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Metal Sessions

THE CAUSE, PREVENTION, AND CURE OF COMMUNICATIONS SHOCK

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*The author presents an unorthodox but time-proven method
for solving communications, safety, and business problems.*

If you have experienced that feeling of intense discomfort when:

--You planned a special night out with your wife that ended in an argument--

--You completely blew your stack over a minor infraction by your child--

--You noticed a strange odor in the room after a teenage party at your house--

--The employee you indoctrinated in safe work procedures last week became a lost-time accident victim two days later--

--The "austere" budget you submitted for next year was cut an additional 20 per cent by top management--

--then this talk is for you. As a matter of fact, since some of these examples are from my own experience, I intend to take a little of my own medicine.

Safety and PR--Common Ground

In many ways, the fields of safety and public relations are alike. Both of us have a great deal of responsibility for the well-being of employees, but most of us rely heavily on persuasion and goodwill rather than authority to carry out our missions. We seldom have the power to tell people what to do; we have to convince them of the worth of the things we want done and hope they will support us with their actions. We both must develop skill in human psychology and behavioral motivation. We are largely reactionary functions. Even though we do our best to anticipate and plan for possible events, we are often at the mercy of them and find ourselves scrambling to come up with the solution to problems after they have occurred. In times of emergency, whether it's a disabling injury

or a major disaster, it is the safety man and the public relations man who must get at the facts quickly and handle both the inquiries and the reports, communicating with top management, our employees, and the outside world. Finally, both safety and public relations people must address themselves to people at a deeper level than super-imposed organization, deeper even than their habits and their five senses. We must reach them at the level of their basic attitudes.

Communications Shock

What exactly do I mean by "communications shock"? We have examples all around us, every day, in every part of our lives. Whether you call it communications shock, or communications failure, or collapse, or breakdown, or maybe communications gap, faulty communicating lies at the heart of most of our problems. In family relationships--marital conflict, separation or divorce, teenage estrangement or drug abuse, child phobia or mistreatment. In your community--neighborhood feuds, juvenile vandalism or delinquency, racial tensions or violence, educational controversy, political malfeasance. In your business--high rates of turnover, absenteeism, grievances, and yes, accidents and compensation cases, labor walkouts, strikes, even plant closures. All these are symptoms of communications bankruptcy, extreme cases of communications shock.

Now that we know what communications shock is, what can be done about it? First, I would like to point out that in most cases

there is no problem with communications, as such.

For example, you may have a talk with your teenage son. The discussion over hair or dress codes or slang expressions may rage back and forth for an hour or more. Finally, one or the other of you leaves the room in total anger and frustration. The next morning during coffee break you say to a friend, "I just can't communicate with that boy."

Wrong. You communicated all right. He understood exactly what you were saying. And that, after all, is communication. What you really mean is that you couldn't persuade him to accept your point of view, and vice versa. The same thing is true of almost all the situations we have considered here. Probably, in most such cases there is perfect communication. Each party receives the message the other is sending. But the basic disagreement or dissension remains unchanged.

Prevention and Cure?

It is obvious that we cannot get at the heart of these problems and turn them around with a mere set or system of communications techniques. Hundreds, or really more like hundreds of thousands, of papers and books have been written on improving your communications skills, such as studying your objectives, anticipating the situation, and listening more carefully. But, if we are going to really change the situations we've been talking about, we have got to change not merely the techniques, but the people.

At work, most of us have production problems, safety problems, morale problems, and so on. But if we look at these problems below the level of statistics, organization, processes and reports, we find only one thing: people. As scientists, engineers, and managers, you know nothing much can be done to change results until we change causes. And the causes of most of our difficulties lie within the hearts and minds of people, individually and in groups. As I said earlier, the concern we have most in common is human attitudes.

If only there was some way that we could get inside a person and make him see for himself the importance and the reasonableness of what we want him to do or, in other words, the correctness of our viewpoint.

I am convinced there is a way. Be prepared for a little communications shock right here, when I tell you what it is. It is Love.

That's right, Love. I know the word "love" has a connotation of weakness or romanticism or foolishness; so, you probably wonder right now what kind of an idiot I am to bring up such a thing.

But let's look past the word itself for a moment, and consider the human faculty involved. Just as Fear is the base element of all destructive and negative motives, Love is the fundamental factor underlying all creative qualities and sentiments. Thomas a Kempis expresses it this way:

"Love feels no burdens, thinks nothing of trouble, attempts what is above its strength, pleads no excuse of impossibility; for it thinks all things lawful for itself and all things possible. It is therefore able to undertake all things, and it completes many things and brings them to a conclusion, where he who does not love faints and lies down."

In other words, love is a powerful and self-chastening sort of thing, not easily won and not to be lightly employed. Probably the simplest and the closest of our human tendencies, love also is one of the most difficult of mastery and powerful of possibility.

There is nothing new about this; man discovered its power and utility thousands of years before Christ, and each discoverer has written down his findings and techniques for his own and following generations to examine and test for themselves. Yet, it is almost as though it has been kept a closely guarded secret which only a few people in each succeeding generation have re-discovered and put to use. And each person that has done so learned an amazing thing about love. You can't give it away without getting an equal, or often greater, amount in return. Perhaps not in kind, or at the same time, but sooner or later all the good we give forth comes back to us. (As a matter of fact, so does the bad!)

Communicating Love

But what does love have to do with our communications, safety, and business problems?

I submit that the only way we are going to succeed in solving any of these problems, is through learning to love our fellow workers. The same applies to the family situation, but let's stick with business for the time being. Charles L. Allen has said, "As we come to love all men, so we enter the war against all enemies of men." That is the crux of the matter. Until we get rid of all these things that are creating and continuing mistrust, misunderstanding, and downright hostility between people, we cannot hope to overcome people problems.

Where shall we begin? That's simple enough. Right here—inside you and me. Before we can get rid of the mean and foolish and phoney and destructive things in our work environments, we have to get rid of them in ourselves. As one writer put it, "The greatest good you can do for another person is to so transform your inner life that others are attracted to your genuine example of goodness."

In short, empire building, status seeking, credit grabbing, self-protecting, playing it "safe," falsifying, lying, conniving, deceiving, play acting, back-stabbing, complaining, gossiping, expense account cheating, grandstanding, and all the other individual negatives we have, most of which amount to ego-gratification, must be dumped overboard before anything will begin to happen to change our families, our neighborhoods, our communities, our plants or offices. Did you think when I first mentioned love, I had in mind something fragile and vague and idealistic? Not a bit of it.

Listen to what Paul says about love in the New Testament, with an interpretation of the qualities he describes:

Paul's Treatise on Love—I Corinthians 13:4-7

Love suffereth long,
and is kind..... Patience & Kindness
Love envieth not..... Generosity
Love vaunteth not itself,
is not puffed up..... Humility
Doth not behave itself
unseemly..... Courtesy

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Seeketh not her own..... Unselfishness
Is not easily provoked..... Good Temper
Thinketh no evil..... Guilelessness
Rejoiceth not in iniquity,
but rejoiceth in the
Truth..... Sincerity

When we learn to cast out all our negative approaches and apply only positive ones, such as patience, kindness, generosity, humility, courtesy, unselfishness, good temper, guilelessness, and sincerity, then we will truly understand how to, as Paul went on to say, "Beareth all things, believeth all things, hopeeth all things, and endureth all things."

I said love is simple, but I didn't say it was easy. You can prove this readily enough by examining your thoughts, words, and actions up to this point today. Draw up a mental balance sheet on the pluses and the minuses that have come forth from you since you woke up this morning. Talk about communications shock! And how many of those negatives were really necessary? How many could you say added something of real value to life—yours or anyone's?

But let's get back to our business challenges. Our interest is in finding a way to change people's attitudes, so they will really want to do the right thing.

First, we begin with our own character and conscience and commitment. As we develop our understanding of love, our wives and children may notice a difference. Eventually, I am confident, people at work will see a change in us and sooner or later every life we touch will begin to be affected by our own positive example of love. For love is positive, only.

"Come on now," you might be saying to yourself, "How much do you think one person can do to influence the course of a complex institution?" Well, take a look at Ralph Nader. I don't know what his personal motives or attributes are, but it is clear that one dedicated person can have a big impact on today's complex and closely interwoven society. As Mark Twain said, "The public is merely a multiplied me!" Begin where you are, with what you have to offer, and you will

be very surprised how much you can affect all life for the better. Ask yourself each morning, "What can I do to increase the happiness and success of other people today?" And instead of asking how to do it, just start doing it. First with your wife, your children, your secretary, your boss. Slowly, quietly, humbly give as much love away as you possibly can. Just think if every one of us were to accentuate the positive and eliminate the negative from here on out! We have the nucleus to start a fantastic social revolution. Believe me, whether it is an individual or an institution, noble character, conscience, and commitment are absolute essentials to meaningful progress.

30-Day Test

But, let me give you a specific test. If it fails to change your life for the better, then you can call me damned fool and safely forget the whole thing.

Beginning today, now, make a pledge to complete 30 days without a single negative thought, word, or action. Not that negatives won't occur to you; of course they will. It is natural to think of many things. But we can control our words and actions. Don't let the negative thought stay with you. Flick it off

the surface of your mind, as you would a flea that landed on your shoulder. Then, replace it with a positive thought. Above all, don't speak or act in any negative manner whatever. This means no bickering, no complaining, no maligning, no scheming, no phony excuses, no lying or deceiving, no resenting, no undermining, no retribution, no anger, no guilt, no negatives whatsoever, not one.

As you can already see, this is going to be tough. First of all, you must become a great deal more aware of what you think and say and do. And you will have a lot of resistance to overcome, from your ingrained habits and conditioned thoughts. But I dare you to try it. In fact, I will try it with you. If we fail today or tomorrow, we have to begin all over again, and again if necessary, until we have completed a full 30 days. Do you have the courage to try? If you do, you will either find it is a complete waste of time, or it will be the start of a very miraculous change in the way you see Life, and Love.

I believe Love and Truth are as practical as your automobile in our modern world. Use them as often, and take care of them as well, and you'll be just as much of a believer and preacher as I am.

INDUSTRIAL HYGIENE SURVEYS, INSTANTANEOUS EVALUATION?—USE CAUTION

By B. F. CRAFT, PH.D.

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A discussion of the different sampling strategies used by the various agencies charged with responsibility for safe worker's environments, how they differ, and some of the problems we can expect to develop.

The passage of the Occupational Safety and Health Act of 1970 represents the beginning of a new era for the industrial hygienist, an era marked with the possibility of changes in the traditional approach to industrial hygiene studies and surveys. The Act gives strong enforcement responsibilities to the U. S. Department of Labor, whose hygienists will be performing inspections in plants to determine if prescribed standards for chemical, physical, or biological agents are being complied with. The sampling strategies used to accomplish this may be quite different from those used in studies by the Department of Health, Education, and Welfare in determining whether or not employees are affected by exposures to potentially toxic materials at the concentrations used or found in the workplace, or required by Section 20 (a)(6) of the Act.

An even different sampling strategy may be used by an employer who is required by Section 8 (c) (3) to monitor and record employee exposures to potentially toxic materials or harmful physical agents. Thus, there will be a variety of sampling schemes used in the various industrial hygiene activities associated with the Act.

I would like to discuss, on a somewhat philosophical basis, some of these approaches to the industrial hygiene surveys, how they might differ, and some of the associated problems that we can expect to develop.

The Industrial Hygiene Survey

Industrial hygiene has been defined as that science and art devoted to the recognition, evaluation, and control of environmental

factors or stresses arising in and from the workplace which may cause sickness, impaired health and well being, or significant discomfort and inefficiency among workers or among the citizens of the community. Incorporated into this definition are several reasons for an industrial hygienist to sample or to conduct environmental studies:

1. To determine levels of exposure among workmen to various atmospheric contaminants and physical agents. Often, workers' exposures are measured to determine compliance with regulations, or such measurements can be made as a part of research studies to develop criteria for standards or to validate presently existing limits.
2. To determine the effectiveness of control measures, such as local exhaust ventilation.
3. For research purposes. For example, to determine the chemical composition and physical characteristics of dusts, fumes, vapors, gases, and mists, or to develop or test a new sampling instrument or method.

There is considerable concern that the new Occupational Safety and Health Act will place the major emphasis on the determination of compliance with standards and I am sure that this will be true. However, the gulf between the approach used in compliance and that used by a practicing industrial hygienist who is evaluating a health hazard may not be as wide as it seems. In many cases, the hygienist in his studies is attempting to gather and analyze information in order to decide: Is the environment hazardous or not? The compliance officer is attempting to answer the same question.

In sampling the industrial environment for

whatever purpose, every effort must be made to obtain samples that accurately represent the worker's exposure or the conditions to be evaluated. There are several basic questions that must be answered in order to assure that the samples are representative: Where should one sample? Which workmen should be sampled? How long should one sample? How many samples should be collected and over what period of time?

The answers to these questions will, of course, depend on the purpose for sampling. I would like to consider here each one of these questions on the basis that the principal objective is to measure employee exposure. Samples are usually collected or instrument readings taken either in the breathing zone of the worker, in the general room air, or at or near the operation creating the exposure.

In general, valid samples may be obtained in any or all of the above locations. However, in cases of air samples taken to measure time-weighted average concentrations which are to be used for compliance purposes, it must be assured that the samples relate directly to the exposure of one or more employees. While there are situations in which contaminant concentrations are distributed uniformly enough throughout a work area to permit measurement of exposures solely on the basis of general room air samples in fixed locations, these are rare. Usually some form of "breathing zone" sampling is preferred. Area samples are useful as an index of general contamination. However, it can be shown that employees working very near the point of contaminant generation will frequently have exposures of an order of magnitude greater than indicated in the general room air.

The decision of where to sample as well as the other questions will depend to a large extent on the hygienist's knowledge of the nature of the process and the associated employee exposure. If the process and the contaminant generation is constant, then perhaps fewer samples will be required to accurately ascertain the exposures. On the other hand, if the process is of a cyclical or periodic nature, the hygienist will have a more complicated problem.

A word of caution here! Many industrial processes are not constant, but vary in some

regular or irregular manner. The period of variation may be very short or cover a time period of more than one shift. The level of contaminant generated may vary considerably at different times during the process. The hygienist must, therefore, take the time to measure these peaks or excursion values in order to correctly determine if compliance is being met.

If a time-weighted average sample is to be collected which represents conditions over the entire shift, the most satisfactory method is to use a personal sampler: a compact and lightweight battery-operated pump and collecting device worn as a unit by the employee which enables sampling throughout the required time span. This approach permits the determination of employee exposure with a minimum of interference with his work and without exposing him to an added hazard.

This sampling approach does not, however, provide all of the information that might be required in order to determine compliance with a standard. For example, if the standard is based on a "ceiling" value, this means that the level is not to be exceeded for any length of time, no matter how small. Similarly, the ACGIH recommends for those values not given a ceiling that an "excursion formula" be applied. This determines the permissible excursion above the TWA number allowed for short periods of time.

Permissible Excursions for Time-Weighted Average		
TLV (PPM OR MG/M ³)	EXCURSION	FACTOR
0-1		3
1-10		2
10-100		1.5
100-1000		1.25

This means that a substance with a TLV of 1.0 ppm should never be allowed to exceed 3 ppm for any length of time. Similarly, a compound with a TLV of 10 ppm should not be permitted to exceed 20 ppm. The personal sampler provides a single number which represents the average conditions during the shift. Unless this average value exceeds the ceiling level, one would not be able to determine if the standard has been violated.

Therefore, a sampling strategy must be utilized that is capable both of determining the time-weighted exposure and of detecting peak or excursion values. As an alternate strategy, one could consider composite sampling, which consists of a series of samples taken sequentially and covering the full work shift. This provides information on excursion as well as on time-weighted average exposure.

A third strategy involves obtaining one or more random samples collected over a time period which totals somewhat less than a full work shift. The more uniform the exposure, the more reliable the results from this method. The above mentioned sampling approach is not suitable for evaluating cyclical types of exposures unless the sample period includes one or more complete cycles. Also, this strategy does not assure definitive information on excursions.

A fourth strategy would be to collect a series of random samples, consuming something less than a full work shift but including samples covering enough of each phase of the work cycle to be representative. This permits determination of the time-weighted average exposures and, if properly done, information on excursions.

This brings us to the question of which workmen should be sampled. The decision of course is very closely related to discussion of where to sample. The Act provides that an employer shall monitor and record employee exposures and inform the employee of his exposure. The regulations regarding this provision of the Act have not yet been formulated, but I don't think that constant monitoring of each and every employee exposure will be required. In some circumstances, it may not be possible or practical to precisely measure the exposure of every worker in a plant. It is then desirable to determine the most severe exposure situations in order that the workers having the greatest exposure risks may be selectively sampled.

In terms of the question, how long should one sample, there is one factor paramount in the mind of the hygienist. That is, to be sure that he collects sufficient samples for an accurate analysis. The volume of air collected or the duration of sampling depends on three

considerations: the sensitivity of the analytical procedure; the TLV or standard limit of the particular contaminant; the estimated air concentration. If the amount of material collected on the sample is too small, the laboratory will be unable to report useful information unless the amount collected was greater than the permitted concentration.

If larger than the required amounts of contaminants are collected, this usually is not a problem for the analytical chemist, since dilutions can easily be made. However, sampling too long may be a problem in other ways. For example, too heavy a deposit on a filter may result in some of it falling off in transit, or the absorptive capacity of a charcoal tube may be exceeded and sample lost or incorrect results obtained.

The number of samples depends on several factors: The purpose for sampling, the sampling strategy used, the nature of the exposure and many others. For example, if the concentration is high, then relatively few samples will be required. If on the other hand, the concentration is at or near the recommended standard, a minimum of three to five samples may be necessary to indicate the exposure for a single task or cycle or operation. In certain research studies that we have conducted in the past we learned that, from a statistical standpoint, we have tended to collect "too many" samples: i.e., we collected more samples than were necessary to adequately characterize the environment in question and thus imposed unnecessary work on the person collecting the samples and on the chemists who analyzed them. In these days of critical time and manpower shortages, we cannot afford this sort of thing! I think that the question of the number of samples and how long to sample can best be answered by experience with the problem or operation being measured.

The last question—over what period of time should samples be collected, again depends on several factors. If, for example, an operation continues for more than one shift, samples should be collected during each shift. Plants in geographical areas of the country where large differences in temperature occur on a seasonal basis should be studied during

both summer and winter months. Oftentimes, problems may be complicated in cold winter months by lack of make-up ventilation or reduced natural ventilation from tightly closed buildings. Additionally, variations as a result of alterations in the normal plant operations must not be overlooked. Examples include exposures during periods when equipment is down for maintenance or

process change. This includes such interesting tasks as a filter bag cleaning, which could produce brief but very severe exposures. It is unlikely that the compliance officer will be present during these critical operations, but the employer should certainly measure the exposure and insure that the recommended exposure limits are not exceeded.

SAFETY'S FUTURE SHOCK

By H. M. LOVE

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The title, "Safety's Future Shock," is derived from the bestseller by Alvin Toffler, a former editor of Fortune magazine. For those who have not read his book, Future Shock is concerned with the greatly accelerated rate of change in our society.

Toffler argues that change is happening too rapidly for our capacity to absorb change and do something about it, that people and groups are already being overwhelmed by change. He calls "Future Shock" a time phenomenon, and defines it as "The dizzying disorientation brought on by the premature arrival of the future. Toffler warns that we must learn to cope with rapid change, to manage the future, or we will ourselves become subject to forces we neither understand nor control.

A middle-aged man can state that the world of today is as different from the world into which he was born as that world was from Julius Caesar's. Almost as much has happened since he was born as happened before. Toffler supports that rather startling statement with the following example:

"If the last 50,000 years of man's existence were divided into lifetimes of approximately 62 years each," he observes, "There have been about 800 such lifetimes. Of these 800, fully 650 were spent in caves.

"Only during the last 70 lifetimes has it been possible to communicate effectively from one lifetime to another—as writing made it possible to do. Only during the last six lifetimes did masses of men ever see a printed word. Only during the last four has it been possible to measure time with any precision. Only in the last two has anyone anywhere used an electric motor. And the overwhelming majority of all the material goods we use in daily life today have been developed within the present; the 800th lifetime."

From that point, Toffler argues that this 800th lifetime marks a sharp break with all past human experience, because man's relationship to resources has reversed itself. Within this single lifetime, agriculture, the original basis of civilization, has lost its dominance to industrialism. And now we can see the approach of something new—Toffler calls it "super-industrialism"—in the technologically advanced countries.

Even if one does not share Toffler's alarm

about the rapidity of change around us, we can all agree with the need to understand what is happening in today's fast-moving society, to plan the future so we manage events rather than having events manage us. One of the factors we must take into consideration in our future planning is the growing demand that we slow down and humanize the industrial processes, show more concern for human values.

It is no exaggeration to say that safety, or man's concern for his fellow man, is becoming one of the most dynamic and challenging issues of our time.

Look briefly at the history of the occupational safety movement. Like so many modern activities, the existence of an organized approach to producing safe and healthful working conditions in industry is only about one lifetime old. Into the Twentieth Century, it was generally assumed that industrial accidents and occupational fatalities were regrettable but unavoidable by-products of progress.

That assumption did not last, of course. Public attitudes changed, and industry developed a growing sense of social responsibility. This was evident as far back as 1906, when Judge Elbert H. Gary, then head of United States Steel, wrote the following directive:

"Our corporation expects its subsidiary companies to make every effort practicable to prevent injury to its employees. Expenditures for such purposes will be authorized. Nothing which will add to the protection of the workers should be neglected."

In refusing to accept the apparent inevitability of injury and death in the mills and factories of that day, Judge Gary was anticipating and controlling change. There began to develop a new field of management which was to be known as safety management, the process of defining the accident problem and designing the remedy for it.

New organization structures were formed to bring inquiry, order, and rules to the management of safety and to develop new techniques for reducing hazards. The association of Iron and Steel Electrical Engineers met in 1912 to consider problems of industrial safe-

ty. Out of this grew an organization that was enlarged in 1915 to include other types of safety as well as industrial safety. It bore the name: National Safety Council.

The record of achievement can fairly and honestly be called good. Between 1912 and 1970, the accidental work death rate was reduced 67 per cent while the gross national product was increasing 900 per cent. What this means is that since 1912, the organized safety movement has saved the lives of almost 1,500,000 men who would otherwise have died from industrial accidents.

In addition, the rate of improvement in safety showed rapid acceleration up to 1961. For example, the frequency rates of reporters to the National Safety Council dropped more than 80 per cent and severity rates dropped nearly 75 per cent during the period from 1920 to 1961. But these figures are not the whole story. Since 1961, frequency rates have gone up instead of down and severity rates have remained substantially unchanged.

What this tells us, I believe, was expressed in the *National Safety News* magazine in these words:

"Long years of admirable successes produced among safety professionals and industrial managers a great respect for methods that have proved their worth, but they have also contributed to a certain complacency about the future."

Note the reference to "safety professionals and industrial managers." *National Safety News* is talking about the accident experience of industries with organized safety programs, industries whose statistics are reported to the National Safety Council. Even taking into account the relatively small increase in accident-frequency during the 1960s, our record over the years is one of progress.

Industries and companies reporting to the National Safety Council—the industries and companies with safety consciences and effective safety programs—show injury-frequency rates which average more than 70 per cent lower than the national rates for all workers. And our severity rates average more than 40 per cent below the national rates.

Unfortunately, we are in a distinct minority. An estimated 88 per cent of the total

American work force does not enjoy the protection of an organized safety program. It is this group which accounts for a disproportionately large share of the 14,000 on-the-job deaths and 2,000,000 disabling injuries which occur in the United States each year. And it is this group—the 88 per cent—which contains an above-average share of the more than 300,000 workers who annually suffer diseases directly related to their jobs.

J. Sharp Queener, of DuPont, a former vice president of the National Safety Council, and currently on the NSC Board of Directors, illustrated a related aspect of this situation when he observed that manufacturing accounts for a below-average percentage of work deaths, although the general public thinks of the manufacturing industries as being the most dangerous places to work. The fact is that the annual death rate in the manufacturing industries—industries where the voluntary safety movement is strong—is about 10 deaths per 100,000 workers, compared with 18 deaths per 100,000 for the total work force.

What it comes down to, I believe, is that the existence of a tremendous number of people not covered by effective safety programs has overshadowed the fact that we in the voluntary safety movement have been doing fairly well in our own shops. We have focused on our own programs and their effectiveness while Congress and the public have been looking at the total picture.

Now, all of a sudden, the future is here, and we find ourselves facing an overwhelming change, as far as industrial safety is concerned, in the form of the Occupational Safety and Health Act of 1970. The question now is, how do we react? How do we in industry avoid future shock? How can we adjust successfully to the changed circumstances we face as a result of the new law?

One danger to keep in mind is that people's expectations of what the new Act will accomplish are almost certain to run ahead of reality. Initially, there were only about 100 (now 350) Federal safety inspectors to police the Act, although it applies to approximately 57,000,000 American workers at some 4,100,000 places of employment. It may take months or longer before complaints can be investigated.

In addition, many specific safety and health standards have yet to be developed and implemented. It is one thing to say that in-plant environments shall be free of harmful pollutants and noises. It is another to spell out exactly what you mean by that statement.

Let me quote Mr. Queener again:

"I don't think you can legislate safety because so much of safety performance is a question of observance of safety rules and regulations. I think a lot of people are going to be disappointed that we do not show an immediate and startling decrease in injuries. However, the attention being given safety will be beneficial and constructive if local committees decide they want safety."

The Occupational Safety and Health Act will ultimately be made or broken at the plant level. Mr. Queener is saying there is time to cope with the situation. He suggested that we can achieve a successful adjustment to the future if we apply common sense and good judgment.

Members of the Executive Committee of the Metals Section were asked for their thoughts concerning the future: 1. What will be the major safety problems of the future? 2. In 1985, what kinds of problems do you think you will have tackled in the last 14 years? There were four major areas of comment:

1. The shortage of qualified safety engineers.
2. The problem of communications particularly as it relates to industrial relations problems.
3. The use of computers for forecasting and correlating data about safety.
4. The problem of total environmental safety.

The comments about the shortage of qualified safety personnel were well taken. The safety function in most industrial situations will have to be considerably upgraded and refined for the safety professional to cope with the unprecedented and difficult hazards of tomorrow. L. C. Smith, manager of the National Safety Council's Training Department says, "The safety team of the future may have specialists in such fields as mathematics, physics, chemistry, statistics, human factors, engineering, industrial medicine,

the government implement it."

Business philosophies generally spring from social and economic considerations—a concern for people combined with a concern for the economic factors which provide them employment. The enforcement of legislative safety regulations does affect profits, no doubt about it. My point is that the best way to avoid even more costly programs is to handle the job ourselves through the voluntary safety movement.

There are two broad areas I suggest for your consideration in coping with safety's future shock. One is to achieve increased effectiveness in the environments we know best, our own industries. The loss of even one life today is inexcusable. We need to accelerate the momentum of the voluntary safety movement, to give fresh emphasis to the vital concept that a well-managed operation can indeed prevent the occurrence of accidents, that accidents are the acts of men rather than the acts of God.

The second part of my program for the future bears directly on the problem I discussed earlier, the tremendous number of persons not now protected by effective safety programs. We should do more than support the Occupational Health and Safety Act in our own plants. We should prepare to engage in missionary work. We should encourage compliance with safety standards by industries other than our own.

I know this must seem like a very large order. However, we will be doing ourselves and industry in general a great disservice if we do not consider the possibility of going far outside our own plants to insist on high safety standards.

Howard Pyle touched on this necessity last May in a speech before the annual convention of the American Iron and Steel Institute: "It is not likely," he said, "That Federally enforced regulations will improve the injury experience of those who have effective safety programs. On the other hand, Federally enforced regulations will tend to move the laggards from little or no safety to some safety, but not optimal safety."

One of the primary jobs of the voluntary safety movement has always been that of educating the American people and their gov-

and industrial hygiene. The safety professional may act as the coordinator and assume the title of environmental engineer and have a doctorate. Certainly with more complete types of automation and with greater stress on system safety, the personal and environmental phase of the job will assume great significance in future work."

Not surprisingly, the Occupational Safety and Health Act of 1970 figured in all 30 replies to our informal poll. There was wide agreement that the act will provide a much greater accumulation of data regarding safety and should give us a better insight into various safety problems and that the standardization of data required by the Act would be beneficial.

As far as overall opinion of the Act is concerned, H. W. Gilberg, Works Safety Administrator for the Jones and Laughlin Steel Corporation, perhaps summed up best when he predicted there would be a great disenchantment with OSHA once the government and public find out that the legislative approach does not work. Mr. Gilberg criticized the OSHA as being conditions-oriented and ignoring the fact that human failures account for 80 per cent of all industrial injuries.

While I can certainly understand Mr. Gilberg's conclusions as to the shortcomings of the Act, I also am convinced that we in industry have a vested interest in making the Act work. I know this will call for a major effort. However, the alternative is that the government will react to lack of results by pressing for even more restrictive and more costly legislation regarding safety.

Those industries which already have effective safety programs must accept a new responsibility. Howard Witherson, vice president of industrial relations at Blaw-Knox says: "Although safety must be made everybody's business... its leadership is your job, our job."

Ted Allen, vice president of industrial relations for the National Association of Manufacturers, summed up my feelings when he told *Industry Week* magazine: "The law can be lived with. It is a case of how we are going to implement it and make it work. We are taking the position that we are going to help it become a sound law and we are going to help

ernment officials as to the importance of industrial safety and the measures required to achieve it on the widest possible basis. Here lies our challenge as far as the Occupational Safety and Health Act of 1970 is concerned.

Let me be specific as to what I recommend. Midwest Steel intends to use its influence in Porter County and the efforts of our safety people to persuade plants in our area to accept reasonable safety standards if they do not already have such standards. We intend to ask our suppliers to meet those standards. Other companies can do the same in their areas of influence.

As individuals, we can conduct our missionary efforts through activity in our local chambers of commerce and service clubs. They provide ideal forums for getting across the safety message and explaining the importance of compliance with OSHA.

In short, we must use this new law, support it, encourage it, and make it work. We must also provide the expertise needed to develop

standards and conditions that industry can reasonably be expected to meet.

Occupational health and safety has become a key issue of the day. It can be expected to remain a key issue. Our job is to avoid future shock—the adoption of even more restrictive legislation—by giving our attention and participation to industrial safety on a much broader front than we have ever thought of before.

A futurist has been defined as a person who is seriously interested in the future, who likes to know what the possibilities are, the problems that may come up and the opportunities that may arise, so he can prepare for them. The safety professional of today needs to be a futurist to cope successfully with safety's future shock.

In conclusion, let me once more quote Tolstoy: "In dealing with the future," he says, "it is more important to be imaginative and insightful than to be one hundred per cent right."

TRAINED OPERATORS—KEYS TO SAFETY AND PROFITABILITY

By EDWARD E. WILKINSON
Supervisor, Safety and Plant Protection, Lukens Steel Co., Coatesville, Pa.

How the hidden costs of untrained operators can more than offset the cost of a training program.

Safety training is certainly not a new subject in American industry. It is not a modern, space age concept or "one of the very latest developments" on the industrial scene. In fact, it is one of the oldest ideas in the world. Over two thousand years ago Christ was learning the carpenter's trade under Joseph's guidance, Paul was apprenticed to a tentmaker, and Peter was probably learning the proper way to cast nets. Safety training? Oh yes, in every sense of the word. The training they were given included not only the proper use of the tools of their trades but an equal

emphasis on proper care of those tools to avoid injury and damage. A net that broke when filled with fish because it had not been mended would not bode well for a fledgling fisherman. And the apprentice tentmaker who sliced a finger or ruined valuable material because he was careless with a knife won no respect from his employer.

Yes, there was a need for safety training even then, but it was probably more apparent than today. The craftsman under whom the young hopeful served was always right there when the accident happened. He knew

of the injury or damage when it occurred and took immediate action to avoid a recurrence by giving the required training on the spot. Today, unfortunately, it's not quite that easy. The one-to-one ratio for craftsman and learner no longer holds true. In even the average size industry an operator can cause extensive damage and even injury before he is noticed. In damage cases it may never be noticed, but simply considered as a normal cost of doing business.

Almost without exception, it will be found that such an operator had little, if any, training for his job. He is usually, in a very tragic sense, a "self-made man" in that he learned the operation mainly by his own experimentation or trial and error. In short, he picked it up as he went along, and after all, what's wrong with that? It's the way the last six men learned the job! Sound a little strong, a little too ridiculous? It is, but in too many cases it's too near the truth.

The truly sad part of this situation is that it is done, many times, because the employer feels he can't afford the time and cost of proper training, when in reality he can't afford the time and cost of improper training.

The problem here, of course, is that the price of proper training may be more evident and certainly easier to compute than the costs of improper training. The cost of improper training (or no training) is usually disguised as costs of damage to equipment and material and personal injury to employees. A portion of it may even be hidden in what are considered to be "normal" maintenance costs for "wear and tear." When these costs are traced to their actual source—inadequately trained operators—they give a startling picture of the cost of improper training.

By avoiding or reducing the toll of damage and injury caused by untrained or inadequately trained operators, the cost of proper training is often more than absorbed. This same reduction in costs serves as a tangible measurement of the value of proper training. But the real bonus from this type of training is the peace of mind that comes with knowing every operator has been trained to do his job efficiently, safely, and profitably.

In a sense, proper training begins the moment a new employee is hired. At Lukens,

the new employee is given an introduction to safeworking procedures as part of his pre-employment interview; this is done through a sound and slide orientation program. This program consists of two modules: one is a plant tour to give the employee a broad overview of the company; the second module emphasizes safe work habits. (There followed a series of slides and commentary describing the second module, the safety hourly orientation.—Ed.) This initial introduction covers only general and plant-wide rules and procedures. Specific departmental rules and regulations are covered in the employee's Safe Job Introduction with his foreman.

Depending upon his initial assignment, the new employee may next be sent to any one of several specific training programs for crane operators, lift truck operators, gas cutters, steel yard burners, and other skills. The length of these programs varies from three to five weeks, depending on the skill involved. To some, this might seem to be a lot of extra time for purely training purposes, but disregarding the resulting reduction in damage and injury rates for a moment, studies show the new employee achieves greater proficiency more quickly under this program.

We compared the old system of piggyback training used to train gas cutters with the new system involving three weeks of combined classroom and field training under a qualified gas cutting trainer. While the new program was aimed only at bringing the man to the third class level, it had an effect on the overall time required for reaching first class status. A 75 per cent reduction in time required to reach third class was purely the difference between piggybacking and a planned training effort. However, when put on their own as third class gas cutters the men in the training group reached the second class level in half the time it had been taking men from the old system, and reached the first class level in 23 per cent less time! In addition to this, they were considered by operating supervision to be better qualified, more capable, gas cutters than those trained in the old ways.

Adding these facts to the reduction in injuries and property damage, you begin to get a better picture of the true value of proper

safety training.

One example of the reduction in damage costs that can be achieved through proper safety training is in our crane operator training program. In 1965, the second full year of training, when only 117 crane operator learners had completed training, the direct cost of damage due to cranes was \$611,608. In 1970, when a total of 583 learners had been trained, the direct cost of damage by cranes had dropped to \$324,535, a reduction

of 47 per cent.

These two examples offer adequate proof that proper safety training not only pays for itself in terms of accident reduction but may actually take less time than inadequate or improper training. So why not march backward to the age-old idea of planned and proper safety training? Don't hope training will happen, or let it happen—make it happen!

OPERATOR TRAINING, "THE HOW AND WHY"

By DENNY L. HOWELL

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There are few terms more abused than the word "training". It is difficult to imagine an activity that has not, at some time, been described as "training".

Imagine the result if a person attempted to define training solely by observation of activities performed in that name. In many cases he might describe it as "spending a certain amount of time in a certain area or building", for how often have we heard "Certainly he's been trained! Why he spent three months in the shipping department".

In another instance it might appear that training means simply observing another person, as expressed in "Sure he's been trained! Why he's seen Joe do that job a hundred times." In each case the person speaking feels completely justified in saying the man in question has been trained and yet that same person would never consider telling his teen-age son or daughter "Go ahead and take the car. You've been riding in it for sixteen years and you've seen me drive it hundreds of times. You'll do just fine!"

We can readily see that the last statement is ridiculous, but all too often we are not aware that the other statements are equally ridiculous. Far too often we confuse "training" with "learning". "Learning" can and does happen in almost any situation, but

training is *never* something that simply happens. This can easily be seen in the definitions of the two words—Learning is "The acquiring (or gaining by one's own efforts) of knowledge or skill"—Training is . . . "to instruct so as to make proficient or qualified." Notice that learning can occur without instruction but training cannot. If we are to consider a man trained he *must* have been instructed, and this instruction *must* have been aimed at making him proficient or qualified.

This, then, is what we mean when we refer to a "trained" operator, a person who has been instructed in a specific job or operation so he is proficient or qualified in the performance of that job. With this definition of a trained operator in mind we can recognize immediately the connection with safety and profitability.

It is of equal importance, however, that we recognize the connection between safety and profitability. Though safety is frequently considered to be something done without consideration for profit, it is actually something which should be done in consideration of profit since, in practice, the two are inseparable. Where, for example, is the profitability in serious and disabling injury to personnel? Where is the profit in damage to

equipment, material, and product? Accidents represent total loss to everyone involved. They have no elements of advantage whether it be human or coldly economic. The advantage to employee and employer lies in avoiding the accident which results in costly injury and property damage.

Trained operators are keys to safety and profitability. They represent one of the most effective means of controlling debilitating, personal injury and property damage. The skilled competent operator is the front line of defense against such accidents . . . providing he is given the necessary training.

At Lukens we feel this training actually begins with the orientation program for newly hired hourly employees. In this program the new employee is given a "plant tour" and a generalized "Safe Job Introduction" through a sound and slide presentation. This audio-visual approach is aimed at satisfying the employee's natural curiosity about the company he is now a part of, and giving him some "feel" for where he, and his job, fit in the overall production picture.

It also "shows" him, in a very literal sense, why and how safety is an integral part of both his and the company's responsibility. Besides demonstrating such basics as proper use of protective equipment, correct lifting procedure, and general safety rules, the program also includes a brief introduction to the principles and concepts of accident investigation and damage control.

The overall goal of this presentation is to put the new employee more at ease in this new situation and to have him regard safety as a part of the total industrial system rather than a separate and distinct function.

When combined with the individual attention of the employment interviewer and followed by a more personalized and detailed Safe Job Introduction by the foreman, this orientation is an effective foundation for the many types of operator training provided.

Depending on his job assignment an employee may be given one or more types of specific operator training. At present, specific training programs are provided for operators of lift trucks, overhead cranes (including radio and pendant controlled cranes), and reg- ular trucks, as well as hand grinders, gas

cutters, and steel yards burners. The programs vary in length and content according to the subject.

Instructors are drawn from both the safety and operating departments with no set divisions of responsibility. In many cases safety personnel instruct in action operation and in others operating men instruct in what might generally be considered safety functions. In short, "You can't identify the players without a program". In all honesty this was not an intended situation but grew from the philosophy that safety, production, and quality are inseparable and a part of each and every person's responsibility.

Though this may cause occasional confusion to an outside observer, it is no problem at all to the men involved. They are members of a team first and a department second. This is quite apparent in the planning prior to a training program when the question always considered is "Who can best teach this subject?" not "Whose responsibility is it?" Development of such an attitude is probably the most critical factor in the success of any training effort.

To get a better idea of what is involved in a typical operator training program let's take a look at the Crane Operator Training Program. (This part of the presentation is intended to be a sound and slide presentation).

The Employment Department interviews the prospective trainee and gives him a brief description of the job duties. If qualified, he is interviewed by the Crane Department. All trainees hired are immediately scheduled for three days of special training. The mornings of these three days are devoted to classroom instruction in the principles and techniques of safe crane operation. The classes are conducted by a member of the Safety Department. The trainee sees films and demonstrations of proper methods and different lifting devices and their uses, with special emphasis given to ways of avoiding property damage and injury.

In the afternoon he gets experience in a training crane. The instructor is a member of the Safety Department but is authorized and licensed by the Crane Department as a crane instructor. The learner actually operates the crane, under the instructor's supervision, and

gets a "feel" for the crane's movement and control.

On the third day a representative of the company's fire department gives the learner training and actual experience in fighting a fire. Successful completion of this three-day program is, however, only one step toward his qualification. To qualify as an operator he must be authorized by management, pass mental and physical examinations, including a checkup examination each year, be fully trained and be issued a license card.

After the three days, the learner gets additional on-the-job training with a qualified crane operator. This training period varies with the individual but normally involves three to five weeks, after which time his performance is evaluated by a crane department foreman. If he can operate the crane satisfactorily, in the opinion of the foreman, he is then promoted and licensed as a crane operator.

All training programs for operators involve both classroom and field training, but particular emphasis is given to the field training since this offers the most meaningful feedback on the success or failure of the training effort. There is no better indicator of a man's ability to perform a given job than to observe him doing that job. Written tests and quizzes may indicate to some degree a man's "understanding" or "knowledge" of a job but his "ability" to do the job can only be determined by having him do it. This offers tangible proof of his level of skill or proficiency.

All field training is done under the guidance of qualified instructors who give each man individual attention. Mistakes are corrected quickly with full explanations, before they become habits. Trainees see and learn the "right way" of doing a job first, with each man getting emphasis on those areas he, personally, needs. Field training instructors are assigned to perform only that function during training so they can devote full time and effort to the learners. In practice, this has proven to be far more efficient and economical than requiring an overworked foreman to do the training "out of his hip pocket" or having a learner "piggyback" with another operator.

Each operator training program is actually a "module" that may be given by itself or as part of a larger, more comprehensive program. As an example, the crew for Lukens Strand Caster was given lift truck training, gas cutting and burner training and radio-controlled crane operator training, since their jobs involved all of these to some degree. Incidentally, they also completed training in proper job instruction techniques so they could train the additional crew.

Trained operators are keys to safety and profitability. Their contributions to loss control, cost reduction, and efficiency are invaluable, but they come at a price—the commitment and involvement demanded by actual "training". For the value obtained, "the price is right".

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