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TUESDAY AFTERNOON SESSION

October 3, 1944

Presiding: W. C. GARbutt, Casualty Mgr., Pittsburgh Steamship Co., Cleveland, O.

Are Mariners Still Learning Safety the Hard Way?

By CAPTAIN J. E. HART

Port Captain, Mississippi Shipping Co., Inc.

In order to answer this question we must analyze former conditions to find out what the hard way was.

In days gone by, mariners were real sailors and not just ships' crews, and it was traditional that the more risks he took in the performance of his duties the better sailor he was considered.

With the advent of steam vessels a different kind of mariner was created, but the old traditions and customs still existed. He still disdained the use of any kind of new gadgets or methods which had been introduced for his safety. He would rather slip down a stage rope or a stay from aloft than use a ladder, jump over the bulwark to the dock than use a gangplank and would rather lower himself when aloft on a gantline than have a shipmate lower him from on deck. Captains and officers were as disdainful of new safety devices as were the seamen and these men could not be convinced that these old customs were safety hazards—that the use of new methods introduced by management and Government Agencies were safer—until he had an accident himself and had to stay away from sailing and depend on the charity of others.

In the several years just before the War, diligent efforts and education were made by Management in having surveys of the vessels made and changing all dangerous hazards, having safety meetings when the vessels were in port, instructing the Captain and Officers in safety methods and how to conduct safety meetings when away at Sea, by giving cash bonuses to Masters, Officers and in many instances, to all hands for no accidents in a certain number of voyages or on any particular voyage, and other methods of education to make him safety-minded and by keeping records of all accidents and having copies of them dis-

tributed throughout the whole fleet. These methods had begun to show results and many ships made records of 12 months without a single accident or personal injury which caused not one hour of lost time.

This was learning safety the hard way.

The United States Government Bureaus by issuing new regulations, the National Safety Council by the distribution of safety posters, the Seamen's Unions by having safety clauses in their Agreements with the Owners, and the management by their educational methods, all contributed to make the men safety-minded, and the results proved that they had learned that safety pays, under normal conditions—but, the War came along.

Now, let us see if the mariner is today still learning safety the hard way. The answer very definitely is YES—and HOW hard. In many instances we know, some we will learn later, and in many I am sorry to say we will never know.

With the advent of the United States in the War and the requisitioning of the Merchant Fleet by the War Shipping Administration for the transportation of supplies and troops for the Army and Navy, conditions changed so very radically that all previous efforts for safety went by the board. Conditions and hazards such as had never before existed were created. Vessels no longer came back to the Owner's home port. Thousands of new ships have been built and manned by men who returned to the Sea after years ashore and knew nothing of the safety education that had been going on. Men from all walks of life who had never seen a ship were trained. New superstructures were erected on the old vessels, on decks that were before unobstructed, for the housing of additional lifeboats, life rafts, and the carrying of all kinds of Army

and Navy equipment. Blackouts were instituted and obstructions could not be indicated by paint or lights. The seamen in many instances had to rig up gear and discharge all kinds of cargoes under hazardous conditions. They had to handle various kinds of explosives. These men had to navigate vessels in localities they had never navigated before, through mine fields, in convoys, in dark without lights, in fog and storm and being subjected to attack from submarines and from the air. In order to do all these safely they had to use every precaution. They have been torpedoed and had to live in lifeboats and on rafts for weeks at a time and use every resource to keep them alive and healthy.

To do all this and come out safely they

surely must be learning safety the hard way.

When the day of VICTORY comes and shipowners can operate their vessels in their own trades, will the mariner be safety-minded?—or will he be so inured to danger that ordinary hazards in normal operations seem so small as to be negligible? I wonder.

We will have to be prepared to meet this condition and grave consideration must be given to one important fact, that these men have gone through a severe mental and physical strain during the war which will be felt by them for some time to come, and any methods used for safety education will have to be given special consideration.

Establish Safety as an Operating Policy

By G. G. GRIEVE

Statistician-Engineer, National Safety Council, Chicago, Illinois

During my early days in industry I had no clear understanding of the place of accident prevention in the efficient operation of an industrial organization.

Accident prevention in its broadest sense means the elimination of all mishaps that result in property damage or injury and delays the flow of production. I did not associate injuries with inefficient operation by putting them in the same class with other mishaps and other failures to keep the department running smoothly. Avoiding injury was the men's responsibility. Other foremen had this view point. We missed one fundamental fact—a foreman coordinates men, machines and other equipment and materials to produce goods or services—he accepts responsibility for damage to equipment or wasted materials, and by the same principle he *must accept equal* responsibility for injury to his men.

Accidents are caused by the unsafe practices of employees, the unsafe condition of equipment or materials, or both. Since control over workers, control over the operation of machines, and control over the movement of materials is vested in operating supervision, the logical way for the safety engineer to function is thru the line organization. The place of the safety en-

gineer in all industrial organization is somewhat similar to the position of production, industrial and other engineers—a specialist on certain phases of operation.

The initial responsibility for establishing safety as an operations policy rests with the safety engineer. He is hired by management as an expert, for advice on the procedure for reducing accidents with the least expenditure of time, effort and money. Therefore, it is the safety engineer's *business* to point out to management how results must be accomplished, and outline the proper general procedure. He knows that results must be achieved largely thru the operating organization. He also knows that management gives direction to the execution of a new activity—that a fundamental of good management is to specify *"who"* shall execute and be *responsible* for a new policy, and why. One of the first, and important steps in inaugurating a safety program, is for top management to explain to superintendents and foremen *why* the policy was adopted, *who* will carry it out, and the *general duties* of the operating organization for making the program effective. This can be done at a meeting of superintendents who can discuss the new policy at a foreman's meeting.

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through conviction in its merit by presenting sound reasons at these meetings is a big step in ultimate success. I believe that failure to take this step in inaugurating a safety policy has been one of the principal reasons for a chain of circumstances that have resulted in ineffective safety work, and no improvement in accident experience. Supervision never got the idea.

Reasons for a Safety Program

Reasons for inaugurating a safety program usually are costs, humanitarian and social, a poor record in comparison with other companies and all of the others with which you are familiar. The cost conscious superintendent or foreman is impressed by the economic losses through accidents whereas the humanitarian aspect appeals to the kind hearted supervisor. There should be no question about the *advisory* position of the safety engineer in carrying out the policy.

Convincing reasons for inaugurating a safety program pave the way for acceptance of the duties and responsibilities of supervision in carrying out the program. One of the principal difficulties encountered in getting safety work into operations is an *impression* among supervisors that this new policy is going to mean a lot of extra work making inspections, changing this and changing that, and doing a host of extra duties. The result is that the safety engineer, in his efforts to get the foremen to discharge their safety responsibilities, is stymied by the phrase "I haven't time." The foreman's safety responsibilities and duties can be made easy.

A course in the fundamentals of accident prevention for foremen has proven successful in getting a safety program off to a good start, even if the course amounted to no more than a 10-minute discussion of some safety fundamental or problem at foremen's meetings. The opinion that the foremen know a lot about the *hazards* of their departments because of intimate knowledge of the operations is entirely *erroneous*, according to my experience. This view checks with conversations that I have had with foremen who have not been interested and actively engaged in safety work for years. I recall my inadequate knowledge about safe crane operations particularly, because one man lost a foot as the result of a crane accident. I could

operate a crane and trained cranemen but as far as really *knowing* safe practices in such work, I was ignorant. I, like other foremen, simply did not do enough thinking about the safety aspects of crane operations to have them in mind—let alone tell them to a trainee. Furthermore, no foreman has seen enough accidents on most machines during his life to do a good training job, based on his experiences.

I do not believe that any foreman should be expected to dig up the information for teaching safe practices. It's the business of the Safety Department and helps to make the foreman's safety job easy and effective.

Many accidents are caused by unsafe conditions of equipment and materials and fall into general classification of lack of guards and safety devices, personal protective equipment, unsafe design, unsafe lay-out and methods of performing the work. The engineering knowledge required for the elimination of unsafe conditions is *so large* that at first, at least, responsibility for their *detection* and *elimination* should rest with the safety engineer. This is not to say that the foremen have no major part in correcting unsafe conditions. Housekeeping certainly rests on their shoulders and so does good maintenance of machines and equipment but the trained eye of the safety engineer, his knowledge of government requirements, his knowledge of the safety codes and his experience in picking out the places that need guarding, employees who should wear personal protective equipment, and numerous other hazards is information which the foreman acquires gradually.

Foremen often rightfully resist efforts to place excessive responsibility on them for unsafe conditions. The result is antagonism towards safety, and it takes a long time to overcome it. Careful planning and study of the operations, the types of equipment, and methods will avoid a great many of these difficulties. For example, I recall an instance in which an operating foreman was held responsible for an accident involving a mushroomed chisel. The foreman argued heatedly that the responsibility lay principally with the tool room because they issued the chisel to one of his men and he couldn't possibly inspect every tool *before* it was used. He was right. The safety engineer had not studied the important angle of

providing safe tools and he had not worked out a procedure with the tool room foreman. The safety engineer had plunged into a program without first becoming familiar with the operation. Later we got a new safety director.

Our mechanical superintendent had a method of inspection which enabled the new safety engineer to work out an excellent plan with him. The mechanical superintendent assigned a repairman to make regular inspections of certain mobile equipment as part of a policy of reducing delays from breakdowns. The safety engineer, who was a good man, observed certain accident possibilities from the standpoint of maintenance, and tied in his inspection requirements with the mechanical departments.

He encouraged regular inspection of equipment by every mechanical foreman in the plant and then tied in his safety items. In these and other ways he so organized and distributed safety functions that no one felt that safety was too much bother.

Canned Safety Discarded

The principal duty of the operating foremen was correction of unsafe practices and a logical and effective plan was followed. I particularly recall how the new man threw out the canned safety material for use at employee safety meetings and substituted subjects pertaining particularly to our work. For example—the safety engineer had studied the department's work and saw that a great deal of time was spent in ladder climbing, and, of course, he knew the hazards. He outlined the important safe practices and unsafe conditions that would cause accidents in doing this work and we had a lively and instructive discussion on the subject at a safety meeting.

He had the faculty of selecting the important sources of possible accidents and putting them first for attention. Therefore he only requested foremen to give attention to practices and conditions that might cause frequent or serious injuries. His reason was that if the important ones were taken care of the minor ones would automatically be eliminated. He was getting his stuff into operations in a substantial and sensible way.

A feature of this safety engineer's work was his approach in getting acquainted. He

had the friendly approach of a good but not a high pressure salesman. It is a human nature to do things for people that you like and I believe that it was his principal way of getting the cooperation of the foremen. He got strong support from the management by his practical methods.

Safety as Operating Policy

Many observations during the past ten years have convinced me that the most effective safety work can be done through the operating organization. One of the best examples was the experience of a certain company. The company has good management. It set up a safety department and gave it good support. The safety engineer, however, apparently missed the boat in integrating safety inspections and training work into the operating organization and spent most of his time in generalized activities of the type which principally aim at creating and maintaining interest. The frequency rate during the first five years did decrease from 35 to about 27 and then improvement stopped for the next three or four years. Something was obviously wrong but what? A conference of executives reviewed the program and came to the conclusion that the operating organization considered safety the business of only the Safety Department and not their affair and the Safety Department had gradually assumed too much responsibility. Its activities so indicated. The top managers and superintendents reviewed the whole situation and declared a new policy—greater participation by foremen. General safety propaganda was abandoned and for it was substituted careful study of jobs, the adoption of safe job procedures, and training of foremen and men in specific safe practices and insistence on the observance of them. This policy of integration of safety into operation, and good planning, and execution paid dividends. It resulted in a decrease in the frequency rate from 27 down to 6 in three years and then an entire year without a single lost time injury.

The trend of thinking about effective safety work is away from general safety propaganda, and toward specific corrective measures. I recently witnessed a good example. I heard a foreman giving instructions about doing a job requiring the removal of some concrete in order to install a machine. His instructions were—Cut

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four inches off this ledge of concrete. You'll have to use the light sledge and these chisels. Wear your goggles and use chisel holders—no mashed fingers or hands. Simple wasn't it? Just part of the job.

Later the foreman followed up on his instructions.

That is down to earth safety work and the goal of establishing safety as an operations policy.

WEDNESDAY AFTERNOON SESSION

October 4, 1944

Presiding: JACK THOMPSON, Safety Eng., Bethlehem Steel Co., San Francisco, Calif.

Good Maintenance — Good Safety

HARRY D. KEERL

Construction Assistant Safety Director, Dravo Corp., Wilmington, Del.

The maintenance of a construction plant, of course, is something with which we are all familiar but the strains and stresses of wartime activity have imposed on all types of machinery much greater loads than the peace time requirements with the result that machinery maintenance requires highly competent supervision to maintain it in working condition.

The production capacities of any plant are contingent upon the proper overall design, to insure an orderly and uninterrupted flow of materials from the source to the finished product. In a shipyard all materials entering into the construction of ships must be expedited from stock yards and warehouses through the various fabricating shops to the point of assembly with the least possible interference and the most economical and therefore the most safe manner.

Assuming we have a plant set up with the above requirements, and production under way, immediately a necessity arises for the proper maintenance of plant facilities, such as roadways, sanitary conveniences, storage yards, warehouses, machines, tools, cranes, power and lighting circuits, shipyards, docks, safety equipment, hospital and dispensaries, as well as fire protection and plant security.

In order to accomplish these results a maintenance organization must be set up to service every facility in the plant.

As an example I will briefly outline the

maintenance organization that we have in the DRAVO Wilmington shipyard as set up by the corporation.

PLANT ENGINEERING is responsible for the maintenance of facilities such as power plant, sanitary conveniences, buildings, roads, railroads, general housekeeping in the yard, all machinery and electrical transmission, light and power, ventilation, etc. This maintenance is accomplished in the following manner.

POWER PLANT crew maintain power plant, heating system, compressor plant and acetylene generating plant.

YARD LABOR crew maintain good housekeeping in yard, repair and maintain roads, railroads, walkways, sewers and disposal of all scrap and refuse.

RIGGING crew maintain cranes, cable and tackle, making regular weekly check up of all these items. Weekly report to Safety Dept.

MECHANICAL crews maintain and service all mechanical equipment in the yard.

ELECTRICAL crews maintain and service all electrical equipment.

VENTILATION crews maintain proper ventilation throughout yard and have men on each hull at all times to provide ventilation to all compartments.

TOOL CRIBS maintain small hand and power tools, air, water, acetylene, and oxy-

gen hose, regulators and torches. Service and maintain as well as sterilize all safety equipment.

One of the most important and vital maintenance problems that we have in our yard due to the number of hazards involved, occurs in the ship erection and launching yards, where, of necessity, ramps, scaffolds, platforms and ladders of a temporary nature due to the sideway launching are necessary. To safely solve this problem the management organized a safety maintenance crew consisting of welders, carpenters, and laborers. One in each erection yard and one in the wet basin Outfitting Dock. These crews maintain all access ramps, stairways and ladders; erect and maintain all scaffolding and platforms; erect and maintain life lines on all scaffolds and decks; construct and maintain guards around hatches and deck openings; erect and maintain all conductor supports to keep decks and passageways free from conductors and other obstructions and also correct unsafe conditions as found. These safety maintenance crews wear hard hats painted green with white cross, and have done more for the safety of the yard than any other organization and I take my hat off to these men for their splendid performance and cooperation with all departments.

Fire control and maintenance of fire fighting equipment is under the control of Plant Security as well as the guard force who police the yard and prevent illegal entry, espionage and sabotage within the yard.

Medical Department consisting of Medical Director, physicians, nursing staff, laboratory and X-ray section, dispensary section and pre-employment examination section. Equipped with a modern hospital and dispensary where first aid is given and injured treated and hospitalized if necessary. The health of the employees is given very considerable attention.

Since conversion of man power is of even greater importance than the material considerations, and to maintain good safety, the Safety Department, organized by Mr. Griffin, Safety Director of the DRAVO Corporation, took over its job with the above maintenance organization in operation and found a well designed shipyard supplied with the necessary facilities for the war production of ships and a corporation who is solidly

behind accident and health programs as shown by accident experience charts. A vice president of the corporation in charge of the DRAVO Wilmington Yard is a pioneer in accident prevention and a blank check from the general manager gave the Assistant Safety Director a free hand in regulating and correcting all operations that were not being conducted safely.

A safety director with a staff of able assistants plans and directs the programs at the various plants of the DRAVO Corporation. A central control was initiated in order that all efforts could be correlated and coordinated so as to minimize wasted energy and time. This type of organization permits free exchange of ideas and schemes which may be beneficial to the entire organization.

The various safety supervisors visit the separate departments of the plant, study each operation, solicit information and suggestions concerning hazards, and carefully analyze each accident so as to ascertain the contributing factors. The information thus obtained is assembled for critical study so that it can be presented for discussion at regular safety meetings. Safety meetings for all foremen, supervisors, and heads of departments are held bi-weekly; attendance being compulsory. These meetings are held at various designated hours during the day and night so that all plant officials may be able to attend one of the meetings without inconvenience. These meetings are considered of such importance that an absentee is required to present an acceptable excuse to the general manager before release from responsibility is granted.

Each supervisor is expected to bring a pencil and paper so that notes may be taken concerning important topics and problems in order that these may be presented at group safety meetings. The supervisors' meetings are normally of one-half hour duration, but a longer period is often necessary when an important or vital condition arises. The benefits derived from such meetings are manifold and the solutions to difficult safety problems are solved, because those with intimate knowledge of the problem are permitted to render assistance.

At least once every 2 weeks, each supervisor must assemble his group of workers and present the important topics and problems discussed and the information obtained at the supervisors' meetings. When im-

portant and pertinent information is disseminated in this manner, each worker receives the benefit of the knowledge and the ideas of men having long experience in a particular phase of the work. Furthermore, workers feel free to express their ideas and to enter into discussions in the group meetings.

Safety Rules, Reports and Statistics

A comprehensive set of safety rules in pamphlet form is distributed to each employee. Upon receipt of this pamphlet, the employee must date, sign, and return detachable card which serves as a record of distribution of the pamphlets. This card exacts a promise that the employee will read the rules and follow them implicitly while in the employ of the company. This card also requests the employee to report any personal injury no matter how slight to his foreman and then go to the First Aid Station for treatment.

The workmen are encouraged to become familiar with all safety rules, especially the general safety rules and the rules pertaining to the specific tasks to be done by and the department in which they are to work. New employees must be instructed in their duties by the foreman. The foreman must advise them of the hazards and place them according to their ability.

Owing to the completeness with which the accident records are kept, useful and interesting reports and charts are prepared. Tabulated reports showing the average number of employees, individual dispensary visits, lost time accidents, days lost current month, days lost previous accidents, and total days lost current month, are made monthly for each department. From this data cumulative frequency and severity rates are computed, and by these tabulations each department head is kept informed of the performance of his department or unit.

An induction program which had been in force for some time was designed so that all new employees were given a talk on general safety practices in the yard and given a safety pamphlet wherein are given safe rules of conduct for each craft in the yard; thus safety maintenance as applied to individuals was started with induction of new employees.

Early in 1943 the management together with the Safety Department and the Union realized the need of Union support to make

a safety program successful, thus augmenting the effective inspection force of the Safety Department. The officers of the Local Union appointed such a committee to work with the Safety Department. This committee consisted of five men chosen from different crafts and sections of the yard. They in turn appointed departmental sub-committeemen in each section of yard on each shift, who reported to the general committee on matters pertaining to safety.

The general committee met with the representatives of the Safety Department, Navy and Insurance Carrier once a week to discuss any hazards that were observed and recommendations were made for their correction.

The insurance carriers appointed a safety engineer as full time safety consultant to cooperate with the company's safety department. This representative, conversant with the requirements, assisted in working out the details necessary to the execution of a successful safety program.

A physical demand analysis of the plant is of inestimable value to the personnel, medical and safety departments in placing men in the proper jobs in the plant. If the employee has a physical handicap he is given a limited work card which must be certified by the Medical Department and general manager, the card is returned to the Safety Department for their records, and the man is then sent to his foreman with this card and a statement as to what work the employee is not to do. These men are checked periodically by the Safety Department to determine if they are properly placed and are continuing in the work specified and that the specified work does not result in undue exposure to accident.

Whenever a problem presented itself involving expenditure of money, the Navy as represented by the Supervisor of Shipbuilding, who has been all out for safety, has given us 100% cooperation in maintaining safe production.

I wish to state that due to the splendid cooperation given by the Navy, management, medical department, supervisors, foremen and all employees as well as the service rendered by the maintenance crews in correcting unsafe conditions, it has been a

pleasure to be associated with all concerned in the effort to eliminate accidents, improve

health and well being of the men in the DRAVO Wilmington Shipyard.

Clearing Decks of Conductors

LT. COMMANDER E. P. KNIGHT

Safety Officer, Boston Navy Yard, Boston, Mass.

This subject of "Clearing the Decks of Conductors" is probably the oldest problem there is in modern shipbuilding.

It certainly is true in the Boston Navy Yard, and I judge that it is true in almost every Navy and private shipyard in the country, that the larger proportion of the total cases to occur are due, directly or indirectly, to the question of cluttered up decks. The figures that are available, sometimes show this: as much as twenty to twenty-five per cent of the total cases which have occurred. I wonder if we all realize that is so, and I wonder if all of us have done what could be done to correct that sort of thing.

In the Navy Yards, as many of you men know, we have handled almost every type of equipment that there is, not only engaged in new construction on every ship, from the smallest to the largest, but have the difficulty, likewise, of carrying on the very extensive repair work on a large variety of ships. New construction is one sort of thing which can be planned for after a certain, very definite fashion. Repair work is something entirely different because the work is generally not too well known to the yard before the ship gets in. You fellows in the construction yard or in the private yard have very much the same type of problem. You may not be too much involved in the repair problem, but you are certainly involved in new construction problems, and there your new construction covers pretty much the wide range of size and shape and type of ship that the Navy yards have.

At the Boston Navy Yard while we have changed, over a period of time, in the different types of ships we have had to build, it is still true that we have had the advantage of certain periods of time of building the same type of ship. And so, early in the beginning of safety work, the practice was adopted of making certain that everything

was done in advance that could be done to a single leadership, cohesive, and it has got

be sure that the ultimate goal of keeping decks cleared was really reached. We have a peculiar problem in Boston, peculiar to our yard from the standpoint of schedule of building, since we lack shipway area or building space. We are abundant in fitting out space, which means we have to keep our ships on the shipways or in the building basins for the minimum possible period of time.

That is fortunate in one respect from our standpoint. It gives us an opportunity, before that ship is cluttered up very much either above decks or below, to be sure we have set up in position and fixed the different types of racks or troughs or as we call them in Boston, "Christmas trees." I think it is most wise that, before the ships come to any fitting out period where there is extensive burning or installation of the great need for electricity or air, the provisions be made then for the latter and for the great use of all types of conductors.

I don't think that any other problem in the ship industry lends itself more easily and in a more interesting way to this type of work in trying to keep these decks clear. There isn't any one remedy. It falls back on the matter, almost always, of ingenuity and common sense. The different types of racks or troughs or frames or procedures that apply in one yard can easily be duplicated or better by some other man's greater ingenuity at another yard.

It isn't possible to wait until you have your job in front of you before you decide just how you are going to go about this type of accident prevention. First you have got to be certain that you have a crowd of men, a certain selected group, adequately trained, exactly knowing that job, and being familiar with the details of the different trades that are going to work on the ship, the requirements of the trade, the shift requirements, because they do change rapidly, and that group of men has got to be under

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to be almost entirely restricted to that type of work.

The second thing I want to emphasize is that the finest system in the world, or the

greatest ingenuity, or the finest group of well-trained men is never going to be able to do its job unless you have adequate supervision and active supervision all the time.

Safe Access to Ships and Work Places

(Panel Discussion)

Discussion Leader: J. E. THIELL, Vice-Pres. & Secy., Manitowoc Shipbuilding Co., Manitowoc, Wis.

Participants:

E. G. ANDERSON, Safety Eng., Bethlehem Hingham Shipyard, Hingham, Mass.

EARL E. GRAVES, Safety Dir., Walsh-Kaiser Co., Providence, R. I.

L. V. MILLER, Regional Safety Consultant, U. S. Maritime Commission, New Orleans, La.

MR. THIELL: The subject "Safe Access to Ships and Work Places" is an all-enveloping subject. Without question it enters into every possible phase of Safety from the point of ship construction. You can analyse your own accident record, trace back the causes of accidents and invariably you will find that somewhere along the line the accident was caused, directly or indirectly, by the situations or conditions created by obstructed accesses, by improperly constructed accesses.

If you look over with complete honesty your own accident experiences, and if I'm not entirely mistaken, you will find that "Slipping, Tripping or Falling," by far overshadow any of the other causes. Why? Possibly, your story will go some thing like this: In our Yard, we do everything possible for the workmen, to see that they have safe access to any and all areas, but Joe this, or Bill that, comes along and removes part of a guard rail and doesn't replace it, or takes up a plank in a staging and doesn't replace it, or leaves tools and equipment in such a place on a staging where they can easily roll off, or pulls welding lines, or air hoses, or temporary light lines, or ventilation tubing, into access spaces such as passageways, gangways, hatch openings, companion ways, escape trunks and tank openings, leaving it easy for a victim to trip over. What do you do about it? Invariably you'll say that, "you will fix it just as soon as possible." If you asked me, I'd tell you the same thing. This, however,

as statistics prove, is not enough, as "Slipping, Tripping and Falling" accidents still lead the list of accident causes in the majority of Shipyards.

We, like any good Shipyard, have an up and coming Safety Department. These men have been thoroughly schooled and trained in fundamental safety. It is their job, out in the field, to care for fundamentals such as gangways, ladders, stagings, ramps, guard rails, toeboards and other like hazards.

Much has been said about housekeeping and no doubt much more will be said. But, I am going to treat this subject a little differently from the usual consideration of accumulation of rubbish, debris, oily rags and so forth. One of the biggest problems we have is the control of the flow of material into the ship construction area. This material invariably finds its way aboard ship and, as a result, creates bad conditions in blocked accesses and haphazardly piled equipment. Conditions such as this practically make it certain that accidents and injuries will occur. In our investigation of such conditions, we found that many departments were in the habit of requisitioning material long before it was needed. This we cared for by calling the matter to the attention of the Foremen, who, in turn, in conjunction with their Supervisors, regulated the flow of material. Not only did that help to increase our margin of Safety, but was also instrumental in preventing property damage which invariably occurs in any material that is exposed in such a manner. Following through by using these methods effected only a partial cure. Inasmuch as the production workers in our Yard are on an Incentive System, we found that contracts involving a great deal of material were given to some men. These employees, when receiving contracts of this nature, would immediately requisition all

the material necessary for that job, even though it would be days and weeks before they would use it. Something had to be done. We talked to the various departments, about it, and in almost every case were able to take long term contracts and split them into two, three, or even four parts. This resulted in less material going at any one time to any one ship.

It may be well to mention at this point, that we have been extremely successful in combating bad practices by the simple means of taking photographs of actual existing conditions. Hundreds of such pictures have been taken which have gained the desired results when the photographs have been brought to the attention of the proper people. If you haven't tried this method of maintaining safe accesses, I heartily recommend that you do.

Welding cable, air lines and temporary light lines present their own problems. Each type of ship presents its own individual difficulties, and consequently, each must be solved separately. We try to keep the greater part of our cable overhead and off the deck. This not only eliminates the tripping hazard but the fire hazard as well. I'd be crazy if I was to stand here and try to tell you that we have the line problem licked, because we haven't. But, we are thoroughly conscious of it. We have a group of men in our Welding Department who do nothing but pull lines, and we feel that with each succeeding ship, they are able to improve somewhat, the line condition.

Another important factor in safe accesses is adequate and properly spaced lighting. While on the subject of electrical installations, it may be well to mention the pulling of armored cable, that is, permanent ship's cable, into place. Our difficulty does not occur when the cable is pulled, but immediately afterward, when the ends are left to hang approximately eye-high in compartments and passageways. This, combined with inadequate lighting, can be the cause of serious eye accidents. We have overcome this condition by making it compulsory that these ends be tied up and under no condition be allowed to hang. Our hazards from this source did not end here, however, because we found that when the cable was cut in, the cable was often too long by a few inches or even a foot. It

was, therefore, necessary to cut off these ends and, of course, if they were dropped on the deck they became perfect rollers on which some one could take a bad fall. Our cure was effected by compelling all electricians to pick up these ends.

Another angle to this problem is the proper planning of work by different departments. This is not to be construed to imply that I think that the departments are not capable of doing their work, but it has been found in some cases that departments have scheduled simultaneous operations in the same area with neither one knowing what the other had planned. Accidents occurred because of this, so it became the duty of the Safety Department to investigate conditions and recommend corrective measures.

Probably the biggest problem in maintaining "Safe Access to Ships and Work Places" is the employee himself or herself. This can be attributed to a large extent to the fact that in our Yard we use an Incentive System in the accomplishment of work. As fundamentally people come to work for what they can get out of it, and to complete any given job in a shorter time than that called for on the contract, consequently increases the earnings of that individual.

MR. MILLER: Safe access is the use of any and all devices, tools, instruments, structures and methods which will get the employee to and from his place of work. When we think of these things we think of illumination and guard rails around manholes, tank top openings, kingposts, ventilators, small hatches and all other trunks, of properly constructed ladders and scaffolding, of proper ventilation, including gas freeing tanks before men go into them, of clearly defined aisles and passageways, in a word, good housekeeping.

You all know that old saying in baseball, "You can't hit what you can't see"; neither can a man working in a poorly illuminated spot do his job without creating a hazard to himself and those about him. Good illumination does not excuse unguarded openings. Any of you who have worked around shipyards must have noticed the way workers go to and fro doing their jobs. This worker-traffic means danger, even with proper illumination and guard rails around all openings. In the Gulf Region about 25% of our lost time injuries

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are the result of falls and slips on the same level or from higher levels. Too often we hear that carelessness on the part of the worker was the cause of the fall, yet carelessness on the part of the worker is nothing less than improper supervision of the worker. The carelessness often comes from another source, from failure to build strong ladders, to see that they are properly secured on the landings and to enforce safety measures concerning the carrying of tools and equipment. And as for carelessness on the part of the worker on scaffolds, that too, can largely be placed on someone else. If a man should lean against a guard rail on a scaffold he depends on that rail. That's what it is there for, protection, and it is not his carelessness which caused that rail to be weak, to be loosely nailed together. Just recently in one of our southern yards a worker fell 80 feet to his death when he leaned against a permanent guard rail which had not been finished. There was no indication, no sign and no warning had been given that this rail was not a guard, but a death trap. Whose carelessness was that?

To put a man into a work place which is not as safe as it can be humanly made is criminal negligence. Just now I am thinking of ventilation and testing tanks to be positive that they are gas free and safe for workers to go into them. In one of the repair yards just a few months ago five men lost their lives as a result of an explosion and fire. These men lost their lives because the fresh water tank, which had been painted with red lead paint just two days before, was not gas free and was not tested by a certified chemist before these men were allowed to go into the tank to cement wash it to remove the taste and odor of the red lead paint from the water.

Another factor which must be considered in providing safe access to the workers is housekeeping. Keeping the yard clean by removing debris and scrap steel, properly placing welders' leads and airhose, keeping fire lanes open and fire plugs unobstructed, roads clear of obstructions and the scaffolds and decks reasonable clean indicates this yard as a good and safe place to work.

MR. GRAVES: I think Mr. Miller has covered the high spots of the subject, "Safe Access to Work Places." We

have got to get the men on board the ship they are going to work on. Some use ramps and some use stairways. We use on our own ships, depending on the size we are building, four stair towers with lead-offs to the stages of the various levels and ramps on to the top main deck. At the outfitting pier we have two stairways, stair towers, leading up to each ship, and gangplank from the top of the stair towers over on to the deck.

Another problem that confronts us in access are these tanks and inner bottoms. Maybe somebody has got an answer to it. I hope that when the discussion period comes, some of you will answer questions for me instead of expecting us to answer them for you. We have a lot of knee injuries in the inner bottoms. Some of you men may tell us what to do to prevent them climbing through from one section to another in the inner bottoms and fracturing their knee caps against them.

All through the inside or the outside of the ship, stagings offer a problem, and there isn't any use discussing that. Probably the problem still sticks that some unauthorized person may move a staging or make alterations on it. We have staging crews and we don't want anyone to touch a plank or drive a nail except that staging crew. Once in a while somebody wants to get over here and steal a plank off the staging and leave the end sticking out. Somebody walks out on that end, and down they go. That is access, because if a man is going to work there, he has got to get onto something to stand up there.

MR. W. E. LAWRENCE (New York Shipyard): How often do you pull your welding line up there?

MR. ANDERSON: They work from ship to ship. Sometimes it is a problem that has gotten ahead of us to a certain extent. We have line fellows to clear the lines, dead lines particularly. We can't get the welders to pull them back themselves. The ships are all cleared before the launching and before delivery. That is understood. We have tried to keep all the active lines out.

MR. LAWRENCE: Are you still building D.E.'s up there?

MR. ANDERSON: Yes.

MR. LAWRENCE: I thought you had pretty good housekeeping.

MR. ANDERSON: It is always open for improvement.

COMMANDER G. E. TWINING (U.S.N.R., Brooklyn Navy Yard, New York): Does that mean the welder is not responsible in any way for the leading of his line?

MR. ANDERSON: Yes, he is responsible, but he won't pull the line back into the ship.

MR. H. A. EDWARDS (Savannah Machine): Maybe you could answer from the New York Navy Yard. Who is responsible for putting the lines up in the brackets or racks in your yard? Do you have certain men designated to handle those lines, or an individual employee or craftsman?

COMMANDER TWINING: I think I can answer that. The practice, which is pretty general in our yard, is that the trade—who is the person in the trade doing the work—is responsible for its own lines and lead them up. If we find lines on the deck, we call the supervisor of that ship for that trade, on that ship, and we simply show it to him and the thing is remedied.

MR. EDWARDS: Thank you.

MR. THIELL: I was standing up here so I didn't get a good view of those photos. I was wondering, you have the hose up there too, don't you?

COMMANDER TWINING: Yes.

MR. THIELL: Do those racks damage the hose in any way?

COMMANDER TWINING: On the other hand, they serve to preserve the hose. It keeps them up out of the way and takes care of the wear and tear.

MR. E. C. FORSYTHE (Ingall's): Do you have your burners put the oxygen and acetylene lines in the same racks with all the other lines? If you do, do they pick up the lines at the end of a shift or leave them there, and do you have any trouble getting them disconnected with the manifold so that they are not left with oxygen and acetylene in the hose?

COMMANDER TWINING: We try to keep the acetylene and oxygen lines separate and away from the electric welding leads. Sometimes we do find them mixed up, and then we do have a system whereby the line is cut off at the manifold or the cylinder, if the cylinder is not manifolded. We

do not have a line, you know, that extends over the yard—a generating system. We buy our oxygen and acetylene in cylinders. We do manifold the cylinders. We have a rigging crew that does that, but the burner himself is responsible for what happens to his own line.

MR. FRANK C. KING (Manitowoc Shipbuilding Company, Manitowoc, Wisconsin): Thank you. I don't believe there is much I could add in listening to all these learned gentlemen.

In speaking about the Shipbuilding Section, it is nice to note that so many shipyards now can come under one session and yet get the benefit of the experiences of all collectively, so that any of the various accidents and experiences coming to mind can probably be solved right there. We, in the State of Wisconsin, in our State Sessions have regional session. Three years ago we started a shipbuilding section which is growing very nicely, and in this last session we had the very able help of the Regional Consultant of the U. S. Maritime Commission, Mr. Clow. As we note these things of gas freeing which has been mentioned, about scaffolding, racks, putting in pipes for good housekeeping, etc. We have boxes under the walk ways and on the stages to take care of conduits. We wire up our ladders. We have railings. Everybody speaks about railings very freely now. Only a few years ago it was impossible to get a railing up on the stage. Having a central place, I think, is a most wonderful opportunity, and we, certainly, in this section must not lose the opportunity to get what we can and keeping the safety we have learned and carry it over into the period into which we are going.

In the shipyards we have been measured not by the practices and experiences of the shipyard but by the practices of a general contractor who is putting up a big building. We, in fact, have so many more hazards and complications, that we have got something to learn there and to go a little further. But, certainly, I still think, being old-fashioned in this game, our greatest work in safety is not alone with the workers with whom we learned a long while ago that we must keep in contact constantly, but the more men and the greater numbers we can interest. The last letter I received from the offices of Mr. Ward calls attention to the responsibility of top methods. It does bring

to mind the fact that just as you are mindful of the need of constant inspection, you can not forget the reinspection, and that the neglect of it has caused accidents. Just now, top management is easier to get at than it was years ago when you pretty nearly lost your job.

MR. GARBUTT: Mr. King mentioned a lot of "ations," such as damnation. He missed out on one, commendation. We have a number of ships in their yard and we have never heard anything but the best reports on good housekeeping at Manitowoc.

MR. THIELL: Pardon me if I refer to our company, but I have had good housekeeping impressed upon my mind very indelibly, because in the fall of 1940 we became actively engaged in the building of subs which, as you know, is a complicated type of shipbuilding, and we went on a twenty-four hour basis, and it is no secret—I can tell you now—that in three years we were two years ahead of the original building schedule. We went on the twenty-four hour basis in the fall of 1940 and we have been working under war stress ever since. This submarine program we naturally put into the machine shop where we thought we had plenty of room. We had so much work we had to sublet, and a great deal of it went to sub-contractors. But, in the machine shop, there was laid out on the floor in paint, where the walkways were. Oftentimes when I went out and wanted to take a short-cut somewhere, these lines reminded me that I shouldn't take that short-cut. I notice Mr. Martin here of the Employers' Mutual of Warsaw. Mr. Martin comes into our plant one day out of the week and I have never seen a man ask as many questions in five minutes as he can. He is sitting down there and hasn't said a word. Do you want to bring up something.

MR. MARTIN (Employers' Mutual of Warsaw): I didn't expect to be called upon. You know, about asking questions, I think that is an inborn trait, and that one gathers knowledge in so doing. I know when the day comes that I shall not ask questions or gather knowledge, I want to be put on the shelf because I count that day as lost.

I don't want to particularly pat anybody on the back, but of the experiences I have had in the shipyards I have visited, at Manitowoc I have had the most pleasant experiences from a standpoint of cooperation, and

I am glad that the gentleman got up and spoke about this thing that King had missed by mentioning commendation.

What I want to ask of the panel board is what experiences they have had in the handling of the tag lines to prevent the men from getting under the load. That is a question I haven't had fully answered yet. Another one is, in the handling of these cables, what success do you have in designating the cables that they use, that is, the air lines from the electric cables, or the gas line, by coloring them, having different colors for different sets of cables. I think that Mr. Thiell had this in mind when he spoke about the cable passing over on the so-called "Christmas trees" whether or not it was enough to prevent the cable from kinking or being damaged in that way. There are three questions I would like to have answered.

MR. MILLER: With reference to Mr. Martin's first question, the use of tag lines off loads or cranes, or lifting, down South we find that the large loads—at least the safety departments are trying to keep them as low as possible to the ground. However, when it is necessary to lift them high, as for storage maybe, under the bottoms there are tag lines provided.

With reference to your second question. I don't recall in any of these yards the lines providing the acetylene and gas—I am speaking of the rubber hose lines—that are colored.

MR. R. C. BARR (Lumbermen's Mutual Casualty, San Francisco, California): Three weeks ago an explosion occurred in a West Coast shipyard on a B flat deck. Eleven men were working. They were testing out a C.O₂ line with extra heavy pipe and extra heavy fittings, and they were testing with oxygen. There were thirteen C.O₂ bottles on the line which were connected to the manifold, but the valve was not open. They brought the pressure up to one thousand pounds by gauge test and held it there for thirty minutes. Electricity was noticed in the line as a result of the indicator or gauge arrow wavering. They found the electricity and corrected it, and brought the pressure up to eight hundred pounds by gauge test, and, suddenly, it gave way in about twelve different places simultaneously. The question I would like to ask is: Should they have used oxygen in testing the line, or com-

pressed air, or would it have been better to use water? Has anyone here had experience on that?

MR. MILLER: I think it would be most desirable there to use water although it is a lot of trouble to dry it out. You could first blow it out and then let the normal atmosphere dry it. You could even blow so hot that you could heat through it with one of those little old Jumbo blowers—electrically heated. Because in a new system where you are testing pipe, the tensional strength of it now may be stamped on it by the mills, but you never know whether the mill run test is the same as that which is used by the shipbuilder who is testing them.

The other danger is using oxygen. If you have any oil in the line, you know, the right mixture could also cause an explosion.

MR. THIELL: Thank you, Mr. Miller. Are there any other questions? Mr. Miller notified me a few minutes ago that the U. S. Maritime Commission has just finished a film, and it is called "Shipsape for Victory." This film will be sent to any shipyard without any cost whatsoever. It is on good housekeeping. In other words, they will loan the film to the shipyards.

MR. MILLER: No. It is given to them.

MR. THIELL: Maybe we had each better take half a dozen. It sounds like it is too good an opportunity for any of us who want to get one of these films. To whom do they write?

MR. MILLER: I suggest that if any of

you desire them, you write the Regional Safety Consultant of your region. Mr. Raymond Clow, Regional Safety Consultant for the Great Lakes, is at 310 South Michigan Boulevard, and Mr. Daniel Hartnett is at 45 Broadway, and I am at 348 Barone Street, New Orleans, Louisiana, and the Oakland address is 14th and Franklyn Streets, the Oakland U. S. Maritime Regional Construction Offices, Oakland, California.

MEMBER: What size is it?

MR. MILLER: Thirty-five millimeter, with a record, you know, and also, Mr. Roche, what was it you wrote me when you shipped it to me? What was missing?

MR. JOHN ROCHE (Chief, Industrial Division, National Safety Council): We had a discussion outline with each of these films, and after the film is used you can use the discussion outline to mark the differences between what is shown in the film and practices in your own yards. A copy of the film is here at the Congress. If anybody wants to see it, I suggest that he get in touch with Ben Grainger who is in charge of all of your meetings, and perhaps after the session is over you can have it put on.

MR. THIELL: It is a splendid idea, and we greatly appreciate having it. Are there any other questions? If not, I don't know how much time we have, but I guess we have covered the subject pretty well, unless somebody has something else. Thank you very much. (Applause)

THURSDAY AFTERNOON

October 5, 1944

Presiding: JAMES E. MACDONALD, Permanente Metals No. 2 Shipyard, Richmond, Calif.

Safe Handling of Fiberglas in Shipbuilding

By EDWARD C. AMES

Public Relations Manager, Owens-Corning Fiberglas Corporation

Although Fiberglas was well established in many peacetime markets before Pearl Harbor, war has greatly extended its uses. For that reason thousands of men and women in scores of plants throughout the nation are meeting it for the first time in fabricating and assembly line operations. The

Fiberglas Corporation believes that such workers are entitled to a full and forthright statement if they inquire whether occupational hazards result from exposure to Fiberglas materials. Because it is impossible to give such information directly to thousands of production workers, it is supplied

to the professionally trained men and women who are best equipped to appraise the data and who are in a position to answer questions raised by production people.

Workers unfamiliar with Fiberglas, as with any new material, may wonder:

Will it get into my lungs?

Will it hurt my skin?

What can I do to protect myself?

Almost invariably such questions reach safety engineers and the first aid staff. This summary may help provide the answers. Highlights are these:

Sound business reasons dictated years ago—long before Owens-Corning Fiberglas Corporation was formed—that careful, scientific investigations be carried out by impartial medical experts to determine whether Fiberglas introduced any hazards not already known. Here are the facts:

1. Thousands of people have been working with Fiberglas since 1932. The number ranges from 20 in 1932 to more than 10,000 today.

2. Fiberglas may cause a little discomfort when first handled. But Fiberglas does not cause any lasting irritation. Workers get used to it, just as hands get conditioned to other slightly abrasive non-toxic materials or to other kinds of manual labor. This is a mechanical action similar to that caused by wheat chaff or saw dust. Fiberglas is not poisonous. It is glass in fiber form. Like solid glass it is basically clean, cannot cause any poisonous reaction. Unlike solid glass, however, it is fine and resilient—so fine that 97 miles of Fiberglas filament can be drawn from a glass marble weighing two-fifths of an ounce.

3. Experience shows that the initial discomfort can be offset best by following these simple rules:

- a. Keep work spaces as tidy as possible, disposing of trim and other scrap in receptacles provided for waste.
- b. Wash well with mild soap and water before meals and at end of each shift.
- c. Wear clothing that is loose at the neck, wrists, and ankles. (Says W. G. Hazard, U.S.P.H.S., acting chief of the Division of Industrial Hygiene, New Jersey Dept. of Health: "No special protective devices or clothing need to be worn, except that in overhead applications of glass fiber, goggles

are often desirable to protect against falling bodies.")

d. Apply calamine lotion containing one per cent phenol to skin surfaces, if you are bothered. Available at most First Aid stations or any drug store; this lotion will help relieve discomfort.

e. Use a cleanser containing a wetting agent for removing fibers that cling to the skin.

4. Careful tests made over a five-year period at Saranac Laboratory by Dr. Leroy U. Gardner demonstrate that Fiberglas has no injurious effect on the lungs. Nobody has ever come down with tuberculosis or other lung trouble from Fiberglas.

5. Compensation rates based on the state's appraisal of the risks in the manufacture and fabrication of Fiberglas—rates which the Fiberglas Corporation pays under state law—are lower than for workers in comparable industries. The Industrial Commission of the State of Ohio, where thousands of workers have been exposed to Fiberglas for many years, says that no worker's compensation claim has ever been paid for disability due to exposure to Fiberglas.

6. Claim records of Aetna Insurance Company, which carries group insurance on all Fiberglas employees, indicate that there is no extra risk in this work; in fact, says Aetna, manufacture of Fiberglas involves no hazard differentiating it from any normal manufacturing operation.

7. Scientific papers delivered at the Pennsylvania Safe Practices Conference indicate that Fiberglas is a clean, safe material.

8. Private physicians who specialize in eye, ear, nose and throat disorders, say that people working with Fiberglas are no more likely than anybody else to have these disorders.

9. Surgeons use Fiberglas yarn to sew up wounds following operations. They use it in surgical sponges as tracer threads. The Army and Navy use Fiberglas tape as a filter for blood plasma in surgical field kits. In a Detroit hospital Fiberglas cloth is applied directly to the skin as the first layer of a bandage specially devised to measure the protein loss in the exudate from surface burns. Fiberglas is described in medical literature as chemically, physically, and biologically inert; harmless to body tissue, non-toxic, nonallergenic, nonsensitizing.

Many new people have begun to work with Fiberglas in recent months. By re-viewing the record, this summary will help answer their questions.

Selection and Use of Personal Protective Equipment

E. E. WHITE

Safety Engineer, Sun Shipbuilding & Dry Dock Co., Chester, Pa.
(Paper Presented by Lt. Com. Carter Kendall)

The selection and use of personal protective equipment is a subject with which we all are familiar, but with the terrific expansion of our shipyards during the war, naturally came the increased hazards. In the early months of 1943, in just a little over a year, our shipyard had grown from 8 shipways, 2 dry docks, and 3 wet basins, to the amazing size of 28 shipways, 2 dry docks, and 12 wet basins. We jumped from 6,000 employees to 36,000 employees. I mention these figures to give you an idea of what it really meant to make a proper selection of protective equipment and then educate the employees in its use.

This subject of the selection and use of personal protective equipment must necessarily be prefaced by the development of the employee, in whose behalf the selection is made. At times it seems impossible to educate the present employee to the use of protective material. Due to this condition, I feel that industries have a great opportunity to select and develop a useful and intelligent personnel and many are doing just this.

A new applicant coming to the door of the Employment Office has or has not the necessary physical and mental requirements to successfully fill a job with credit to himself and to the industry. It is at this point where management steps into the picture, and, through its organization, can really do something constructive for itself and the applicant.

I will try to develop this employee in the next few minutes, into the man all safety engineers like to work with.

Always an Unknown Quantity

The applicant is an unknown quantity when he fills out his application for employment and presents it to the interviewer. The first step in his industrial career has then begun. The interviewer must be of

high calibre, familiar with the physical and mental requirements of all the crafts in the industry. It is a very serious business—one that will produce either a liability or an asset for both the employee and the management.

If and when the interviewer has decided that the applicant is probably a good risk, he approves him for an aptitude test. I feel that the employee of today, unfamiliar with shipbuilding crafts (having come from an industry of unrelated character) needs a test to give us some idea of his latent skills. Through choice or by compulsion this employee has given up his job in non-essential work, and definitely needs the protection of the industry into which he is coming. I feel then that the first two steps, the interviewer and the aptitude test, are very much in the category of personal protective equipment, already in the possession of many companies. In our yard, we know that protective equipment cannot function 100% when worn by a man or woman who has been misplaced.

The next piece of equipment furnished by the industry is the physical examination. Regardless of what the interview or the aptitude test has shown, the applicant's qualifications may be off-set by this examination. Certainly, his health should be the concern of the industry.

When the interviewer, the aptitude test and the physical examination have placed the applicant in the proper position, industry has used the equipment necessary for their protection as well as that of the employee. In the selection of the personnel who interview, give the aptitude tests and examine the applicants physically, great care should be taken that only the best equipped men available be procured for these positions. Then industry must insist on the use of this equipment.

The employee is now on the payroll, but

he must not lose his identity. Industry has so much protective equipment yet to offer. The newcomer looks forward to what he hopes will be long and profitable employment, and industry without a doubt cherishes the same idea.

Equipment Overcomes Fear

It is not long until the employee begins to think of what will happen to him in case of injury and sickness. Protective equipment has been set up to overcome this fear; compensation, hospitalization, insurance, and benefit funds.

We can't stop here, because the identity of the employee is not yet fully established. He has not really become one of the big family until he finds himself bathing in fine shower baths, dressing in sanitary lockers, eating nutritious food in well-run cafeterias and, if injured, receiving the expert attention of competent doctors and nurses in up-to-date dispensaries. These items are protective equipment for both management and the employee.

There is still another factor, which provides a most important milestone on his road to success. Can we expect the employee to remain contented forever at the same job and the same pay? Industry does not want him to, so it provides schools and proper supervision.

All the protective equipment to this point has been to properly place an employee in a congenial and remunerative position, to take care of injury and sickness, and to build in him a pride of his job and the industry through the establishment of the proper facilities.

There is still one vital piece of equipment used by industry that is most essential, and that is the social and athletic activities fostered by industry and made possible by the employee.

During these days when so many employees are separated from their families by great distances, the joys of living are few and far between. Life must be made bearable for these men. The Service Organizations realized the servicemen's needs when they organized their clubs and encouraged entertainers to visit the battle fronts and camps. However, someone has failed the home front soldier. Here was a tremendous opportunity, but most communities failed miserably to provide the

facilities to make life pleasant for the dislocated workers in essential industry.

Therefore, industry itself called upon its final protective equipment. It sponsors bands, picnics, concerts, dances, and athletics. The employee now has become one of the family, and unless he is beyond the salvage point, he should be happy.

I come now to the material equipment, which is supplied for our workmen by our Safety Equipment manufacturers. I have often wondered just how these men, who manage the Safety Equipment business, got into this line of work. At first, I felt it must be through their experience in industry that prompted them to establish their concerns, but after talking to a considerable number of our manufacturers, I found it was through the compulsory law passed by the various states for the protection of their industrial citizens.

Equipment Must Be Used, Too

The problem of the Safety Engineer is how to select the best equipment for the respective problems, and then educate or enforce the use of this equipment.

In the earlier part of this paper I tried to develop the ideal employee, and now that we have him, the obligation to protect him becomes paramount. We must protect him against blindness, deafness, tuberculosis, silicosis, burns, broken bones, sprains, heat exhaustion, strains, sickness, and last but not least death.

Let us look at the equipment.

There is to my knowledge sufficient goggles of all types on the market to meet every hazard. The grinder, the buffer, the welder, the driller, etc.—all can have full protection.

The hearing has been protected with ear plugs of good quality.

The body can be clothed with leather, fire resistant materials, heat resistant shields, leggings, spats, gloves, and safety shoes.

There are wooden shoes, knee pads, breast protectors, safety helmets, etc.

There are respirators for dust, lead and zinc fumes, paints, etc.

There are masks to enter explosive mixtures, fires and smoke.

Apparently there is no end to the ingenuity of the manufacture of safety equipment.

To select the proper equipment and use it to the best advantage is the problem. Who should make the selection? The only man who does know, or should know, is the Safety Director.

When the equipment is delivered, then—the fun begins. Are the methods for its use to be compulsory or educational?

I believe in the educational policy in normal times, and the compulsory policy in times of emergency.

None of us like compulsory tactics, neither does the soldier like discipline. The soldiers, however, through discipline and education, are winning the great victory against our common enemy, and I see no way to win the war against industry's common enemy, "accidents and death," other than through a combination of education and discipline.

I feel an ample supply of material should be made available to the employee. The equipment supplied to the workmen, such as safety helmets and goggles, should be handled through the tool rooms, while leather clothing, safety shoes, work gloves, overshoes, etc., should be sold at cost through safety stores.

During the year 1943, our two stores furnished 35,000 pairs of safety shoes; 187,000 pairs of work gloves; 52,000 pairs of welder's gloves; 10,000 pairs of overshoes; 2,500 rain coats; 1,000 pairs of knee pads; 5,200 leather jackets and 2,200 leather overalls.

Our tool rooms have in circulation 12,000 pairs of goggles of all kinds, not including shields of all types and 15,000 safety helmets.

We advertise these stores in our yard magazine. Whenever an employee is hurt because of the lack of this equipment, we make an issue of it.

If Messrs. Shipman, Gaskill and Gass will come to the platform, we will dispose of the questions and answers and close this paper.

Questions and Answers

Q. In scaling inside of tanks (even after they have been gas freed after carrying hi-octane gas) the removal of the scale frees additional gas. While this is not an explosive mixture, men get headaches and become nauseated. Is there a respirator

that will solve this problem? If not, how would you handle it?

A. The Ethyl Gasoline Corporation has issued instructions stating that all men entering tanks that have contained leaded gasoline be equipped with blower type air line hose masks as well as special coveralls, acid proof gloves, rubber boots, etc.

Q. When a blacksmith works on white hot metal, using a flatter to mold the piece, what can he use to protect his face, arms, body and legs, and still be able to work?

A. A cellulose acetate face shield about 6"x9" window, .060 thickness—light green shade to protect from glare. Heavy woolen shirt with sleeves rolled down or a pair of chrome leather shoulder length sleeves. Another suggestion would be the use of welding cape sleeves of chrome leather. A split chrome leather apron, divided at crotch and attached to the legs with adjustable fasteners, permitting freedom of legs. The size of apron to be 24" wide and ending about 8" below the knee.

Q. A fire in a cofferdam has burned 1500 feet of hose. The smoke is very heavy and the heat intense. What mask should a fireman use to enter the cofferdam?

A. Self contained oxygen breathing apparatus should be worn, and I would recommend that two men equipped with self contained oxygen breathing apparatus enter the cofferdam each with a life line and that two men be assigned to remain outside and handle the life line.

Q. Every day thousands of electric bulbs are broken. Is there an instrument devised to remove broken part from the socket that will avoid shock?

A. Use what is commonly known as a lamp base remover. This device is made up of a wooden handle in two sizes, six and nine inches in length. The six inch size is used for medium or standard screw base and the nine inch size for Mogul screw base, which is the larger size of lamp base. At the contact end of the handle a recessed molded piece of rubber is attached. This molded piece of rubber has slight ridges and is tapered to enter the inside of the base of the broken lamp. The contact end of the handle and the rubber part is recessed to fit over the center glass filament base of the lamp. The tool is inserted

into the broken lamp and the base is removed by friction grip; even though the current may be on, the rubber insulates against electrical shock. It is understood the workman should wear goggles as additional protection from possible broken glass.

Q. Must all goggles, respirators and gas masks meet certain standards and be stamped as approved for industrial use before they may be sold?

A. Safety goggles should comply with standards as set down in the National Head and Eye Code and the requirements of Federal Specifications. Respirators need not necessarily meet requirements of specific bodies, such as the National Code for Head, Eye and Respiratory Protection, Bureau of Mines Standards and Federal Specifications except where such devices are used against exposures of toxic atmospheres in which definite requirements are set down by specific bodies as to their design and filtering efficiencies. On nuisance dusts or dusts of a non-toxic nature, it is not necessary to have devices meeting the requirements of the above mentioned bodies. Gas masks are required to meet the specifications as established by the U. S. Bureau of Mines.

Q. In shipyards, what is the best helmet to use, a brimless one or one with a brim? Is there any way by which a man wearing a helmet can keep his head warm in winter weather?

A. Most manufacturers can supply either a cap type brimless helmet or one with a brim, both of which will give the same amount of protection as far as the crown of the helmet is concerned. There is no doubt, however, that the helmet with the brim will give added protection to the man's neck and ears in case of falling objects. Some yards have found, however, that with men working in confined spaces the cap type helmet is more satisfactory due to the fact that it is rarely accidentally knocked off, while the brim type may get in the way in very confined quarters. For this reason some yards use both types depending on the particular operation. Most manufacturers can supply winter linings for use with the protective helmet and will not only keep the man's ears warm but also his forehead, temples and the back of his neck. The practice of wearing a felt hat or woolen hat beneath a protective helmet

will place the helmet too high on the man's head with a possibility of it being knocked off.

Q. What filter type of respirator should I use in the following jobs: (1) working in lead or zinc fumes (2) cleaning castings (3) using radiax saw (4) grinding tools on the emery wheel (5) in presence of smoke?

A. (1) U. S. Bureau of Mines approves "Type B" mechanical filter type metal fume respirator.

(2) Type A approved mechanical filter type respirator.

(3) Type A approved mechanical filter type respirator.

(4) Type A approved mechanical filter type respirator.

(5) The use of a filter type respirator for protection from smoke is not recommended.

Q. Do the filters on air line respirators completely eliminate all harmful substances in compressed air?

A. Most air compressors use oil for lubricating the cylinders and oil mists and vapors will get into the air during compression. If a compressor overheats, carbon monoxide may be formed. A good air filter filled with activated charcoal will remove the oil, water, and pipe scale, but not carbon monoxide.

In connection with their approval of supplied-air respirators, the U. S. Bureau of Mines says—"It is the responsibility of the user to provide respirable air either by a compressor that does not use an internal lubricant that could produce gases or mists that may be objectionable or injurious to health, or by one that is protected by suitable filters, temperature regulators, and alarms."

A carbon monoxide alarm is available which can be installed to continuously sample the compressed air supply and give an audible warning if carbon monoxide is present. Blowers or compressors are available which do not use a lubricant in the compressor, and these are recommended as an air supply to masks or respirators.

Q. Is an electric arc more intense at night?

A. There is no variation in the intensity of the light source of an electric arc at

night over that of the day, however, due to the pupils of the eye being open wider at night, there is a greater amount of the light in the arc brought into the eye, where night or general low light intensity are worked in.

Q. A crane operator working at night finds flash goggles too dark to see certain spots due to the lighting, yet his eyes get sore. What is the solution?

A. Naturally, you would have a check made to determine that the lighting is adequate and properly distributed.

If a crane operator's eyes are normal, try lighter shades of filter lens. A lighter shade would probably give you the right answer.

Q. To what degree does flash glass absorb ultra violet and infra red rays?

A. So-called flash glass or high visible light transmitter filter glass of standard

quality, such standards being established in relation to requirement of the National Head and Eye Code and Federal Specifications, has an absorption in the ultra-violet of practically 100% and in the infra-red field from approximately 80 to 95%.

Q. Welders claim flash glasses plus the glass in the shield make the work too dark. He needs glasses because he works close to other welders. What is the solution?

A. In arriving at the density or shade number of the welding glass in combination with his flash glasses, it would be to his advantage to have a set of glasses which include flash glass and the welding glass, of which the combination is equal to that of his welding glass. This can be determined practically by adding the shade number of his welding glass to that of his flash, and subtracting the numeral one from the total of the two glasses.

Grounding of Portable Electrical Equipment

By HARRY W. NELSON

Elec. Foreman, Pullman-Standard Car Manufacturing Company, Chicago

I was asked to tell of our experiences and of methods used in the grounding system for all portable electric hand tools and appliances at our plant. While we have not had any serious accidents from electric shock at our plant, we did have several complaints from men working with portable electric tools that they were getting shocks from their machines. Notwithstanding the fact that we are prone to discount such complaints, we know that it takes only a very small amount of current to produce serious results. In 1942 at our parent plant, the Pullman Car Shop, one man who was using a portable electric drill while working on a car received an electric shock that knocked him from the platform on which he was working, breaking his arm and causing an 8 week time loss accident. So with that and other instances in mind, the Safety Department pushed the grounding of these tools and kept after it until authority was issued to do the job that cost approximately \$10,000. The untiring efforts of our Safety Department and the willingness of the management to cooperate, enabled us to win, along with other awards, the coveted Ad-

miral Land Safety award that he have received.

At the Calumet Harbor Shipyard, we are serviced by the Commonwealth Edison with 12,000 volts Primary stepped down to 480 at our switchboard; from there it is distributed to the various ways, docks and building in duct way under ground. All of our 440 volt equipment is grounded, if it is portable; a 4 wire cable or cord is used; all the switch and fuse panels, receptacle outlets and connecting conduit, are grounded at each location.

The lighting current is obtained from 3 phase transformers connected 480 Volt Primary to 208 Volt Sec.—120 volts any phase to neutral and the neutral is grounded at each transformer; also all conduit fuse panels and receptacles are connected to a ground.

For welding circuits, each way and dock has a complete ground tie-up, so that welding machines may be disconnected and moved from any location without disturbing the ground clamps on any ship. Then, of course, this welding ground is, in turn, grounded so as to prevent any shock from the weld-

ing current as these ships are set on wooden blocks. In connection with the grounding of the A. C. side of our welding machines, I would like to call attention to a special feature that we, at Pullman, use, and that is an instantaneous trip-relay, the current coil of which is hooked in series through the ground wire and the relay contacts are in series with the operating coil of the motor starting switch. This affords us the necessary protection for the A.C. side and, at the same time, protects the power cable from heavy welding currents that are likely to be carried over the ground wire should the welding ground become loose. With this ground hookup the resistance to ground from our panel boxes or from the power and light receptacle boxes on the ways and dock is approximately 5 ohms which I am sure provides us with a ground that meets safety requirements.

This has given you a picture of the main and service layout on the ways and docks; from here we go into the ships. On the 440 volt power receptacles no changes were made as they were 4 pole, one grounded, these being used for welding machines and ventilating systems. However, for lights, the receptacle previous to change-over was three pole, 1 being neutral and 2 for 1 phase of the lighting circuit giving us 2 120 Volt circuits at each receptacle and these two lines fused with 60 amp. fuses. Each ship requires three of these feeders or 6 circuits, and about 120 lamp outlets, of which 100 are 100 Watt lamps and the balance 200 Watt lamps set in places where a little more light is needed. Also, each ship is provided with from 15 to 20 portable receptacle boxes, each box having four Duplex outlets or 8 outlets. These boxes are accomplished with flat plug boards and jacks. The feeder circuit coming into a ship may have two or three plug boards, and, from these, several circuits of lamps and receptacle boxes are taken by means of jacks. These jacks are fusible and are fused with 30 amp. fuses; then the receptacle boxes are fused with 15 amp. fuses. Therefore, each ship has 6 60 amp. fuses,

about 20 30 amp. fuses and from 60-80 15 amp. fuses. Now with 16 ships under construction on the ways and always at least five ships (and most of the time more) in the water at the docks, you can get a glimpse of the job to change this all over from two wire to three wire lines together with about 400 portable electric tools and from 1000 to 1200 extension cords, and see that we did not interfere with the production schedule. This meant changing all the three wire feeder circuits into the ships to 4 wire, changing all the jack circuits to 4 wire, and carrying the ground wire to all portable receptacle boxes. To connect this ground wire, brass plates were put on the flat plug boards and mating plates on the jacks so that the ground wire from the receptacle at either the dock or way was carried all the way through the system to the farthest receptacle box on any ship.

Our first move was to make up several new 4 wire service feeders with grounded flat plug boards and then exchange them for the old three wire ones. We then re-vamped the old ones until all service feeders were changed. Then we started with the jacks and changed them over until all circuits were complete with ground to all portable receptacle boxes. Now with this done, it was time to start on the portable tools themselves. For these we made up all three wire cords with three prong plugs attached and the other end prepared for a quick attachment. Over a weekend our entire electrical force was brought in to change all the cords on the portable tools and the receptacles in all of the portable boxes.

After this installation was finished we took meter readings of the resistance and checked from the portable tool to ground and we found that the resistance is 1 ohm. These checks of resistance are made frequently on various ships. Also a visual check of wiring is made constantly to see that our men are keeping this Safety item on their minds at all times. Also the maintenance of the portable tools themselves is a steady job, for they require frequent inspection and constant care.