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Industrial Fire Safety

PLANT ORGANIZATION FOR FIRE PROTECTION AND PREVENTION

By J. WARD BUSH

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Organizations for industrial fire protection and prevention are as varied as the industries themselves. There is no formula that guarantees that practices used at one plant will offer adequate protection for another. Each industry must consider the hazards peculiar to the type and size of its factory buildings, the nature of the processes required to produce its product, and the quality of protection provided by the community in which it is operated.

Similarity with any other plant is not important. The matter of real importance is the fact that a study has been made, a program planned, and an organization developed to carry out the plan. I don't believe any company can afford to do less.

I should like to outline for you today the program which we have found effective at Caterpillar. I do not hold it up as the shining example of the ultimate in protection but it is, of course, the area with which I am the most familiar.

Our Peoria plant is the parent plant of our company's operation. It consists of 155 acres under roof, paved storage yards of approximately the same area, and a total area of 458 acres inside perimeter fences.

The plant is divided into five separate areas by city street and the state highway. Our largest single area building covers slightly under twenty-five acres. Buildings range in age from four to fifty-five years. Approximately 82 per cent of the floor area is sprinklered.

We build earthmoving equipment and engines. Our largest unit built in Peoria measures 24 ft. 9 in. in length, 14 ft. 10 in. wide, and weighs 41 tons.

It would be nice to have our buildings divided into smaller sections, and I am sure our insurance carriers would be much happier, but due to the nature of our product it is not practical.

Our management is well aware of the fact that large open areas increase the odds that any fire which occurs may cause serious damage. Recognition of this fact has made the odds more favorable and was the well spring from which plans and procedures designed to further reduce the odds were developed.

While fire protection of our plant is the responsibility of every employee, the primary responsibility for the program is delegated to the plant protection division of the manufacturing department. The plant protection division consists of 160 employees, supplemented by 112 volunteer firemen recruited from factory personnel. All officers of the division are given basic fire training, but the major responsibility for fire prevention and control is vested in 25 fire inspectors and twelve command officers.

Fire prevention planning at this company starts on the drawing boards of the planning and engineering departments. By the establishment of a close liaison between plant protection and these departments, the company is assured of:

1. Fire resistant construction throughout for new work and the replacement of existing combustible installations with fire resistant material as changes are required.
2. Provision of adequate exits to insure safe evacuation under emergency conditions.
3. Provisions of automatic fire doors, water curtains, etc., to restrict the spread of fire.
4. Automatic alarm systems to provide notification to personnel of an emergency.
5. Provision of automatic sprinklers, carbon dioxide, and dry chemical systems for the protection of special hazards.
6. Adequate protective water supply to assure acceptable volumes at workable pressures for a reasonable length of time.

Since March of 1951, the rules and regulations for fire prevention and safety for the State of Illinois have been based on the national fire codes as published by the National Fire Protection Association. Such direct references by state statute emphasize the importance of our membership in the NFPA and makes even more valuable the wealth of information available from them. In my opinion, no industry can afford to be without membership in this association. Through constant study of their publications and reports our people keep informed on new products and new methods of controlling the hazards attendant to them.

If new materials do not show up in our production operation we can at least anticipate that we will be confronted with them in our research and development areas.

Each hazardous condition and situation is analyzed to see if it can be corrected or is a calculated risk of operation. If it is a calculated risk, it is necessary to minimize the hazard in every way possible and to provide protective equipment for fire control. Again the best results can be obtained only through close cooperation with the research, planning, and engineering departments.

We have established a hazardous materials control committee. This committee consists of representatives from the research, engineering and purchasing departments, metallurgical laboratory, medical hygiene, safety and plant protection divisions. Whenever any hazardous materials are brought into the plant they are studied by this committee. They determine where and how the material is to be used, and if it offers a fire or health hazard under the specified terms of use. It is then the committee's responsibility to decide the necessary precautions to be observed or to present recommendations to management that the material be barred from use at the plant. Management has seen fit to stand behind these recommendations, resulting in safer operations.

Even though we minimize the combustibility of our buildings and hold to bare necessity the hazardous processes and materials we use, we are well aware that in any operation involving over twenty thousand employees there will be fires. To reduce the odds of the fires which do start achieving serious proportions we divide our efforts

into two categories: (1) fire prevention, and (2) fire control.

Our fire prevention program includes:

1. Complete hourly inspection of all areas of the plant when they are not tenanted by employees.
2. Inspection of fire equipment, i.e. extinguishers, sprinkler valves, major protection systems, etc., at least once each shift.
3. Proper maintenance of fire protection equipment by qualified craftsmen.
4. Constant supervision of waterflow alarms, critical utility valves, protection systems such as CO₂ coverage of special hazards by a proprietary system reporting directly to plant protection headquarters.
5. Individual inspection of each cutting or welding job performed outside an area assigned for such work and the provision of standby personnel if, in the judgment of the inspecting officer, it is needed.

6. Special training for all factory supervisors in the recognition and correction of fire hazards.

Fire control:

Eighty-two per cent of our buildings are equipped with automatic sprinklers. Areas not so protected are in buildings with fire resistant roof decking and light hazard occupancy.

Our primary water supply is received from the 1 million gallon reservoir of the city of East Peoria at an average static pressure of 85 psi. This supply is backed by our domestic water storage of 375,000 gallons in elevated gravity tanks and 450,000 gallons in ground level reservoirs supplied through three fire pumps with a combined capacity of 3,500 gpm at 125 psi.

In addition to our ability to refill these ground level reservoirs from our own wells, we have provided means as a last resort, to refill them or pump directly into our fire mains from our millwater supply. This millwater system is fed through 6,500 gpm pumps taking suction from the Illinois River.

We maintain a Ward Lafrance 1000 gpm pumper staffed at all times by the paid firemen of the plant protection division.

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Industrial Subjects Sessions

ing in all phases of fire control. This training includes instruction in:

1. Safety to life and rescue.
2. Size up or analysis of fire scene.
3. Isolation of a fire, and exposure protection.
4. Extinguishment.
5. Salvage and overhaul.
6. Fire cause investigation.

Each man of the fire section is charged with a share of the instruction of volunteer firemen. We are proud of this group of men who give of their time to assure the protection of company property and the jobs of their fellow employees.

It is, of course, a foregone conclusion that the personnel of the plant protection division are carefully chosen for their physical and mental ability, their interest in the work, and their personal integrity. We believe that it is equally important to be just as particular in the selection of our volunteers. It has been our experience that seldom does a volunteer who joins our department only for the money involved or who has been arbitrarily assigned to it by his supervisor turn out to be a credit to the department. We believe that a real interest in the fire service is of prime importance. Over fifty per cent of our volunteers are also active in one of the 25 departments and fire districts in the five counties surrounding the plant.

After it has been determined that a man has an interest in the work, his foreman or supervisor is contacted to see if he is a dependable employe and if his normal duties are such that they can be interrupted if his services are needed as a fireman. Continuous process operators, tool and die sinkers, pattern makers, and other highly skilled personnel are not usually selected, as their work includes considerable overtime which would interfere with their attendance at drills and training classes. Maintenance men and construction personnel are excellent candidates, as they are usually well acquainted with the plant and familiar with water mains, electrical service, gas lines, etc. Also, their work keeps them in practice climbing and handling ladders, ropes, and an assortment of fire service hand tools.

The third step in the selection of a fire-

man is an examination of his personnel record or history folder. It must be realized that his assignment may carry him into restricted or critical areas. It will pay you to be sure of his background; then submit the application to the medical department for approval. You will be amazed at the number of applicants who will be rejected. It is almost impossible for you to determine if he has a bad heart, a hernia, a previous back injury, or something of that nature. A check of his physical condition in advance may save you a lot of embarrassment later on.

We are assured that these are not unreasonable requirements by the fact that we have a waiting list of applicants on all shifts who want to join the volunteer group. Our volunteer organization is composed of seven-man squads. When activated they assemble at a specified location and report to the fire scene as a team. One member of each squad is selected as a team captain who is responsible for coordinating the operation of his group. We have found that this unit method of training and operation has greatly improved the efficiency of our volunteers.

To train volunteers, the standard job-instructor training method which employs the following five steps is used:

1. Tell or demonstrate how it is done.
2. Help the man do it.
3. Put him on his own.
4. Correct his errors.
5. Give him practice.

Our training course for plant officers and volunteer firemen includes instructions in the chemistry of fire, recognition of fire hazards, handling of first-aid equipment, operation of fixed fire protection systems, operation of major equipment and fire control operations. These fire control operations are further subdivided as follows: safety to life and rescue operations, protecting exposures, forceable entry, ventilation, extinguishing evolutions, and salvage operations. At the end of this course of instruction, if a man cannot efficiently perform the work, it is usually safe to assume that he does not have the necessary interest and he should be replaced.

VISUAL AIDS

It is a well-established fact that a person retains a far greater percentage of the information he receives by sight than through any of the other senses. Perhaps the most

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extensively used visual aids are the moving picture projector and the slide projector. To these have been added several types of reflex projectors which project on the screen any picture, sketch, or map placed on the view table.

There are many sources of training films available at little or no cost. Among these are the National Fire Protection Association, National Safety Council, fire insurance companies, fire equipment manufacturers, and state college libraries. Many fire equipment companies also have cutaway models or pictures of cutaways of their equipment, which offer valuable assistance in understanding the unseen operating features. Many lessons can be learned through pictures cut from publications for use with reflex projectors. A complete set of ladder evolution pictures mounted on heavy cardboard has been found to be a valuable aid in teaching new men proper ladder techniques.

We realize that there is always the possibility that some emergencies will be beyond the scope of our normal protection facilities. These may include:

1. Emergencies arising out of plant operations, such as a serious fire or major explosion.

2. Natural disasters.

3. Damage resulting from enemy action.

The odds that we will be faced with any of these types of emergencies are small, but we do not feel we can disregard them. In order to fulfill our obligation we have organized:

1. A company disaster plan.

2. Mutual aid arrangements with other industries, area fire departments and the local civil defense organization.

Our disaster plan contemplates the mobilization of all company departments into an all-out effort which may or may not be an amplification of their normal responsibilities. Definite functions are, however, assigned to each department and every effort is made to utilize available skills in the most advantageous manner. Job titles, not names, are used for assignment purposes.

A disaster manual has been formulated and issued as a restricted document to responsible management. We have never been required to activate this organization for an actual incident but we have staged both

paper tests and dry runs and we are convinced it can be depended upon to function effectively if needed.

The fire department of the city of East Peoria is a part paid, part volunteer department. The Peoria Fire Department, located just across the Illinois River, is a fully paid department. Both are well-equipped and well-managed but both are handicapped by manpower shortage. In a recent major fire in Peoria, all of that city's equipment and manpower were in use, and East Peoria had dispatched their first-line equipment to the scene to assist. Had we been faced with an emergency at this time, we would have had to depend upon our mutual aid support. Our relations with these departments are cordial but we must plan around their limitations. To provide this mutual aid support we hold membership in two organizations: 1) the Central Illinois Industrial Fire Council, and 2) the Tazewell County Firemen's Association.

The Central Illinois Industrial Fire Council is an organization of men responsible for the administration of the fire protection programs of the industries in our area. It is a unique organization in that there is no membership fee and no dues. Once each month the members meet for an informal, Dutch treat dinner, listen to a program on some phase of fire protection and exchange information. Any member feels free to pose a problem and generally someone in attendance can offer a solution or at least some good advice. We sponsor an annual industrial fire seminar which draws an attendance of approximately two hundred men and is increasing each year.

The secretary maintains a list of fire and allied equipment which is available for mutual aid use. Any plant called will arrange for delivery of the needed equipment to the scene of the emergency and will provide technical assistance in its use if needed.

The Tazewell County Firemen's Association is, as the name implies, an organization of all of the fire departments and fire districts in our county. Each department, regardless of its size, has an equal voice and vote in the affairs of the organization.

Mutual acquaintance and a knowledge of their neighbors' equipment make the coordination of two or more departments into a single effective unit as simple as coordinat-

ing the efforts of the several companies of a municipal department. This cooperative arrangement places at the disposal of any chief faced with an emergency beyond the scope of his own department the manpower, and equipment resources of the other member departments. A system of standby alert guarantees that no community will be left without protection even though their own department be involved in a mutual aid effort elsewhere.

Civil Defense in Peoria is a well organized operation. Developed under the existing federal, state, and local laws and ordinances, it has not been involved with political entanglements. It is financed by permissible tax and operated under a strict budget and accounting program. The director is a young man of outstanding character and ability. Oriented to the program by working several years as administrative assistant to the previous director and further qualified by an excellent education and a tour of military service, he has gathered around him an efficient and dedicated organization.

The organization is staffed and trained to

supplement the various agencies of local government in the event of a community disaster as well as enemy action. Our company has cooperated in this program because we feel that the deterrent factor presented by an informed and prepared nation reduces the odds of a nuclear war.

Company employees are involved in almost every phase of the organization and our disaster plan is designed to function as an integral part of the community program. Plant protection personnel have been qualified in the handling of radio equipment, decontamination, first aid, rescue and many of the other special services. We believe that, if it is needed, this is one Civil Defense unit that will give a good account of itself.

What are the odds that we will be faced with an emergency tomorrow, this month, or this year? I don't know. I can only answer that we believe that by consideration, planning, and preparation we have made an honest effort to minimize the odds while allowing reasonable freedom of operation to the people responsible for the manufacture of our product.

RECENT DEVELOPMENTS IN FIRE PROTECTION EQUIPMENT

By ROLF H. JENSEN

Associate Managing Engineer, Underwriters' Laboratories, Inc., Northbrook, Ill.

Although the published title of my talk is "new developments" in fire protection, I am going to speak only of portable extinguishers.

Since Webster defines the word "new" in relative terms, such as "Modern" and "Unfamiliar," I believe it is permissible to extend my area of new developments back to 1954. This was the year the Underwriters' Laboratories, Inc., Factory Mutual Laboratories, and Underwriters' Laboratories of Canada, in cooperation with the Fire Extinguisher Industry and the NFPA Committee on Portable Extinguishers instituted a program of realistically rating the fire-extinguishing ability of extinguishers.

That program brought about a revolution

in the design of extinguishers which has continued uninterrupted to the present time and has resulted in consistent improvements in fire extinguishers. While discussing this past 10 years of extinguishers, I would like to include some information on what modern extinguishers can and cannot be expected to do, and add a few "do's" and "don't's" of maintenance and use.

How often have you looked at a product and silently asked yourself, "Do those things really work?" In all probability many times—and some of these have probably occurred when the product in question was a portable fire extinguisher. Let us examine this question by reviewing the methods of rating extinguishers for fire-fighting ability and the