs or areas) of the various occupations in the plant.

The usual procedure in a situation of this sort is that of carrying out an elaborate survey of the lead content of the air in all parts of your plant. I do not advise this, for the reason that it would take a considerable period of time and repetitive sampling (in order to obtain representative

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results), and the cost would be considerable (unless the State authorities were to do it for you). Moreover, it would not tell us nearly as much as would the sampling of the men, themselves, who bear, in their own bodies, the record of their experience. The latter information can be obtained quickly and will tell us what we need to know - namely, where there is danger, and how much danger.

As I told you on the telephone, I believe now that we should do these analyses for you. The results must be interpreted for your benefit, and I do not want to be handicapped in this by doubt as to their reliability. You will need access to analytical facilities nearer to your plant than Cincinnati, but that can be arranged later. We can help you out in this matter (as we have done elsewhere) by making sure that you obtain reliable results. We shall send to Dr. Judd the necessary containers, according to your instructions, when you wish this done. We shall provide suitable instructions for obtaining satisfactory samples.

The next step in dealing with your problem seems to me to be that of our giving Dr. Judd all the help we can in dealing with your problem. If he will pay us an early visit, we can go over the problems, step-wise, and advise him what can and should be done. This, in my view, is a crucial matter. I have tried to point out what is wrong with your plant, in some detail. I have not made specific recommendations for curing its faults. A number of things need to be done. Some of these develop automatically out of my criticisms, but how badly are they needed, and where does one start? For example, I believe that you will find it necessary to use wet methods of cleaning floors and of preventing dust, unless you rebuild all the floors in the plant and make them readily subject to vacuum cleaning. This will require drains, ditches and settling basins (or perhaps one central settling basin). Where should you use such methods (certainly in the smelter, but where else?), and where should you resort to vacuum cleaning? This, of course, is an engineer's problem, and not mine. Consequently, I am not making arbitrary recommendations, but waiting a bit to see what can best be done. (I do not expect to visit your plant again and again in order to guide or follow your progress, and this is why I thought it necessary to write an elaborate memorandum. It is also why I think it necessary to work with Dr. Judd.) By corresponding with Dr. Judd (and with you also, if you wish), I can aid him and you to some extent, and aid in the achievement of your purpose. You have a difficult job to do. It will not be easy to surround all of your operations with satisfactory safeguards, but it can be done, and if you are to continue in business, it must be done. I have no wish or intention to be nastily critical, but I know what is going on in this country in matters of industrial health, under the pressure of social changes, union demands, and governmental regulations, together with the progress of professional education. I know that such a plant as yours would not be permitted to operate in some parts of this country. Indeed, it is only because of the benighted state of industrial hygiene in Pennsylvania (confidentially, Ohio is little better), that such a plant can continue to operate. But Pennsylvania is catching up, and sooner or later you will

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be in deep trouble. You have time to act so as to escape this "catching up", and you should do so.

What I advise, therefore, is the step-wise procedure whereby you deal with first things first, and gradually get your entire house in order. One of your first requirements is good medical guidance and supervision, and therefore, I am pleased and encouraged in the belief that Dr. Judd can provide this. I will help him all I can.

I enclose herewith a statement of my expenses and a bill to cover the cost (to the Laboratory) of the time spent by myself and my secretary thus far, in dealing with your problem.

Perhaps I should advise you that I do not expect to make any charge for the time I (and others) spend with Dr. Judd. The Laboratory absorbs the cost of such professional courtesies as a part of our educational function. We shall, however, charge for the analytical services suggested, at the rate of \$12.50 per analysis.

I wish to express my appreciation of your courtesy and hospitality at the time of my visit.

Cordially yours,

Robert A. Kehoe, M. D.

RAK:ss

Enclosure - 3 copies of memorandum and
Statement of expenses

P.S. I enclose a brief memorandum on the lethal dose of lead for cattle. This however, is not the criterion which should be applied to the concentration of lead which is permitted in a stream.

R. A. K.

RE 0018681

MEMORANDUM

On the Conditions Observed During a Visit to the Plant
of Price Battery Corporation at Hamburg, Pennsylvania

This plant was visited on November 22, at which time the operations were observed, and various matters of interest to the visitor and of concern to the management were discussed at some length. In addition, the plant physician, A. Judd, M.D., was interviewed, and certain matters concerning his activities were inquired into and discussed, briefly, with him. The purpose of this memorandum is, first, to comment on certain physical conditions associated with the operation of this plant, in their relation to industrial hygiene, with special reference to the exposure of the employees to lead; second, to review, briefly, certain matters of procedure and policy in the handling of the operative personnel; and third, to make certain recommendations for the improvement of industrial hygiene, with respect to the control of the exposure of the employees to lead.

1. General Conditions in the Plant.

There are several features of the plant which create gross difficulties in matters of industrial hygiene.

(a) One factor is the limitation, as well as the unsatisfactory arrangement, of space. It is wise, so far as possible, to isolate operations which give rise to dust and fumes from those which are not associated with a significant degree of contamination of the air. This applies also to the movement of materials and partially fabricated articles (those which spread lead-bearing dust around), whereby the wheels of vehicles of any type and the shoes and clothing of employees redisperse lead dusts on floors into the

air. Lead-bearing materials and parts are stored in many areas of the plant, and the floors are littered with dust. If more space were available it would be possible to rearrange storage and transport areas so as to confine the exposure to dust to those persons who must handle and transport partially finished parts of the batteries.

(b) The plant is over-crowded with equipment and materials in all stages of production from the smelter on through, the space being too little and, therefore, crowded and poorly arranged from the aspects of convenient handling and conveyance, and the achievement of cleanly house-keeping. In consequence persons are being subjected to exposure to lead dusts, because of the work and activities of others, when their own work, of itself, involves little necessary exposure.

(c) An additional problem, which militates against good house-keeping, is the condition of the floors generally, in most of the areas of the plant. These are rough, uneven and irregular as to surface, so that they defy adequate cleaning. In consequence of this factor, augmented by the shortage of space, there is a general state of uncleanness. The housekeeping is very poor, and is likely to remain poor, in view of the difficulty, under the prevailing circumstances, of achieving good house-keeping. (Cleanliness in the lead trades is something very different from the degree of orderliness which is satisfactory in many industries. It is achieved only when lead-bearing dust on floors, moving objects, and surfaces that may be disturbed by moving people and objects and air currents, has been reduced to the point at which only very minute quantities are available for dispersion into the air of spaces in which people work. By "minute quantities" one means a few milligrams, rather than visible, palpable quantities. This is why the housekeeping is said to be very poor, for almost anywhere in

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the operating areas of this plant, lead dust exists in sufficient quantities to be seen readily, and in some it can be shoveled up. One cannot guess at the concentrations in the air in various parts of the plant, but the impression developed at the time of the visit was that in some areas - the smelter being the worst - the atmospheric contamination must be excessive. In others, at least intermittently, it must often be dangerously high.)

(d) A third problem, somewhat related to those mentioned previously, is the difficulty of providing suitable drainage (floor drains, ditches, etc.,) in and from the operating areas by which water, used to hose out dust and debris from floors and other accessible surfaces, can be collected into a settling basin and freed (sufficiently) of lead before entering drains which lead directly (or perhaps indirectly) to a local stream (or streams). It does not appear that there is space enough to enable suitable local drains to be used and controlled (as to their output of lead).

(e) The problem of stack effluents may or may not be significant. It appeared at one time during the day that there was a considerable quantity of effluent; at other times it appeared to be nearly negligible. If there is an intermittent escape of lead compounds in significant quantity from this source, some further effort will need to be directed toward this end. Our primary concern, however, is for the safety of the workmen in the plant, and although the cultivation of good relations in the neighborhood is important, the workmen are subjected to greater risk than the neighbors, and they are entitled to the first consideration.

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2. Specific Areas and Conditions.

(a) The yard around the smelter in which broken batteries are stored and handled, and transported, along with other lead-containing materials, to the furnaces, is potentially dangerous. It appeared, at the time of this visit, that there was sufficient moisture in the materials and all over this area to prevent the dispersion of dust into the air. There is no assurance, however, that this is always the case, and if it is not, this situation is dangerous. In a similar situation, involving dry material, we found that every man who had worked for as long as three weeks, had absorbed dangerous quantities of lead. Lead-containing materials in this area of the (Price) premises were distributed over the entire area of these activities in very generous quantities. Only a limited amount of superficial drying of some parts of the general area would be sufficient to create a gross hazard.

(b) Conditions within the smelter on the day of this visit were almost as bad as any that can be imagined in lead trades in which dust and fume are to be dealt with. The fume in the air was distributed largely (but not exclusively) within the upper part of the smelter building, where no one was working (one man went into this area to open up a partially plugged duct and remained there only for a short time). It can safely be assumed, however, that the point at which the visitor stood to view the operations, was surrounded by air too heavily contaminated with dust and fume to be safe for regular occupancy. There was no part of the smelter, on this day, in which it was safe for men to work regularly. Some of the men wore dust respirators. One had his respirator around his neck. Others had no respirators

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with them at this time, despite the existence of unusually bad conditions. It is evident that the use of respirators is a matter of judgment or choice on the part of the workmen. It is just as evident that, under the conditions that existed in the smelter on this day, every man should have been using his respirator continuously. The men, clearly, had no fear of the situation in which they were working. This means, simply and certainly, that they had no real understanding of the significance of the exposure to lead to which they were being subjected. This observer will be surprised if there is a single man in this group who has not absorbed potentially dangerous quantities of lead. If there is such a man in the group, then the conditions observed ^{at the time of the visit} (on November 22nd) were unusual, or else such a man has been working in the smelter irregularly or for only a short time.

To cap the climax, as to conditions in the smelter, dry sweeping was being done in an effort to gather up the shovels full of finely divided, dry, lead oxide. Reference will be made to this procedure later.

(c) The area in which pasting is done appears to be reasonably free of hazard. Even here, however, moist paste falls to the floor, and some of it remains there long enough to dry and then to be available for dispersion into the air. An area of this type should be spotless and entirely free of dry deposits.

(d) At the other end of the pasting machines, and in the same room, the plates, now filled with oxide, and partially dried (still moist enough to prevent dusting), are being handled and piled up on wooden boards or frames. These boards, while being transported to and from the point at which they were being loaded, and while being handled, had considerable quantities

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of dried oxide (once paste) upon them, so that the moist state of the newly made plates did not serve to prevent the contamination of the air at work sites with dust. Moreover, the debris on the boards fell to the floor, at times, where it was ground up by the feet of men, and by the low-wheeled vehicles on which finished and unfinished products were being moved about. Such boards or frames, used for the handling of plates in tiers, are widely distributed through the plant, often being seen in rooms in which little or no other means existed for spreading lead compounds upon floors. No effort appears to be made systematically to keep them clean, and thus they are a source of widespread contamination. Emphasis is put on this, possibly beyond its significance as a lone factor, for the reason that the movement of people, equipment and materials through this plant is an important series of sources of contamination of the air. The floors over which vehicles move, the vehicles themselves, and everything they carry, should always be free of dust-producing materials. These items can be vacuum-cleaned frequently and kept clean. After they have moved unclean materials, they should be cleaned thoroughly, so as not to perpetuate the distribution of debris. However, so long as dusty objects and dust-producing materials are being moved about, the floors over which the movement takes place will be contaminated. Such floors (in areas of traffic) should be kept smooth, free of pits, ridges, gratings and the like, and should be thoroughly vacuum-swept with sufficient frequency to maintain their cleanliness. The only alternative - which is an unsatisfactory one, for several reasons - is that of keeping the floors wet, so as to prevent the raising of dust. Vacuum cleaning is preferable, but is, we believe, impossible, unless floors are smooth, regular and as free as possible of objects that get in the way of vacuum sweeping, having corners and crevices in which dust gathers.

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(e) In the assembly area, groups of plates bound together in units, were being handled on unventilated stands or tables, on which dust accumulated. All such tables or stands on which dry (or drying) materials may collect during normal operations should be down-ventilated grilles. Every movement of these materials raises dust unless the latter is removed at its point of origin. Every such movement also results in the dropping of dry (or drying) material on the floor to be trod upon and carried about.)

(f) In areas in which plates were being handled (pasting and assembling) men and women were seen eating and drinking during a rest period. At this time, the adjacent wash-rooms were being used to some extent, but the employees did not always wash up before eating and drinking, and they did not resort to eating rooms, but ate and drank essentially on the job. It is possible, perhaps, to avoid the ingestion of appreciable quantities of lead under these conditions, but it is hardly likely that this will be done, and it is certain that it was not being done by all of these people.

(g) The wash rooms, lunch room (one seen, there may be others), shower rooms and locker rooms, while not highly attractive, appeared to be ample for the purpose to be served by them. It is to be doubted, however, that they are being used satisfactorily by a well informed and well supervised plant population. The sight of employees eating and drinking, without a disciplined washing up, beforehand, was fairly convincing evidence that they have little idea of the ways of cleanliness in connection with their work - that is, of the precise nature of the cleanliness required and how to achieve it.

3. Matters of Procedure and Policy in Industrial Hygiene.

It can hardly be said that there is a program of industrial hygiene in this plant, in the technical or professional meaning of the term. A feeble attempt in that direction is being made on the recommendation of some person or person - obviously inexperienced - connected with the insurer (or insurers) of the industry.

Industrial hygiene, in the lead trades, insofar as it is sought and achieved in its non-medical aspects, is comprised of a series of technical procedures, whereby exposure to lead is measured and brought under adequate control. It consists, first, of the design of operations so as to limit the contamination of the air of work-rooms, and the arrangement of space, so as to separate potentially hazardous from non-hazardous operations. It then measures the respiratory hazard by adequate sampling and analyses of the air at the breathing zone of the operators of various processes, and on this basis appraises the need for measures of control. It continues further in bringing the necessary degree of control into the hazardous or potentially hazardous operations. Such control relates to the design of equipment, the ventilation of equipment that requires ventilation (primarily by exhaust ventilation of specific areas or operations which give rise to dust or fume), and the collection of exhausted material where it will not return to the air. (The adequacy of the measures of control is checked by further analysis of the air.) It goes still further, in developing methods of housekeeping which prevent the accumulation of materials that can raise dust, and which gather up such materials by means which do not, of themselves, create dust.

Industrial hygiene as applied to industrial personnel, is directed first to the instruction of such personnel in the potential dangers of their

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work, so that they will understand why they are required to do certain things and not to do certain others.

The first lesson relates to care in not raising dust. (Dry sweeping, of course, flies in the face of this, and defeats every other effort to achieve understanding of this matter.) Such attention as is required is devoted to the proper use of respirators, air-line masks, or whatever is best and necessary, in dealing with irregularly recurring conditions in which, from time to time, the air where one must work is badly contaminated and must not be breathed or must be cleaned before being breathed. Proper masks must be selected by the management (or those who know best), and must be kept in proper condition for prompt use, and their use must be enforced by adequate intelligent but insistent, supervision. (It is not satisfactory to depend upon the use of respirators regularly or constantly, for the avoidance of exposure to lead dust or fume. The basic conditions under which men work should be safe. There are, however, situations which may recur from time to time, through faulty equipment or operations, or in connection with occasional operations or processes, which require respiratory protection. These should be subject to firm supervisory instruction, so as never to be ignored.)

Next in importance comes the training of the personnel in the avoidance of the ingestion of lead. This calls for excellent facilities for storing work and street clothing (double lockers), comfortable and cleanly showers which will invite usage, suitable hand (and face) washing facilities, spotlessly clean and dust-free rooms in which all eating is done, and clean and sanitary toilets. Unless these are orderly, clean, and reasonably attractive they will not be used freely by men and women, so that training and discipline will fail.

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All employees should be instructed in attention to the details of cleanliness - bathing and changing clothes at the end of the shift; washing up carefully before eating; eating and drinking only in specially provided and designated places. (Men were seen to be smoking. Some of them in all likelihood, chew tobacco. This should probably not be permitted, for it is only by the exercise of unusual care that this can be done without taking lead into the mouth. In any case, if it is permitted, the men (and women) should be shown how to avoid the ingestion of lead. They must come to an understanding of the fact that the swallowing of lead, in connection with their work, must be prevented, and that this can be done only through their own care.) No food or drink should be kept anywhere in the plant except in designated storage areas and facilities. Such facilities must be so designed, located and maintained as to be free of dust at all times.

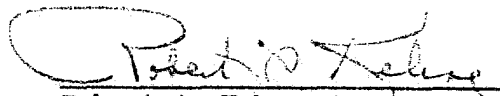
There should be a satisfactory regimen of medical supervision of all operating personnel. This is comprised of suitable medical examinations, suitable clinical laboratory procedures for investigating the health of employees, and satisfactory analytical facilities for checking the lead content of blood or urine (or both) at suitable intervals as determined by medical and economic policies of the plant, (such facilities need not be in the plant, but should be accessible by prearrangement and not too remote for prompt service), and opportunity for inspection of the plant and for instructing the employees in matters of hygiene. The details of the medical regimen cannot be- and need not be - described here. They can be considered in detail by Dr. Judd, who will be prepared to decide what should be done and what can be done in the available time, after consideration of the situation with the management. (It is anticipated that he will visit this Laboratory and consider

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our advice). Suffice it to say, as a general principle, that the hygienic regimen of the plant, in all matters that relate to the care and guidance (in matters of health) of the operating employees, should be in his hands, and his recommendations should be followed as closely as may be possible. No one else should have any hand in the instruction and supervision of the employees in hygienic matters, except on his advice. All medical and hygienic findings and the records thereof, should be in his confidential keeping, and should be inaccessible, except for his wish and consent, to all other persons. Such time as may reasonably be required of Dr. Judd, to permit him to take over and bear the full responsibility for the conduct of the regimen agreed upon between him and the management, should be scheduled.

The establishment of a satisfactory medical and hygienic regimen will necessitate provisions for a suitable medical facility in the plant. The present quarters are wholly inadequate for this purpose.

From The Kettering Laboratory in the Department of Preventive Medicine and Industrial Health, College of Medicine, University of Cincinnati, Cincinnati, Ohio.



Robert A. Kehoe, M. D.
Director.

Date: December 7, 1961

KE 0018692

MEMORANDUM

On the Toxicity of Lead in Food or Water
for Cattle

The oral dose of lead required to kill cattle varies with a number of factors, such as the compound of lead ingested, the state of health and nutrition of the animals at the time the lead is ingested, the period of time over which the dose is ingested, the age of the animals (the young being more susceptible), and the medium in which it is taken (whether in food or water and in what concentration).

One dose of soluble lead, of the order of 50 to 100 grams, administered orally at one time, to an adult, healthy cow, is likely to be lethal.

If the food or water taken regularly by cattle contains lead in relatively high concentrations, illness - perhaps fatal illness - results after periods of time which vary inversely with the size of the dose taken per day. Low concentrations, on the other hand, appear to be incapable of inducing chronic poisoning. It is said, authoritatively, that such a quantity as 8 milligrams of lead (Pb) per kilogram of body weight per day, can be taken daily by adult cattle over a period of months, without harm. Young calves sicken and die after a few days when they ingest 0.2 to 0.4 gram of lead (Pb) per kilogram of body weight. The lethal dose for adult cattle, under these conditions, is somewhat larger.


Robert A. Kehoe, M. D.

December 7, 1961

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STATEMENT

Expenses of Robert A. Kehoe, M.D. in visiting the
plant of Price Battery Corporation, Hamburg, Pa.
on November 22, 1961

Airplane fare	\$78.65	
Hotel (paid by Price Battery Corporation)		
Meals	6.35	
Taxi and airport limousine	<u>7.00</u>	\$92.00

Reimbursement of The Kettering Laboratory
for time spent in services of consultation
and advice rendered by Robert A. Kehoe, M.D.
(including secretarial services) to
Price Battery Corporation in connection
with the hygienic appraisal of their plant.

2 days at \$120.....	<u>240.00</u>
	<u>\$332.00</u>

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