not afford the protection desired to the upper part of the leg when this occurs. However, in wearing knee type leggings, it is important that the trousers are bloused over the top of the legging, so that molten metal cannot enter through the top and run down inside between the plants and the legging.

Before I continue discussing personal safety equipment, let's see if, in your estimation, this wearing of safety equipment pays. I have positive proof that it does pay, because I can use the foundry I work in as an example of the results that can be obtained. The Harvester Company purchased and took over operation of the Waukesha Foundry in February 1946. We had no planned safety program and not many safety rules, such as those we have now requiring the wearing of safety equipment. We had 28 lost-time accidents among our foundry workers in 1946 including one fatality. In June of that year we had a safety program functioning and a goggle and legging wearing rule that worked. Our record thereafter showed how it worked. Of the 28 lost-time accidents in 1946, twenty-five happened during the first six months. We had three lost-time accidents the last six months of that year.

During 1947 we did not have a lost-time accident, and we did not have a lost-time accident again until August 1948, which was the only one of its type that year. So we worked two years with one lost-time accident. During these two years, 1947 and 1948, we worked over 2,159,000 hours with one lost-time accident in a 100 per cent foundry operation. Incidentally, the one accident we did have during 1947 and 1948 amounted to only three days lost time. In 1949 we had three lost-time accidents. These amounted to a total of 48 days lost time, and so far in 1950 we have had two lost-time accidents, one of which amounted to four days, and the other to one day of lost time. I think this record speaks for itself, and if you could see some of the damaged personal safety equipment turned in for replacement and repair, you too would be enthusiastic about equipping your employees with some type of goggles and other types of safety equipment.

In Wisconsin, as probably many of you know, under our Industrial Commission rules, any safety equipment that an employee is required to wear as a condition of employment must be furnished gratis by the employer. So we do not require that our employees wear safety shoes in order to hold their jobs, but we do our best to sell employees on the idea of wearing safety shoes. We sell two types of shoes, lace and what is commonly called molders shoes, which are the slip-on type with elastic sides. We sell lace shoes in both high and oxford styles. We discourage wearing oxfords except in our cleaning, inspection, core and finishing departments, as hot sand and molten metal in other departments may get in low shoes very easily. These safety shoes have saved many employees from serious injury. I wish I could show you a couple of shoes that have withstood the heavy impact of a casting that accidentally dropped or fell, so you could see how the blow was deflected or how the toe of the shoe was crushed without causing injury to the foot.

We also encourage the wearing of gloves by our grinders and employees who handle castings because an accident such as a cut or burn may take place. Many times a grinder's hand slips and touches the wheel. The glove is cut but the hand is saved from injury. Sharp edges on castings can cause nasty cuts, which can be prevented by the wearing of gloves. Likewise a shifter may accidently burn his hand on molten metal or on a mold or weight. The gloves used are of the gauntlet and knitted-wrist type with a leather palm. Gloves are sold to employees at cost.

I think I have mentioned the hazards most common in our foundries which are burns, eye, foot and hand injuries, and the measures we have taken to prevent them. Of course, what is done to prevent such injuries is up to you, but we have prevented a lot of these injuries in our plant. Safety education is a never-ending process, and you must put all your efforts into it to keep it alive. A safety program must go on day-after-day so that there will be no letdown.

During the many years that I have been connected with safety, I have sold myself on it. If you are sold it is that much easier to sell the other fellow, and if you do sell the other fellow on wearing personal safety equipment your safety program is bound to succeed.

The Problem of Industrial Hygiene in the Foundry

By HERBERT J. WEBER
Chief Industrial Hygienist, American Brake Shoe Co., Medical Department, Chicago, Ill.

Potential hazards to health in the foundry industry are becoming more numerous today because of advances in metallurgical research. Formerly the foundry was identified with silicosis, but recent studies have shown that the incidence of silicosis in the industry is low. However new alloying materials are now being used to obtain special metallurgical properties. Thus today we find lead, zinc, tellurium, beryllium, manganese, phosphorus, radioactive cobalt—to name a few materials—being used routinely in founding. These have given rise to new hazards and to new problems of prevention. The solution is not the same for all yet, fortunately, there are some common principles of approach that are applicable in a generic way.

Sometimes I think preventive measures are becoming so complicated that only a trained hygienist is capable of applying them intelligently. On the other hand, there are certain common sense procedures that should seem obvious even to the uninitiated.

In the light of our present knowledge, you cannot deal with beryllium for example, in the same way as you would with silica or with radioactive materials, and respirators are not a solution. As I have said elsewhere: "Respirators are a stop gap—a dubious remedy. In the first place their use lulls one into a sense of false security. Suppose management issues respirators to all exposed employees instead of controlling the dust and fume; and thereby in its mind disposes of the hazard, has it solved the problem? If the solution of industrial hygiene problems were that simple, you need no industrial hygiene program other than a respirator service, and you need no industrial hygienists. But actually, men will not wear respirators continuously because they are forced to breathe against a resistance; and for work requiring exertion or where there is exposure to heat, a respirator is a cruel remedy. Furthermore, unless the respirator fits tightly, it is worthless. In my experience, this device may be defined as a muzzle type ornament loosely pendent from the neck and used in dirty industries to distinguish the laborers from the office employees.

"If a respirator must be worn, except for unusual cases and for intermittent or casual jobs, it is an indictment of the working environment and an admission of unhygienic conditions. It should be a last resort when all other solutions have failed or are impractical."

This is not to condemn respirators *per se*. They have their use and there is a real need for them in the situations mentioned but they have been readily seized upon as a panacea for all ills due to exposure to foundry dusts and fumes. Properly and appropriately worn, they are effective.

As I said before, the problem of prevention is a complicated one. Some foundries are mechanized, some are production shops, others jobbing shops. One makes beryllium bronze castings, another tellurium iron, and yet another manganese steel. Correct and safe procedures will be different in each instance and the limitations of this paper prevent a detailed analysis of these specific problems.

However, there are some control factors common to all and within the reach of the poorest plant. Oddly enough they are, in my opinion, the most powerful weapons in the fight against occupational disease. They are:

1. *A willingness on the part of top management to correct bad conditions.* Lip service is futile and is readily sensed by the line supervision. The annual pep talk at the safety dinner is not enough. Supervisors must be made to account for departmental hygiene as well as for production. In my experience, unless you have the support of top management, the most expensive exhaust systems will not bring about good working environment.

2. *Good Housekeeping.* It costs little but pays the biggest dividends. A cluttered and dirty area in a foundry causes accidents and occupational disease.