Memorandum to Sr. Crottanelli on the Tetraethyl Lead Manufacturing Plant at Bussi. over a Adriatic Sea arm of Italy,

General Statement.

The hygienic conditions in the plant appear to be generally satisfactory. They are not as good as they can be made, and there is a lack of precautionary measures at certain points, which while not of great significance in a plant of small output would be of importance in a larger plant. A number of useful improvements can be made at little cost. It is doubtful, however, if any extensive improvements should be attempted in the present plant since the dangers of re-construction will be greater than the dangers of continuing the present operations.

As to the salvage value of the present plant, it must be said that none, or at most, very little of the equipment could be used or should be used in building a plant which is to operate on the ethyl chloride process.

Specific Recommendations.

A. Ground Floor T.E.L. Building.-

The lowest floor of the T.E.L. building where the T.E.L. is filtered and separated is apparently unduly high in lead vapors. This I believe is due to a series of small sources of leakage as follows :

1) First and probably most important, the pump employed to pump the filtered lead into the weigh-tanks, is of a type which in our experience can be expected to leak. There should be, here, a Lewis type of pump, with ventilation at the head of the pump column.

2) The weigh-tank is connected to the entrance and exit lines by short lengths of woven flexible piping, with screw fittings at either end. These flexible pipes tend to leak and should not be used unless absolutely necessary, and they should be connected to the system by welding if they must be used. It would be better to eliminate them and to use longer or spiral solid tubing for the connection to the weigh-tank, thereby excluding the opportunity for leakage of liquid or vapor at these points.

3) There are too many joints and too many sight glasses in the piping on this floor. The piping lay-out should be simplified, and all unnecessary joints and sight-glasses should be eliminated. Such sight glasses as must be used should be better constructed to reduce the opportunity for leakage. A type of sight-glass which has given better results has been constructed mostly of metal with double glass flat plates in the front and back sides, with a light behind.

4) The filters should have slotted ventilators above and to their rear , so that when they are opened and the bags are lifted up, the air of the room will not be unduly contaminated with lead vapors.

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3) There should be regular receptacles to receive the dirty filter bags when removed, these being equipped with tight covers so as to enclose the vapors. These should be used to carry the filter bags from the plant and to a point at which they can be burned and the containers can be cleaned.

B. Sludge Pit.

The sludge pit is now open on one end and can be entered by anyone who approaches it from the open end. There are certain articles stored there which are used (perhaps) for other purposes unrelated to sludge. This pit should be closed, and locked to prevent entrance, and to prevent the escape of vapors into the surrounding air. It should be kept under suction and no one should enter it, for any purpose, without an air-line mask. No articles should be stored there except such as are used in handling sludge.

C. Lead Melting, Reclamation and Pigging.

Because of the small quantity of metallic lead reclaimed, and because of the infrequency of operation up the furnace, no precautions are taken in pouring molten lead into molds. In any larger operation and to some degree also in one as small as this, this is bad practice. A pigging table, with ventilation to care for fumes, should be constructed in direct connection with the receiver from the furnace. The ventilating hood over this receiving pot should be lowered and flared more so as to carry away all fumes from the vicinity of workmen.

D. Laboratory Analyses of Air.

The lines which carry air from various parts of the plant to the laboratory for analyses of lead content are long, and are joined to the reaction receptacle by long rubber tubes. This arrangement, without doubt, causes low results because of the partial condensation of vapors along the metal pipes, and more particularly because of the absorption of lead by the rubber tubing.

It is better to set up the air sampling equipment in immediate proximity to the air to be tested, by setting up the reaction receptacle and the meter on a shelf in the space under examination. Rubber tubing must be avoided except for the smallest bits required to connect glass tubing in the equipment.

E. Masks.

The type of mask employed in entering contaminated areas is not good for several reasons. The small face-piece can hardly be fitted so as to avoid minor leaks. The absorbing medium is too small in quantity and too thinly disposed in the cartridge-like canister attached directly to the face-piece to cleanse the air. The face-piece should cover the entire face and chin and the canister should be attached to a belt and, by a tube, to the face piece so as to provide a considerable thickness of charcoal to be traversed. It is better not to depend upon a charcoal filter type of mask in a manufacturing plant, but to use air-line masks only. When these are used one does not have

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to worry about the saturation of and absorption medium (i.e.) the period of effective absorption of the toxic vapor), or the occurrence of small leaks around the face-piece.

F. Gloves.

In manufacturing operations the use of rubber gloves is hardly to be recommended because of the necessity of using tools and carrying out many other operations which result in injury to the gloves. A very good quality of leather glove, thoroughly impregnated with a mixture of glycerine, soap and beeswax (the exact procedure for preparing the gloves will be provided) should be used ; These must be kept clean on the inside and must be inspected for cleanliness and good condition from time to time. They must be discarded promptly when contaminated, or worn thin, or when cut or broken.

G. General Advice.

It is not to be supposed that all the defects of operation can be picked up in a single trip of inspection. It is especially true that severe exposure arises in connection with abnormalities or emergencies and also in connection with repairs. Provisions must be made to carry out repairs and the removal or modification of equipment without exposure to lead vapors or to liquid in contact with the skin. To what extent facilities for the purpose are available in the plant one cannot say.

It is the opinion of the writer that the magnitude of the basic or the regular exposure as well as the periodic unusual exposure cannot be known with sufficient accuracy on the basis of the present medical supervision provided in this plant. Such supervision should include the detailed study of each man and the conditions under which he works. There should also be a means for maintaining a regular study of the lead excretion of a group of men whose occupations cover all the types of work and exposure met with in the operation of the plant.

17/8/38