Quarry Section

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THURSDAY MORNING SESSION

October 17, 1935

The sessions were called to order by General Chairman William H. Baker, of J. E. Baker Company, York, Pa., who presided. A previous session held jointly with the Cement Section had been attended by the delegates on Wednesday morning, and the minutes of that session will be found in this volume under the heading "Cement Section." Chairman Baker traced the progress of the section, particularly praising the activities of the standing committees.

Dust Hazards in the Quarry Industry

By J. WM. FEHNEL

Chemist, Industrial Hygiene Laboratory Metropolitan Life Insurance Co., New York

Quarrying is a special type of mining, the methods of working are the same in some instances. While hazards in quarrying and mining have been recognized and standards of operation adopted for their elimination, the health hazards have not received great notice. This is probably due to their slow progress in producing disability or death.

The oldest published data on the harmfulness of exposure to dust deals with the mining industry. Some of the records date back before Christ, and as early as 1556 Agricola[1], according to Mavrogordato[2], in his De Re Metallica, described the perilous occupation of miners due to inhalation of dust and pointed out that permanent injury to the lungs resulted from exposure to certain kinds of dust, but not to all kinds.

In 1780 Ackerman[3], quoted by Koelsch, described miners phthisis as the most "frequent and specific" mine workers' disease and said that physicians did not agree regarding the true definition of it.

The first investigation of health hazards in the mining industry in the United States was made in 1914-15 by the United States Bureau of Mines in cooperation with the U. S. Public Health Service in the Joplin, Mo. mining district. Of 93 men examined, 64 showed definite evidence of pulmonary disease, 3 were suffering from non-pulmonary disease, and 26 were seemingly well. A further examination of 720 miners made from May 15 to December 31, 1915 showed that 45.7 per cent had silicosis and tuberculosis and 5.3 per cent had tuberculosis. A report in 1917[5] on this study by Lanza and Childs contained the first detailed X-ray studies of silicosis made in the United States. The operations in this district are principally in shallow mines.

A recent study by the United States Public Health Service[6] of the exposure to dust in coal mining showed that 2 per cent of anthracite miners and their helpers, with less than five years exposure, showed signs of pneumoniconiosis and that the rate increased to 16 per cent among those with more than fifteen years exposure. These are records for persons under 45 years of age.

Kibbey[7] reported in 1931 that practically all miners working in the bituminous coal mines of his company in Alabama had anthracosis demonstrated by X-ray and there was a high mortality rate from tuberculosis among them. Kibbey does not associate the tuberculosis to inhaled coal dust but rather to a retarded calcium metabolism due to deprivation of sunlight.

The Industrial Health section of the Metropolitan Life Insurance Company, in cooperation with the Department of Industrial Hygiene of the College of Physicians and Surgeons of Columbia University and the New York Tuberculosis and Health Association, undertook during 1928 a study[8] of the rock dusts to which are exposed rock drillers and other hard rock workers engaged in excavation and subway construction in the Borough of Manhattan, New York City. Forty-two per cent showed

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[1] Agricola, Georgius, De Re Metallica: Book I. Trans. from first Latin ed. of 1556 by Herbert Clark Hoover and Lou Henry Hoover, 1912, p. 6.

[2] Mavrogordato, M., The Etiology of Silicosis. Rept. 4th Meeting of Permanent International Commission for the Study of Occupational Diseases, Lyon, April 3-6, 1929, pp. 1-22.

[3] Koelsch, Franz. Theophrastus von Hohenheim, called Paracelsus. Of the Miners' Consumption and Other Miners' Diseases. Deut. Gesell. Gewerbehyg., N. F. 12. 1925, 69 pp.

[4] Lanza, A. J., and Higgins, Edwin, Pulmonary Disease Among Miners of the Joplin District, Mo. and Its Relation to Rock Dust in the Mines, Technical Paper 105, Bureau of Mines, 1915.

[5] Lanza, A. J. and Childs, Samuel B. Miners' Consumption: A Study of the Disease Among Zinc Miners in Southwestern Missouri, U. S. Public Health Bulletin #85, 1917.

[6] U. S. Public Health Service. Treasury Dept., Public Health Bulletin #208, The Health of Workers in the Dusty Trades, III. Exposure to Dust in Coal Mining, 1933, pp. 7-19.

[7] Kibbey, C. H., Relative Pneumonia Fatality Among Surface Workers and Miners, American Journal of Public Health, Vol. 22, No. 4, 1932, pp. 360-366.

[8] Smith, Adelaide Ross, and Fehnel, J. Wm., Silicosis Among Rock Drillers, Blasters, and Excavators in New York City, Journal of Industrial Hygiene, Vol. XI, No. 2, Feb. 1929.

early silicosis and 15 per cent well developed silicosis in the examination of 208 drillers, blasters and excavators. Evidence of tuberculosis, both active and inactive, was found in 9 per cent of the total examined. The great majority of these workers had previously worked in other mining operations, both coal and metal.

Atmospheric dust samples were taken at eight locations, six of which were building foundation excavations and two in subway construction work. The building foundation work is comparable with quarry operations as far as general methods are concerned, but the area is more confined, so that the dust concentrations may be higher.

The dust counts on dry jackhamer drilling varied from 53 million to 17.5 billion particles, less than 10 microns in greatest diameter, per cubic foot of air, and the free silica of the rock ran from 0 per cent to 84 per cent. In many instances, workmen engaged at other operations than drilling were exposed to high dust concentrations, as general air samples taken show from 16 to 200 million dust particles per cubic foot of air.

In subway tunnel work general air conditions ranged from 2 to 37 million, mucking from 4 to 270 million and water Leyners drilling at headings from 136 million to 2 billion. The tests on wet drilling were made at two different locations and were taken while 5 wet drills were operating.

So far we have only mentioned dust concentrations and free silica, so it is interesting to note the comparison of particle sizes found with dry and wet drilling. In the one tunnel there was little seepage of water, so that the workings were dry and the particles of dust generated by wet drilling showed 96 per cent less than 10 microns in size, 75 per cent less than 5 microns and 50 per cent less than 3 microns.

In the other tunnel there was an excess seepage, necessitating the wearing of boots and the constant operation of pumps. Here the dust generated at the heading by the same number of wet drills showed 99 per cent less than 10 microns, 98 per cent less than 5 microns and 50 per cent less and 1.7 microns. In comparison, the particle sizes found in the dust generated by dry drilling with a jackhamer showed 95 per cent less than 10 microns, 65 per cent less than 5 microns and 50 per cent less than 4 microns.

Later tests substantiated the conclusions that wet drilling did not allay the extremely fine dust but did substantially lower the total count. In a test conducted in October, 1931 in a tunnel in the Bronx, New York City, seven CPS type axial water feed drifters were mounted on two benches at the heading with five on the upper and two on the lower bench. A water pressure of 75 pounds was maintained and the drilling rate was 100 feet per drill in five hours. The dust concentration averaged 47.5 million particles per cubic foot over a 30-minute period of sampling.

In a study of underground iron ore mining comparisons were made of wet and dry methods of drilling and it was found that the reduction of dust was ten to one. While this appears to be a long step toward the solution of the dust problem in drilling, nevertheless when we consider that concentration as high as 5 and 6 billion particles were found, reduction to one-tenth of this concentration by wet drilling is not sufficient, especially when a considerable amount of free silica is present.

The Ministry of Health of the Welsh Board of Health published a report[9] on an Investigation Into the Alleged High Mortality Rate from Tuberculosis of the Respiratory System among Slate Quarrymen and Slate Workers in the Gwyrfar Rural District, in which a thorough investigation of working conditions in the quarries and cutting sheds was made and living conditions noted. Physical and X-ray examinations were made and the incidence of tuberculosis and mortality statistics compared for various types of occupations. Unfortunately, no determinations of dust concentrations of the atmospheres to which the workmen were exposed was made, nor were determinations of the chemical or petrographical composition of these dusts made. It was noted that the mortality curve for tuberculosis reached its maximum at a late age and it was concluded that:

1. The workers in the slate sheds are exposed to an injurious dust.
2. The dust concentrations are not very great and the workers and quarry managers, together with the local medical men, do not consider the inhalation of the slate dust to be injurious.

[9] H. M. Stationery Office, London, 1927, Ministry of Health, Welsh Board of Health, Reports on Public Health and Medical Subjects No. 38.

3. The living conditions are not responsible for the high death rate from tuberculosis in this district.

A report by Rogers[10] in the New England Journal of Medicine in August, 1932 indicates that slate dust may contain a higher percentage of free silica than granite, but the tuberculosis rate is not as high in the slate as in the granite district of Vermont.

While we have made many comparative studies of mining operations, in underground work and also some comparisons with open cut or typically quarrying operations, we have found that general ventilation plays a very important part in the control of the dust concentration.

For instance, we found that dust concentrations as high as 6 billion particles per cubic foot were commonly encountered in drilling underground and we encountered in comparison the following dust conditions in quarry work:

Type of Rock	Quarry Operations	Dust Concentrations
	Drilling	
Limestone	Jackhamer	29.5 million particles, less than 10 microns, per cu. foot.
Cement rock.....	" (wagon type drill).	25.4 " "
Asbestos	"	(28.8
		(33.6
"	"	(54.2
"	" " " "	96.4

Mucking operations in general show low dust concentrations, approximating the general air dustiness of the locality. Conditions are, of course, modified by air currents so that while the shoveling operations may not produce a heavy dust concentration, drilling operations close by may set up dust that grossly pollutes the breathing zone of workers engaged in mucking.

Normally the dust concentrations in quarry operations are dependent upon the worker. In few instances is the worker required to remain exposed to a heavy dust concentration, and then only for a short period of time. It is usually possible for him to work in a position away from the direction of the air currents carrying the dust clouds. This is especially true where the drill is of the mounted type. In case of hand jackhamer drilling, the operator is required to bear down with his full weight in order to supply the required feed to the drill. Here the rate of drilling is more or less dependent on the physical characteristics of the man and often the contractor picks only the heavier men for this work. With mounted drills, the weight applied or the feed is constant and the rate of drilling is not only more regularly progressive but also the operator is not required to be constantly exposed to the arising dust cloud.

Tests on mucking show that the dust generated is dependent upon: 1. the fineness of the material; 2. the dryness of the material; 3. the rate and method of handling.

In recent studies in the iron mines in upper Michigan with mechanical scraping of relatively wet material, the dust in the breathing zone of the tugger operator closely approximated the general air of the mine area. In quarry and building foundation work the same conditions held, but in most instances the dust concentrations of the general air were too high for safe breathing over a period of time.

A test run recently[11] of hand shoveling in a dry mine indicated that greater dust concentrations were generated when the material was thrown from the shovel into the car. Samples taken with two men shoveling showed an average dust concentration of 83 million particles, but on applying suction to the top end of the car to entrap and remove the arising dust, the dust concentration was reduced to 8 million particles.

Crushing operations are usually associated with quarry operations. These operations, together with screening or sizing of materials, are usually done on the dry material. Usually the crushing and screening plants are mechanical, requiring only

[10] Rogers, Edward J., Silicosis or Pneumoconiosis in Vermont Granite Cutters and Slate Workers, New England Journal Medicine, Aug. 4, 1932, Vol. 207, pp. 203-208.

[11] The American Institute of Mining and Metallurgical Engineers, Technical Publication No. 637, Control of Dust in Mines, Feb. 1935, N. Y. C.

a few employees at stations and more often only intermittent attention is necessary for the oiling of the machinery.

In some cases the screening operations are done wet and the resulting dust generated is greatly reduced over the same operation done on dry material and especially, as is common practice, with no covers over the screens.

In a survey of a silica grinding plant, the following dust concentrations were obtained:

Location of Sampling	Total Count in Millions of Particles, less than 10 microns, per cu. ft. air sampled
Crusher room	4.25
Grinding room	9.52
Bagging room	69.33

These tests were taken in the summer and there was good general ventilation with all doors and windows open. The crusher and grinding room operations were mechanical, requiring the attention of one oiler intermittently, but the bagging room had two men at the two bagging machines and two men trucking the bagged silica into a car for shipment. These four men were exposed to the highest dust concentration in the whole plant.

A similar study of a feldspar mill operating with open vibrator screens showed the following concentrations:

Location of Sampling	Total Count in Millions of Particles, less than 10 microns, per cu. ft. air sampled
At roughing roll	2,656
At roll crusher	1,589
At screens (feeder end)	4,652
At screens (take-off end)	8,885

Samples taken in a wet limestone screening plant showed 0.91 million particles as the general air dustiness. This limestone was burned to make caustic lime and samples taken at the kilns showed:

Charging floor	2.5 million particles
Bottom of kilns (discharge of kilns)	1.7 " "

Summing up, our experience gained over a number of years by making surveys of varied industries, we have definitely concluded that:

1. Dust is principally produced by mechanical operations and in the mining and quarrying industries, drilling operations are the chief dust producers.

2. Employees at other operations than drilling are often exposed to a high dust concentration due to pollution by dust generated by the drills.

It is, therefore, logical to conclude that the proper way to eliminate dust is to entrap and remove it at its source. While wet drilling may, in certain instances, be effective, the use of water offers other difficulties, especially in freezing weather.

The effectiveness of the Kelley Trap has been demonstrated experimentally and its adaption to drilling operations in its first commercial use on the foundation of the Metropolitan Life Insurance Company's Home Office Building at 24th Street and 4th Avenue, New York City[12] was successful.

A series of later tests conducted in the Balmat mine of the St. Joseph Lead Company[11] showed the practicability and efficiency of the Kelley system under severe mining conditions.

The dust health hazards of the quarry industry are such that they can readily be eliminated by efficient and economical measures.

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[12] Hatch, Theodore, Kelley, George S., Fehnel, J. Wm., Control of the Silicosis Hazard in the Hard Rock Industries, II. An Investigation of the Kelley Dust Trap for Use with Pneumatic Rock Drills of the "Jackhamer" Type, Journal of Industrial Hygiene, Feb. 1932.

Some Phases of Accident Prevention

By H. F. YOTTER

Insurance Supervisor and Safety Engineer, The General Crushed Stone Co., New York City

Accident prevention is primarily a matter of organization and education, but existing dangerous conditions must be made safe before we can reasonably expect the cooperation of the employees.

Safeguarding must not only prevent the accident for which it is designed but it must serve its purpose without unnecessary interference with the proper performance of the work. If not practical, it is a hindrance, rather than a help, in preventing accidents.

Whenever practicable, it is advisable to enlist the aid of the man on the job in planning guards. If the workman feels that he has had an active part, even though minor, in the provision of a safeguard for his protection he takes a keener interest in its use. He comes to look upon it as *his* guard. Safety suggestions from workers should be encouraged, for in this manner their interest is increased and their initiative stimulated.

It is possible to make nearly perfect safety devices, but human frailty does not permit of perfect control of the human element. You can probably recall instances where men of long experience and with good safety records, in a moment of thoughtlessness, suffered injury through taking ridiculous chances. At one of our plants we had a man of more than usual intelligence who was assisting in rivetting a truck body. This man had been with us for twenty years and up to the time of this incident had an excellent safety record. The dolly fell out of the rivetting hammer, which was being operated by a fellow workman, and this operator laid down the machine and walked away. The helper picked up the hammer and, out of curiosity, looked into it to ascertain whether the piston also had fallen out. In doing so he touched the trigger. The injury, fortunately, was not serious but had he shut off the air at a valve located several feet away the injury would have been avoided.

The employer is morally obligated to see that his employees are taught the hazards of their occupation and to make sure that they are alert in their efforts to avoid accidents. Notwithstanding this responsibility, it is probably true that there are still many plants where accidents are caused by the neglect of the employer to properly acquaint both new and old workers with the dangers of their particular duties. In each accident prevention activity management must lead the way in a manner that will convince the workers of its sincerity.

We are reminded of the warning given to his men by an old lumberjack—"Boys, when you hear the crack of timber look out for yourselves. When one of these big trees comes down you must be somewhere else, and be there quick. Use your heads and use them fast." In our allied industries the failure of mechanical and human equipment is not usually preceded by as much warning as the cracking of timber before it falls, and our workmen must consequently foresee the dangers attendant on their work to avoid injury.

In educating the workers it is highly desirable to teach them to be habitually careful. Workers should become imbued with the safety habit. While this habit may not be so easy to acquire as some others, it is infinitely more worth while. The best safety device is a safe workman, and the safety device in a man's head is of greater value than the guard on the machine he is operating.

The best results in safety education are obtained by personal contact. Supervisors of safety who have many operating units under their direction do not have this personal contact with the rank and file. Under these circumstances the duties of teaching the men how to avoid being injured devolve all the more heavily on the foremen in direct charge of operation.

Accident prevention should be made the responsibility of the foremen, just as they are held accountable for quantity, quality and cost of production. Safety bears a close relation to each of these operating phases. When the foreman is convinced of the value of safety and is enthusiastic in preventing the men under his supervision from being hurt, considerable progress has been accomplished. Because of his close

contact with the men, the foreman is in a position to notice the hazards of the work and determine the direct and indirect causes of accidents.

A careful study of working conditions, a thorough analysis of accidents, and a searching inquiry into potential causes of accidents will give an accurate picture of the hazards to which workmen are exposed and enable us to determine the proper means of eliminating them. No remedy can be effective which is based upon a wrong diagnosis. It is manifestly of great importance that we profit by those accidents which do not involve injury, as the difference between an accident without injury and one causing injury is sometimes only a matter of a fraction of a second or a fraction of an inch. Each "narrow escape" is well worth investigating.

If the foreman is an effective leader and holds the respect of his men, he is in an excellent position to influence them to acquire the habit of working carefully.

Foremen are seldom eyewitnesses to injuries. It is therefore imperative that they should attempt to foresee an accident in the making. Too frequently they fail to see a workman doing something which their experience ought to tell them will, if repeated, eventually result in an injury, and such an unsafe practice should be stopped before, not after, an injury occurs.

Accidents cannot be effectively or appreciably reduced until every man on the job knows exactly what he is doing, why he is doing it a certain way, and the part his efforts play in the whole plan.

The average worker is inclined to follow his own judgment on matters affecting his safety. He must therefore be thoroughly educated in accident prevention so that his judgment will be sound. He must come to realize that hazards do exist, that he and his fellow workmen are exposed to them, and that it is highly important that he habitually exercise caution if he and these fellow workers are to avoid injury.

A workman must be safety conscious to the point where, if confronted with a dangerous situation, he will instantly recognize the risk involved. Some men come to believe that they are immune from injury. This attitude is very dangerous and management must recognize it as a serious problem.

The human mind generally is not freely receptive of new thoughts suggested by others and this natural resistance must be overcome. When a new idea is broached, particularly if it involves a change in a man's method of working, he challenges it in his own mind. It is therefore necessary that the merit of the suggestions be made clear to him.

Accident prevention is an essential part of good management. During recent years the standards of every phase of modern industry have been constantly rising. This change has necessitated greater efficiency in the production of our product and consequent closer attention to protecting workmen against injury. The strenuous competition in business today calls for the highest degree of efficiency, and industrial accidents so impair efficiency that they cannot be ignored.

The lowered morale of employees due to reduced wages and the uncertainty of employment during the past few years has caused them to be nervous and has taken their minds off their work. The problem of making ends meet on reduced income and other family troubles have created worries which follow the worker to his job, reduce his interest in his work and his alertness, until his mental condition is often a real accident hazard. Recent conditions of business have also resulted in greater labor turnover and any period of new hiring means at least a temporary increase in the accident rate.

In many instances this depression in business activities has resulted in a let-down in supervising. Foremen who usually did only supervisory work have been required to work as well as supervise in an effort to reduce overhead. This method of cutting costs is questionable from an accident prevention point of view.

Safety posters play an important part in teaching accident prevention. Such illustrated bulletins should contain striking suggestions which cause the men to think about their hazardous surroundings and enable them to apply the lesson to their own working conditions. Without this application to conditions with which the man actually comes in contact, the forcefulness and effectiveness of the poster is largely lost.

Since the last annual Congress, the National Safety Council has issued 756 different safety posters. In so far as possible, these posters have been designed to meet the need for bulletin board material and are aimed at the outstanding common

causes of accidents. During the year the demand for these posters has reached the highest total figure in the history of the Council; over three million posters have been used in the fight against accidents. Over 70 per cent of these posters are suitable for use by members of our Quarry Section.

What the Worker Thinks About Safety

By GLENN L. GARDINER

Assistant to the President, Forstmann Woolen Company, Passaic, N. J.

What the worker *thinks* determines what he *does*.

If we were to ask a number of people their opinion as to what the worker thinks about safety, we would get an interesting variety of replies. Some would say, "That's just the trouble—the worker doesn't think about safety!" Another reply would be, "The worker is indifferent to the whole subject." Some people believe that the worker feels that "accidents are bound to happen, so why make a fuss about it."

The reaction of some would be that the worker thinks, "My own safety is my own lookout, and no one needs to be telling me to watch my step." Others have the opinion that the attitude of the average worker is one of bravado—he thinks, "Why be chicken-hearted about the dangers of the job?" Some workers have a superstitious attitude toward safety. They say, "When it's your time to get knocked off, you just get knocked off. When your number is up, you're going to get hurt—if it's your unlucky day, nothing can prevent an accident."

Then we also know that there are many workers, particularly in those organizations where intelligent accident prevention work has been carried out, who thoroughly believe that *"it can be done"*—that accidents can be prevented. Certainly the records of successful companies prove that where an effective job has been done in correcting the thinking of workers regarding safety, accidents can be reduced to the vanishing point.

What the Worker Thinks About Safety Rules

What the worker thinks about safety rules and regulations depends a great deal upon how strictly safety rules are enforced. The reason that so many workers lose respect for safety rules, is that often safety rules are not enforced with the same degree of rigidity with which other rules of worker conduct are enforced.

Safety rules must also be sensible and practical. A fundamental principle to follow is to make no more rules than are absolutely necessary, and then enforce them without compromise. Some safety rules may unnecessarily hamper a worker's productivity and interfere with his earnings. Such rules should be carefully considered.

To be thought well of, safety rules must be properly "sold" to workers. The reasons back of the rules should be thoroughly explained. The worker should clearly understand that the purpose of such rules is to safeguard his life and health.

The attitude of the worker's supervisor, the manner in which he carries out safety rules and standard practices, will determine what the attitude of the worker will be. The foreman who enforces safety rules apologetically and says, "I'm sorry, but this is a safety rule that the company says I've got to enforce. I know it's a nuisance, but I've been given my orders and I have to carry them out," cannot expect to convince his workers that safety is essential.

The foreman must indicate that he himself is sold on safety regulations, or he cannot expect his workers to respect them.

What the Worker Thinks About Safety Committees

In my opinion a large proportion of workers think that safety committees are "a lot of eye-wash." Most workers do not want to be bothered by membership on them.

One of the reasons for this rather prevalent lack of respect is the fact that so many safety committees have been set up and then allowed to die without activity and without accomplishment. With all due respect to companies writing compensa-

tion insurance, their representatives have been responsible in many instances for the attitude of indifference on the part of workers toward safety committees. Most of us have had the experience of being called upon by the representative of such an insurance company. We have been told that "You can get a certain percentage reduction on your rate if you will set up a safety committee and hold regular meetings of the committee." And often, this statement has been made with a wink, which indicates that you can take the safety committee as seriously as you see fit, just so long as you set it up and make it appear to be functioning.

Safety committees can perform a vital and useful function in any program of accident prevention. It is one of the most difficult safety activities to keep functioning effectively, however. Real work must be given the committee to do. Safety committees should have some authority. Their suggestions should be acted upon promptly and thoroughly. No safety committee will amount to anything unless it has vital work to do, is held responsible for that work, and is given credit for its accomplishment.

Therefore, if you want safety committees to do the job they are capable of doing, do not embark upon a safety committee set-up unless you are prepared to go all the way. It is also proper to rotate frequently the membership of safety committees so that many workers will have an opportunity to participate in their activity.

What the Worker Thinks About Safety Posters

A worker thinks nothing about safety posters unless the posters *make him think.*

The trouble with many safety posters is that they do not stimulate active thinking. Granted, it is not easy to make safety posters which register with equal effectiveness with every worker who looks at them. Different workers are appealed to by different types of posters.

Safety posters are safety advertising and must be judged by advertising standards and the principles of advertising psychology. There are two time-honored definitions of advertising that may well apply to safety publicity. The first is that the function of advertising is "to deliver an unbroken series of favorable impressions" for a product or an idea. The second is that "advertising is the art of causing others to KNOW, to REMEMBER and TO DO!" Is short, the job is to make the worker *know* safety, *remember* safety and *do* the safe thing always.

Almost as long as the safety movement has been under way there has been argument over the "gruesome" type of poster. I am one of those who believe that the type of safety poster which makes a worker think most actively is the poster which pictures for him possible consequences of indifference, carelessness or thoughtlessness relative to the hazards of his job. One of the best proofs of the effectiveness of the "gruesome," I believe, is the recent article entitled "And Sudden Death" by J. P. Furnas in the August "Readers Digest." The article painted the gruesome side of automobile accidents; it was gruesome almost to the point of nausea. But I firmly believe that it has been more effective in awakening public opinion to the necessity of greater automobile safety than all the statistics, newspaper articles and other forms of publicity put together. I am told that the sale of reprints of this article has exceeded a million and a half copies.

To be effective, safety posters must have a clean-cut, worth-while safety message in the form of reminder, suggestion, warning, information, or instruction that will help prevent accidents. The poster that does not capture the attention and aid in developing what we call safety-mindedness might better be consigned to the waste basket.

The worker will think little or nothing of safety posters unless they are frequently changed. They should also be posted prominently at accident-possible points, so that they strike the worker's line of vision, and so that he cannot escape the message which they hurl at him.

What the Worker Thinks About First Aid

I am quite sure that the average worker does not think enough about first aid.

Accident statistics indicate that 15 per cent of all compensation cases are infection cases. There are more than 100,000 such cases annually, causing the loss of a week or more from work, and costing more than 25 million dollars a year in compensa-

tion. The key to reducing this type of injury is the education of workers to think more seriously about the importance of getting first aid treatment of minor injuries which may lead to serious infection.

Why do workers so often neglect first aid? This question has several answers. Many workers just do not want to be bothered about having a slight scratch or cut fixed up. They have had many such slight injuries before and always recovered without serious consequences. Then, some workers do not want to lose time from their jobs to get first aid, particularly if they are working on a piece-work basis. Many regard it as being "sissy" to go to the trouble of having a scratch dressed. Some workers fear that the reporting of these slight injuries may build up a bad record for them. Others do not get first aid attention because they do not want fellow workers to make fun of them for taking seriously so slight an injury.

All this makes us realize the importance of combating such mistaken viewpoints by continuous educational effort to impress upon workers the commonsense importance of getting first aid treatment.

Rather strict rules and regulations should be in effect with reference to getting first aid treatment. Workers should be made to understand that the neglect of slight injuries places them in a much less favorable light in the eyes of the foreman and the management than a record indicating that they have called at the first aid room on frequent occasions to be treated for injuries. There is no more effective medium for the education of workers on the importance of first aid than well conceived posters showing the disastrous results of neglecting slight injuries.

What the Worker Thinks About the Safety Engineer

Probably the worker thinks little about the "safety engineer" until he happens to get hurt and the safety engineer questions him as to how it happened.

It seems to me that the real function of a safety engineer is not to attempt personally to prevent all the accidents that may happen in the organization. His real function should be that of a safety adviser and helper to get the entire supervisory organization safety-conscious to begin with, and then to help them to bring this same attitude toward accident prevention to the workers under their supervision. I should prefer to think of the safety engineer as a foremen's "safety follow-up man." The real responsibility for preventing accidents should be put squarely up to the supervisors themselves. The safety engineer should function as a helper to them. Their safety suggestions and requisitions should be made to him and then it should be his routine duty to see that these suggestions are carried through promptly and effectively. He should furnish the technical guidance, the facts and the analyses of accidents, and all of the information the supervisors should use to sell safety to their workers.

One reason why the average foreman does not take more interest in safety is that he does not have the time nor take the time for all the details that go with safety work. This is where the safety engineer can do a job, and prove his true worth.

What the Worker Thinks About His Foreman

The foreman's safety attitude determines the attitude of his workers toward accident prevention. An indifferent foreman is a positive menace to the safety of his men. If he regards safety as a function of secondary importance, then his men will think of safety only when there are no other things to think about. The foreman who does not recognize that safety is the RIGHT WAY OF DOING A JOB, has missed the target.

An accident is just a MISTAKE! Many a foreman has found it possible to transfer the spirit of cooperation from accident prevention work to the other functions of the department. A group of workers who have learned to cooperate on safety matters can more easily be led to cooperate in getting out the work and in getting out quality work.

If a foreman will take safety seriously, he can make his safety activities the foundation for the building of a great deal of worker good-will. If he approaches safety always with the idea that he is working for the welfare of his workers, it is inevitable that his workers will appreciate this spirit and return to him many times the effort he has made in their behalf.

Workers will respect a foreman much more if he takes safety seriously. The foreman who is slip-shod and apologetic about his half-hearted enforcement of safety regulations, may think that he is being "a good fellow" with his workers, but they do not so regard him. In their hearts they feel that he is an undependable fellow who is not living up to his responsibilities.

Particularly important is the impression that the foreman makes on the new worker. There is no better time for the foreman to impress a man with the importance of safety than when he is learning the job. The development of safe working habits right from the outset is a vital feature of good safety work.

What the Worker Thinks About His Company's Safety Program

A company that sponsors and keeps alive an effective accident prevention program reveals a sincere interest in the welfare of its workers. Do not let anyone tell you that workers do not appreciate such an attitude in the company they work for. This appreciation may not be shown in many tangible ways, but its value is there nevertheless.

Let us not forget either that what the worker thinks about safety is generally a direct reflection of what the top management thinks. When he sees management conscientiously endeavoring to provide safe conditions, safe equipment, and the best obtainable safety devices and protective appliances, together with competent supervision that is ever watchful to prevent accidents, he knows that management is sincere and deserves his hearty cooperation, which he then freely gives.

Today, as never before, we need to find ways and means to stimulate good will with our workers. Safety furnishes a non-controversial avenue of approach to the worker's heart. An active program of accident prevention helps to heal sores of the mind as well as the flesh. If you do not believe that workers think well about a company's safety program when conscientiously and effectively carried out, just listen to the conversation of workers employed in an organization where no attention is paid to their safety.

The good will value of active safety work stands at a higher level today than at any other time in the whole history of industry.

Thought and Action

We know that more than 80 per cent of the accidents of industry are preventable only by the workers' own safe thinking and safe habits.

Most accidents among workers happen to those who are not thinking. Many of the accidents ascribed to "carelessness" are rather due to thoughtlessness or lack of thinking.

To influence the action of people we must first influence their thinking. The key to safe thinking and safe working habits is the repetition of impressions upon the mind of the worker—impressions which bring to him a realization of his responsibility for his own safety—impressions which cause him to KNOW, to REMEMBER, and to DO!

ADJOURNMENT