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FREQUENCY - ZERO

By S. M. SHARP

Vice President, Engineering-Operations, Southwestern Electric Power Company
Shreveport, La.

This is not my first Congress—I've seen quite a few — so with all the trials of such a huge affair, confusion is not one of my troubles. There was a time when Congress did confuse me. When I saw the appeals of my first Congress in evidence everywhere, frankly I wondered. There were slogans, "Reduce accidents," "Cut down the number of deaths," "Let's save lives," etc.

This sounded good, but when thought was applied to some of these phrases, questions arose in my mind, "How do you attempt just a reduction?" "Which type of accident should we attack?" "What types are less harmful and therefore do not warrant our major concern?" As an operating man I did not feel that I could select or permit a state of confusion in one area in order to combat it in another.

It was then that it became clear that the safety problem is not to be settled piecemeal. Rather it is a philosophy that should begin with the original plans of a job and continue so long as operation is maintained. The goal must be accident elimination, not just reduction. Frequency-zero, not just improvement.

Also it was a sobering thought to realize that, with my engineering responsibilities, the groundwork for safety was being done under my supervision with the very planning of the work. Through the years it has been my belief, therefore, that a primary phase of this sometimes nebulous subject of safety can be resolved and reduced to reality. It is a hard-headed proposition of engineering and planning accidents out of our picture by good planning and engineering standards.

With these facts in mind, I would like to share with you a few thoughts that make sense to us at Southwestern Electric Power Company.

Our main objective is to build an electric system that will result in giving dependable service at the lowest possible cost and yet provide the safety features required to protect the employees of the company and the general public. To properly carry out the ob-

jectives of Southwestern Electric Power Company, which are more or less common to all electric utility companies, we have and must use three important standards to guide us.

1. The National Electrical Safety Code
2. The Bureau of Safety Rule Handbook
3. Engineering and Construction Standards

The National Electrical Safety Code was prepared by the National Bureau of Standards, Department of Commerce, in cooperation with the electric companies, the telephone and telegraph companies, the railroad companies, the labor unions concerned, the technical societies concerned, governmental bodies concerned and safety organizations. It has been approved by the American Standards Association as an American Standard. This code is kept up to date and revisions issued from time to time. Revision is a slow process because so many people and associations are involved.

The present Standards Handbook Code H 43 is applicable for the installation and maintenance of electric supply and communication lines by electric utilities. (In the State of Texas, Handbook Code H 30 applies according to law; however, the rules applicable to the installation and maintenance of electric supply and communication lines are the same as in Handbook H 43.) It also covers the safety rules and discusses the code requirements. This code specifies protective grounding rules, clearances, working room, safety factors and many other design factors pertaining to the grade and type of construction required. Keep in mind that all of the requirements of this code are the minimum requirements.

The Safety Rule Book is published by the Bureau of Safety and the scope of the rules cover:

- Part I General Rules for all Employees
- Part II Electrical Departments
- Part III Generating Stations
- Part IV Electrical Transmission and Distribution

With the help of the people in companies associated with the Bureau of Safety, the Safety Rules are revised periodically to keep abreast of the changing conditions and improvements in equipment and procedures. The Safety Rules provide proven rules, that when followed will result in carrying out the earnest desire of each company to conduct its operations with the utmost regard for the safety of its employees, its customers and the public.

In the foreword of our Engineering and Construction Standard Book, we list what we believe to be the principal reasons for these standards. The first two reasons in this list are:

- (1) Safety to the workmen
- (2) Safety to the general public

You will not be surprised to recall practically the same wording in the first sentence of the foreword of our Safety Rule Book. When we examine the *aims* of rules, whether they be specifically labeled safety rules or construction or engineering rules, we again see a natural parallel. They all call for conformity with a basic overall plan or design that grows out of past experience as well as technical theory. In other words, they call for doing things the "best way" from a broad viewpoint, and the "best way" has no leeway in it for accidents.

Furthermore, we find we can achieve the best results in compliance with rules and standards when the employees involved are informed as to why they have been placed in effect. When it is learned that there is sound basis for these restrictions, it is very likely that good acceptance will follow.

As we approach the subject, we must also recognize another very basic factor. That is the desire on the part of individuals to do things in their own way. They look upon such rules and standards, as we are now discussing, as infringements on their own personal liberty and, therefore, something they should naturally oppose. This is all the more reason for the close cooperation between engineering, construction and safety to obtain the soundest possible plan from every viewpoint. In this brief discussion I would like to explain to you, who represent the safety people of your various companies, the aims and viewpoints of the engineering functions so that you may more successfully

join with the engineers of your companies to provide safer designs and working procedures for your personnel and your construction. *Frequency-zero means no accidents*, and *no accidents means no mistakes* in planning, construction, nor operation.

It all starts in the planning stage with a standards program. Now, the general conception of a standards program is that it is a means to provide economy or save money. But, if we can provide a means to preserve life and at the same time effect economies, we have achieved a double victory.

All of our engineering and construction standards are designed in accordance with the rules as outlined by the National Electrical Safety Code, keeping in mind that these rules are minimum requirements. As you remember, I previously listed those agencies and organizations who prepared this code. Thus it may be readily seen that all interests were being protected. This code provides such clearances, structure and conductor strength to protect the general public. It provides safe, adequate and climbing working space for the workmen, not only for those of the electric utility companies but also the workmen of foreign systems whose facilities are often joint with the electric utility system. It specifies materials to be of such strength and with such adequate safety factors as to provide safety to all concerned. It also specifies safe working and operating procedures.

All designs of construction must be such that they are workable in accordance with another important standard, the Safety Rule Book. The structure of facility must be so designed to protect adequate and safe installation of safety devices that are specified by the rule book for use while performing the specified work. Certainly all items of material used for any project must be installed so as to be functional, but they must also be so located and with such clearances that would make replacement in the future possible in a safe and satisfactory manner. In other words, the design as shown in a standard should be such that the project or job can be installed safely and in the future be operated and maintained in a safe manner.

While an engineering and construction standard must provide these basic safety requirements, it must also provide the econ-

omy that results from use of standard materials, standardized assemblies and standardized work methods and procedures. It must also be designed to provide the minimum in future required maintenance and to continually provide improved service to our customers. Now, it would be simple to provide a design that would only meet the two first named safety requirements — that is, Safety To Our Employees and Safety To The Public. By taking into account these two requirements and ignoring the other reasons, it would *not* be hard to see how the costs could increase to the point where you could "safety design" yourself out of business. This does not mean you should compromise safety but it is necessary to incorporate all of these reasons into each design to have both an economical and safe structure on all viewpoints. With this approach you can keep the engineers with you and not resentful of inroads into their field.

We can have the economies of efficient construction and still have our "frequency-zero." While we can't remove every possibility of an injury, we can make our devices standard so as to permit the workmen to develop the good habits and safeguards to complete and round out the task of a successful job.

The same type construction used throughout a company not only provides economical benefits available from larger quantity purchases, etc., but also provides a very valuable safety feature. When it is necessary to bring crews from other divisions to emergency areas, they are familiar with the type construction and know the best work methods to apply. This certainly can be demonstrated during any severe wind or ice storm. This uniformity really pays off in reduced labor costs.

We have previously mentioned how work procedures and methods are designed into standards. Now you know it would be impossible to find an engineer who is excellent in structural and electrical design and at the same time had all the "answers" on the best methods of installation. A standard cannot just be made on a drawing board; it must be developed.

We attempt to give everyone in our company who uses a standard a part of its development. The need and idea for a new standard might well be brought up by a

line crew foreman or a member of his crew, by a serviceman, by a meterman, or by an engineer or a supervisor of construction. After the initial design is made by the engineering department, a mock "set up" is often made and this is analyzed from both installation procedure and future operating requirements. From this analysis, such changes as necessary are made and the proposed standard is then circulated to each division engineering and operating department and the general safety department. The opinions of all concerned with its use are thereby obtained. The drawing and specifications with suggested changes are then returned to the general engineering department for incorporation of the new ideas and necessary changes. This now revised proposed standard is then returned to the divisions to be used in making actual installations.

These installations are then field checked by the safety department engineers, the divisions engineers, design engineers, and the division operating and construction supervisors. After this field trial and check period, any necessary changes are then incorporated into the final approved standard.

All through this development, the safety department has been providing assistance; in the original comments, in the observance of work methods on the "mock up," and in the final stages of approval. An approved standard in our company also includes the approval of our safety director or his representative. The safety man must gain and hold his place at the planning table by *trying* to see the engineer's problem and selling a good solution—not by just bucking in a negative manner.

Provisions must be made in a standards program for revisions or changes as the various conditions of safety and economy demand. It is essential that they be reviewed to make use of new materials or changes in methods. In our company we encourage everyone connected with the use of standards to submit ideas and suggestions on improvements of them. If a revision "setup" was not included in such a program, the advantages of a standards program would soon be lost.

If it is so determined that any new material or process merits our consideration for use, then it is tested, both electrically

and mechanically, to determine if it will satisfy all our requirements, of course, including safety. One or more divisions will then be selected to try this idea in its proper application to actually determine if it is a worthwhile improvement. From this information gained, the decision can then be made to either approve or reject the item.

The benefits of a standards program cannot be realized unless it is accepted by all and is followed as closely as possible. It is the responsibility of the supervisor concerned with construction to see that standards books are kept up to date and to see that the phases of construction under his supervision adhere to the approved standards. In our company we obtain very good adherence to the standards and I believe this may be attributed largely to the fact that the people who use them assist in their initial development. They also know that any suggestions they make for revision are going to receive due consideration whether or not they are actually put into effect.

In addition to gaining uniformity in construction practices and aiding in safety programs, engineering standards are of great value in giving instructions to contractors who do work for the companies. This is just as important as a training aid used as an instrument of safety. Before the days of our present standards program, the appearance of a new contractor's crew on our property touched off a long period of constant engineering supervision in order to maintain any semblance of conformity with ordinary construction or safety practices by the contractor's crew. A standards book placed in the hands of a contractor gives him every opportunity to comply with our construction standards.

Certainly, safe methods cannot be determined and applied unless the job being constructed is fully understood. Only after the end result we want to achieve is determined, can the best procedures be laid out.

If we can get the idea across that engineering and safety are not in conflict with each other, but are both means to the same goal—namely, production in a safe and required manner, we will take a great step in improving the overall performance within our companies and toward "frequency-zero." Therefore, a good and acceptable design for any project or facility must meet four basic requirements:

(1) It must be able to be originally constructed in a safe and satisfactory manner.

(2) It must provide features that will allow it to be easily and safely maintained in the future.

(3) It must result in a completed project that renders dependable safe service with outages reduced to a minimum, and

(4) Giving full consideration to the first three requirements, it must be of the most economical design.

Also, safe working procedures must be worked out to be applied during the original construction and for future maintenance of the job. These factors lead to a well-planned job that has no place in it for injuries because injuries are the results of mistakes and mistakes are the result of poor planning. And let us not forget that accidents consume time regardless of whether or not they injure people or property.

The goal for our company and for any company to have good, practical and readily understood engineering and construction standards is the responsibility of the engineering and operating departments. However, this must be accomplished by the cooperation and teamwork of the engineering, operating, and safety departments of the company. The result will provide plans and procedures for doing a job in a satisfactory and safe manner. This should also result in motivating, building up and keeping alive a good safety attitude in our employees.

Let us think and shudder for a minute about a company's safety program if there was not an adequate standards program to work in conjunction with it.

What would be our assurance that all new materials available for use were adequately tested for required strength and safety facilities?

Would all our crews be following safe, tested and proven installation procedures?

Would our service people always know and follow the best operating procedures?

Could we always be sure that adequate clearances were being obtained for protection of public property and life?

Would we know that our services and maintenance people had adequate and required working room to perform their tasks?

In answering these questions, we quickly ascertain the fact that if you have an ade-

quate engineering and construction standards program, as we have, you have a valuable and necessary essential part of your safety program, and be well on your way to "Zero-Frequency."

By following such a program, as I have outlined to you, we can satisfactorily fulfill our part of the obligations due to our customers, stockholders, employees and the public.

A SAFETY PROGRAM FOR ELECTRIC AND COMMUNICATION UTILITIES

By H. H. MARSH, JR.

General Superintendent, Substations and Shops Dept., Duquesne Light Co.
Pittsburgh, Pa.

It is not unusual practice in court to establish the qualifications of witnesses to testify and I feel that this is certainly in order here today. I have asked myself, "Who am I to be talking on the subject of 'A Safety Program for Electric and Communication Utilities'?" My name and my company are not of particular consequence.

The only significant item is that I've had over 38 years of association with an operating department of a large public utility and during that time, I have had experiences that have convinced me that everyone should be enthusiastic in accident prevention work. I have grown up with our safety programs and over the years have learned that the end result sought in avoiding accidents is in the conditioning of each individual to a safety consciousness.

Accomplishing this however, is not easy. It is a slow process and it is never completed. I feel that it can be done however, by honest effort and by continuous application of small doses, just as dripping water can produce amazing results.

I'm convinced of this because of my own conversion to safety consciousness and the correction of faulty attitudes I once had. Much like many young people today, I was once egotistical and felt that safety rules were "for the birds," not meant for me — I wasn't so awkward or dumb as to be hurt under circumstances covered by a lot of foolish rules. I used to feel that there always would be accidents if the stage was set up right—they were really acts of Providence and who was I to interfere. Then

there was that law of averages that I believed held, like actuarial statistics — it never entered my mind that those averages could be influenced and changed. I felt that I was able to look out for myself but that if I did have an accident it was someone or something else that was to blame.

I wanted to be left alone to make a name for myself in establishing records of performance that weren't hampered by rules. Short cuts and chance taking and calculated risks were the order of the day — in accordance with the old saying, "nothing ventured, nothing gained." I felt that the company had hired people to look after safety and that if I "rendered unto Caesar things that are Caesar's," they should respect my field and leave electrical station maintenance to me.

Why am I different now? I've learned the hard way. I've had the harrowing experience of informing a young expectant mother that she was a widow; I've accompanied fellow workmen to the mortuary to discover data for fatal accident reports. I've seen the frightful results of major electrical burns and the gory results of cutting injuries and I've honestly felt the pain experienced by others as a result of fractures. My conscience has bothered me at times in asking me what part did I have in perhaps being a factor in leading to any of these accidents (either by an act of omission or commission).

I've never quite satisfactorily answered my conscience on this question as to past accidents, but the fact that I've tried to cor-

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