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58th NATIONAL SAFETY CONGRESS

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The Problem Worker ALCOHOLIC REHABILITATION PROGRAM

By ROBERT R. J. HILKER, M.D.
Medical Director, Illinois Bell Telephone Co., Chicago, Ill.

Illinois Bell Telephone Company is one of the pioneers in having a rehabilitation program for employees with alcoholism. Our program was started in 1951 and has been gradually expanded over the intervening years. The program was not started because of a certain knowledge that any specific number or per cent of employees suffered from this illness. As a matter of fact, in the early days of the program it is highly unlikely that alcoholism was recognized as a real illness at all! The program was really started by a farsighted management-medical team who knew the problem was significant. It was significant then in human loss, in loss of business efficiency, in increased sickness disability and in increased accident disability both off and on the job. We maintain our program today for the very same reasons. However, today we know that it is an effective program in partially solving these problems.

Our knowledge of the number of alcoholic employees in our 42,000 employee group is undoubtedly as rudimentary now as it was when the program was started in 1951. We have really made no effort to survey the problem. You are aware of the various statistics quoted about the incidence of this illness in other companies. Our company is probably no better, or no worse, than any other similar business. What we do know is that our program has demonstrated that we have enough sick employees to justify continuing and expanding our efforts.

The detection procedure we use to find the employee with alcoholism has undergone a change over the years from the original concept of looking for the alcoholic employee to our present concept of looking for the problem employee. We now look not only for alcoholism but for any other medical reason that prevents the employee doing a good job. This we call a Health Evaluation Program. The immediate supervisor selects an employee for referral to the

Medical Department when that employee is not doing a satisfactory job and when the situation cannot be remedied by the usual management procedures. This being the case, the supervisor has a frank discussion of the job problem with the employee. It is indicated to the employee that this type of performance—whatever it is—will no longer be tolerated, and that some effort must be made to change the behavior pattern so that job performance will become satisfactory. A visit to the Medical Department is suggested as a method of helping the employee in his own rehabilitation. This is not a punitive visit in any way. It is explained to the employee that this is one more step our company will take in an effort to aid him in doing his job in a satisfactory way. The employee is free to accept this referral or to decline it if he wishes. Should he decline the referral, he then must make a real effort on his own to change his job performance to that which is satisfactory to the employing department. If he accepts the referral to the Medical Department, we view this as an opportunity to help a patient who has a serious job problem. We do a complete history, physical examination, and laboratory examination on every referred employee. We also arrange and pay for any outside consultations which are necessary. In other words, we do the very best we can to aid in the rehabilitation of the employee with a job problem. Of course, this has a company oriented benefit, too, in that it hopefully resolves the job problem as far as the employing department is concerned.

With a detection procedure of this type it should be quite obvious that the employees who are referred to us usually have emotional illness, alcoholism, are drug users, or have undiagnosed or poorly treated physical illness. The great majority of people we see on this type of evaluation are emotionally ill. The next most frequent cause of job dysfunction is alcoholism.

One of our staff physicians is in charge of the health evaluations and supervises the Alcoholic Rehabilitation Program. We also have an Alcoholics Rehabilitation Counselor in our department as a full time employee. After evaluation by the physician, problem drinkers are referred to him. Should it be determined that alcoholism is indeed the problem, regular counseling will be arranged with this counselor. Arrangements will also be made for the employee to participate in meetings of Alcoholics Anonymous. Our staff physician in charge of this program assists in the rehabilitation when it is determined that professional care above and beyond that which is furnished by the alcoholism counselor is needed. Hospitalization is recommended and arranged for by our department when it is indicated. We also discuss our plans with the employing department. Without their cooperation any successful rehabilitation would be very unlikely. We feel very strongly that the constructive coercion thus initiated is necessary to motivate most employees to participate in the program. The job, after all, is extremely important to the employee and it is only by showing evidence of participation in a serious rehabilitation effort that the job will be secure. This is just a very short view of our rehabilitation procedure.

Our program was known only on a "word of mouth basis" until 1969. It was, of course, discussed with management employees in some staff meetings, but no general announcement of a company policy on alcoholism was ever made. In 1969 a brochure explaining our policy and program, together with a condensation of the book *The Drinking Game and How To Beat It*, was mailed to the home of all employees.

We are now reporting on 402 employees on whom we have adequate records. In the early days of our program, most records were not adequate for statistical follow-up. In these cases reported we have records of five or more years before and five or more years after referral to our program.

First, let us consider how these employees were referred to us. Ninety per cent were referred by the employing department—most of these on a health evaluation basis. Four per cent were discovered while having other routine examinations in the Medical Department, and six per cent were self-referrals.

In years of service, the large number of employees had between 10 and 29 years of service at the time that alcoholism interfered with their doing their job efficiently. Only 77 had less than 10 years of service. These employees were most often between the ages of 35 and 54 years. These, of course, are normally the most productive years in the life of the employee and the years in which they could hope to progress in the business. This length of service and age distribution indicates to us that alcoholism had really been present and unrecognized for a considerable time before it finally resulted in a job crisis of sufficient magnitude to demand corrective action.

The great majority of men were married, as compared to only about one-third of the women. The incidence of divorce or separation was much higher in women. This could either indicate a difference of the view of society toward alcoholism in women or indicate that the married dependent woman is willing to endure more to hold on to her marriage. We know that there was severe discord in the marriages of many of our male patients.

We made an effort to estimate the major area of life stress in all 402 employees. In 86 per cent it was our opinion that the life stress was within the employee himself. Home stress accounted for 25 per cent, while job stress accounted for only 9 per cent. It should be noted that some patients had more than one area of life stress.

It is important to make a diagnosis of the type of drinking, in order to be most effective in rehabilitation. Twenty-one per cent were heavy drinkers. These people are not true chronic alcoholics but drink in a serious, damaging recreational way. They are able to control their drinking much easier than other types. Sixty-three per cent were typical chronic alcoholics. These are the people in whom drinking is compulsive and self-destructive. Six per cent of people were reactive drinkers. They react to life situations by drinking. Ten per cent were symptomatic drinkers. These patients were suffering from emotional illness. Alcoholism was simply a manifestation of the emotional illness. Psychiatric care is necessary for them. Psychiatric consultations were obtained in 37 per cent of employees referred for evaluation. This figure probably

is too high, since in the early days of our program all patients were referred to a psychiatrist. We now have psychiatric consultation only on a selective basis.

What success have we had in obtaining the cooperation of these 402 people and in changing their drinking habits? 230 of the 402 referrals were rehabilitated—this is 57 per cent. By rehabilitated we mean that these employees had completely controlled their alcoholism for one year or more. Fifteen per cent were improved; these employees were able to function satisfactorily on the job although their drinking had not been completely controlled. Twenty-three per cent had accepted our help; this is the group of employees in whom we are unable to predict what will happen. Some will undoubtedly fail and will not be controlled. Others will be improved or even move on to the rehabilitated group. Five per cent of all employees were not cooperative and our rehabilitation efforts were a total failure. Of all employees referred to us, 87 per cent have accepted counseling by our rehabilitation counselor. A smaller group participated in regular activities of Alcoholics Anonymous. This group, however, was composed almost entirely of chronic alcoholics who benefit most from this fellowship.

Now let us consider our success in changing job performance. We had the employing departments estimate job efficiency for the five years prior to coming on the program and for the five years after rehabilitation. Forty-six per cent of women were rated poor before entering the program, whereas only 22 per cent were subsequently rated poor. Only 10 per cent were rated as good employees before coming on the rehabilitation program, while 46 per cent were rated as good employees after being rehabilitated. Clearly, we were able to change the job efficiency of these employees.

In men, approximately the same results are evident. The employees rated poor were significantly reduced, while the good employees were substantially increased after rehabilitation. The combined effect on job efficiency shows that poor job performance dropped from 28 per cent to 12 per cent. Good job performance was only present in 22 per cent prior to rehabilitation and increased to 58 per cent after participation

in the program. These results indicate that a significant change in job behavior can be accomplished by rehabilitation.

Promotions are another measure of success. We are not sure that these statistics are completely accurate. We know that the statistics we are presenting to you are true; however, we have a feeling that some of the promotions may not have been made known to us and that our figures are really not high enough. However, six patients were promoted to management and four patients were promoted to higher pay groups.

It is well known that the alcoholic employee has many more days of sickness disability absence than does his counterpart who is not alcoholic. The statistics presented are for the number of cases that lasted for more than seven days, or reported illness. We do not have statistics on the first seven days of absence. These 402 employees had 662 cases of sickness disability absence in the five years before participating in our program. In the subsequent five years, the same employees had only 356 cases. This is a significant reduction in sickness disability. These employees still are not quite as good in this regard as employees who were never alcoholic at all. Nevertheless, cutting our sickness disability rate in these employees by nearly 50 per cent is certainly worthwhile.

We are also very interested in our ability to change the accident process. First, let us look at off duty accidents. Again, these figures indicate only those cases which lasted more than seven days. In the five years before rehabilitation, there were 75 cases of off duty accidents as compared to 28 cases after employees were referred to the program. This is certainly a significant reduction in off duty accidents. I think we are all aware of the importance of alcohol as a cause of these accidents. I am not sure that we are all aware that this significant reduction can be obtained by an effective rehabilitation program.

Many studies have proved that alcoholic employees have many more on the job accidents. Our employees were no exception. These figures represent any on duty accident requiring medical treatment. Severity is not indicated in these statistics. In the five years before these employees participated in the program there were 57 on duty accidents.

This number was reduced to 11 in the five years after rehabilitation, dramatic decrease. There is no doubt that the control of alcoholism will produce a favorable change in the accident process.

A final disposition of our 402 referrals is of interest. When this study was completed, 63 per cent were still working, nine per cent had been dismissed, six per cent resigned, 20 per cent were pensioned and two per cent were deceased. In the pension group, it should be mentioned that some of these were forced pensions, some were vol-

untary, and some patients had simply arrived at mandatory retirement age.

In summary, our statistics on 402 employees referred to us in rehabilitation indicate that job efficiency can be increased, sickness disability absence can be reduced, and both off the job and on the job accidents can be reduced. When these advantages to the business are added to the social advantages to the employee and his family, as well as to society in general, it is quite obvious that a rehabilitation program is most desirable.

THE PROBLEMED WORKER: APPROACHES TO BEHAVIORAL MEDICAL SOLUTION—DRUGS

By DAVID SOHN, M.D.

Medical Director, Laboratory for Chromatography, Bayside, New York

On a bright, clear, midsummer day this year, an outboard motor boat carrying three teen-aged youths crashed head-on into a barge moored along one side of the broad channel in which they were navigating. One of the boys was killed outright. A second died subsequently.¹ The boys were from an affluent community where teen-age drug addiction is a major problem. No factual toxicological information was obtained. However, accidents of this nature, with no explicable predisposing causes, are often the consequences of drug intake, causing perceptual disorientation with disastrous results. The infamous "Los Angeles turnarounds"—amphetamine tablets abused by long distance truck drivers—have frequently been implicated in vehicular accidents, particularly when there is multiple vehicle involvement.²

With exceptions of the nature cited, the record of drug-involved accidents is extremely inadequately documented.³ The reasons for the lack of documentation of drug-involved accidents are several: first is the obvious fact that an individual involved in a drug-induced accident is unwilling to admit, or is unaware, that the accident was drug-induced; second, the individual's co-workers or supervisors may be afraid to report pertinent information—this is particularly the case with narcotics where the erroneous stereotype of the addict being "to

a large degree responsible for the increase in the number of violent crimes, and degenerate violent crimes, the senseless brutal crimes"⁴ may literally terrify an addict's co-workers and supervisors; lastly, medical and nursing personnel, even in very large firms, may be unaware of the presence of addicts in their firms or of the means to detect them.

As recently as eighteen months ago, David H. Goldstein, M.D., then president of the Industrial Medical Association, told the Mental Health Association of Greater Chicago that narcotics addiction was a much greater problem than employers realized. He indicated that (1) addiction robs employees of their motivation to do a job well; (2) for addicts, poor performance and absenteeism mount; (3) a turn to theft is almost inevitable to support increasing drug needs; (4) addicts become security risks on the job since they may turn to forgery as well as larceny; and (5) death is a risk of drug abuse. He went on to say that, although many companies were unaware of the scope of the problem in their plants and offices, others refuse to admit its existence.⁵ Discussions with physicians prominent in occupational medicine disclosed that in addresses before industrial medical groups, at about the same time as Dr. Goldstein's address, there was general disbelief that drug abuse was a problem in their plants.⁶

In the face of a situation where many of those who should have been most able to recognize the disease of drug abuse refused to even admit of its existence in industry, it is little wonder that no statistics of drug-related accidents are available. It is only within the past year that an appreciation of this problem in industry has developed. This should not be construed as a reflection on the abilities of physicians in industry, but rather represents a failure of feedback from the periphery and a general problem of cultural unawareness. That this lack of appreciation of the problem was widespread until quite recently is reflected by the fact that one year ago, when some fifty suburban bus companies were offered pre-employment screening of their bus drivers for drug abuse on a non-profit basis, as a public service, there was absolutely no response.⁷

Industry's stake in drug abuse has been succinctly outlined by Dr. Goldstein as indicated above. In addition, in industries manufacturing consumer products with a potential for accident or injury, as in the automobile industry, negligent assembly of components may have serious consequences. In fact, Professor Sidney H. Willig of Temple University Law School, in his presentation before a symposium on drug abuse in industry, stated that should an accident eventuate from an improperly assembled component because of drug addiction in the assembly plant, the manufacturer may be liable because of implied liability and breach of warranty.⁸

Drug use—particularly of opiates, has been recorded in the United States since the eighteenth century. The greatest impetus to the spread of addiction was the indiscriminate use of morphine by injection during the Civil War. Morphine addiction gained the title of the "Soldier's Illness."⁹ Narcotics addiction remained an ever-present but relatively limited problem until the years following World War II, when organized crime turned to narcotics sales because of the huge profits which could be realized. Post-war development of tranquilizers and of many readily synthesized hallucinogenic agents; the increasing use of the hypodermic needle as the means of entry into the body of drugs normally taken orally, providing an entirely different level of effect of these drugs; and the generally more tolerant public attitude toward many varieties of drug use have each

contributed to the alarming rise in drug abuse.

Dynamics of Drug Abuse

The drugs of abuse can be classified for our purposes into two broad categories: (1) the stimulants group, including the hallucinogens; and (2) the depressants group, including the tranquilizers and, for the discussions to follow, the anti-histamines. Drowsiness and sedation are frequent side effects of the anti-histamines. In situations where mental alacrity is essential, these drugs present definite hazards.

Among the depressants are the barbiturates, which include compounds like phenobarbital, pentobarbital; similar acting compounds like Doriden (glutethimide) and Placidyl (ethchlorvinyl); the tranquilizers; and morphine and related opiates including heroin, codeine, dilaudid, methadone, and demerol, as well as certain analgesics with potential for abuse as Darvon (propoxyphene). Hydrocarbon solvents and anesthetics are included in this group.

The stimulants include cocaine, amphetamine and methamphetamine, and Preludin (phenmetrazine) as well as the hallucinogens such as LSD, mescaline, DMT, and marijuana.

The drugs mentioned are representative members of the two groups, and the enumerations are not inclusive. With the exceptions of heroin, mescaline, DMT, and marijuana, which have no medical use and cannot be prescribed, the remainder all have legitimate medical uses and are legally obtainable on medical prescription. LSD has been used clinically on an experimental basis, including psychotherapy¹⁰ and the treatment of alcoholism.¹¹

Psychopharmacology

The predominant pharmacological action of the depressants is to reduce mental and physical functions. These drugs may cause loss of consciousness; interference with association of ideas, memory, and mental performance; diminution in motor response, diminished reflexes, and increase in response time; and elevation of the threshold response to pain. The narcotics will depress respiration and the cough reflex, stimulate the vomiting center, constrict the pupil, and cause urinary retention and constipation.^{12, 13}

To proceed further, several terms must be introduced: *tolerance, dependence, and abstinence syndrome.*

Tolerance is that phenomenon characterized by the fact that more and more of the drug must be used to produce equivalent effects. Tolerance development modifies drug action by reducing their effects on certain vital mechanisms such as the cardiovascular and respiratory systems. The brain as a whole is exposed to progressively larger drug concentrations as tolerance develops in those systems necessary for survival.

Dependence is the distortion of normal processes resulting from prolonged drug administration with the necessity for the presence in the body of adequate amounts of the drug for the maintenance of equilibrium. The narcotics will give an euphoric effect. The first drug trial is a rewarding experience, further rewarding trials will result in a conditioned behavior pattern, positive reinforcement, and, in time, primary psychological dependence. Most individuals are in this category. This is all that is necessary to add to uncontrollable compulsive abuse with any psychoactive drug in susceptible individuals—the state of physical dependence.

Physical dependence results in a state of increased nervous activity—the abstinence or withdrawal syndrome—when the drug use is terminated. There are two types of abstinence syndromes: (1) that related to morphine, which begins about eight hours after abstinence. Sweating, tearing, running nose, fever, restlessness, rapid breathing, tremors, insomnia, gooseflesh, loss of appetite, dilated pupils, vomiting, and diarrhea occur. These signs are relieved interchangeably only, by morphine-like drugs. (2) suppression is the basis for detoxification by compounds like methadone. To prevent these withdrawal symptoms, the addict is constantly re-injected with the drug which he is addicted. Because of tolerance, his body requires ever increasing doses. He rapidly outstrips his ability to pay for the drugs by legal means and often will resort to crime to support this need.

The second type of abstinence syndrome is related to alcohol and barbiturates. This results from termination following either oral or intravenous administration and is related to the total daily intake of the drug. Withdrawal results in delirium, hallucina-

tions, tremor, fever, and grand mal seizures. It can be life-threatening. This syndrome is not induced by phenothiazine tranquilizers. Neither phenothiazine nor morphine-like drugs will suppress the withdrawal syndrome, though most other depressants may be used interchangeably.

The stimulants enhance and excite psychic functions and increase motor activity. They induce psychotoxicity with distortion of perception, hallucination, illusions, and behavior disorders. With the hallucinogens (LSD, marijuana, etc.), distortion occurs with relatively small doses. Physical dependence is not a significant feature of the stimulants—except possibly with large intravenous doses of amphetamines—and withdrawal does not lead to a well-defined abstinence syndrome. Psychological dependence to satisfy occurs.

Both the depressants and the stimulants may result in personal injury or antisocial behavior following excessive "spree" use or continued intake. Excessive intake of depressants results in loss of consciousness and motor function, which may exert a limiting effect. The stimulants, however, will not cause physical incapacitation and are likely to be more dangerous to society because of the false bravery, the paranoid delusions, and the perceptual distortions limiting mental and moral control over an active musculature with no impairment, or with even greater capacity to perform physically.^{12 13}

The drug-induced deficits associated with these drugs can be divided into those deficits directly and immediately affecting the worker in the performance of his job—those effects being related to the quantity of drug taken and the time of intake; indirect effects; and associated deficits.

Direct depressant deficits include drowsiness, motor incoordination, and spatial disorientation. These are common to all of the depressants. The implications for anyone using fast-moving machinery or driving vehicles is obvious. Those under the influence of these drugs will have slow reaction times and reduced mental alertness and spatial disorientation. He will therefore be unable to correctly gauge his rate of approach or distance from a moving object, nor be capable of reacting in time to make proper corrective maneuvers. It takes little imagination to picture the hazards which such an individual would present were he to be in the cab of

a tractor-trailer, in the seat of a fork-lift, or operating a large printing press.

The stimulant abuser, to the contrary, will have a false sense of power, bravado, and paranoid thinking. Were he at the wheel of a moving vehicle, those who crossed his path would do so at their own risk. Amphetamine psychosis is not unknown, and these individuals may literally run amok.¹⁴ Hallucinogen users will rarely have the hyperactivity of the other stimulants. Marijuana will give a "cheap drunk" with drowsiness and disordered depth perception. LSD-type compounds may cause perceptual changes of all the senses, of time, and their body images. The deficits will be relatively similar to those with the depressants.

Two very important points must not be overlooked. Alcoholism is common among addicts. In a series of addicts autopsied by the New York City medical examiner, one in five addicts examined by the medical examiner had liver changes compatible with heavy drinking.¹⁵ The second point is that of multiple drug abuse, which in many groups is the rule rather than the exception. It is not rare to find evidence of heroin, barbiturates, and amphetamines in the same subject. The drug abuser may, therefore, evidence complicated patterns of impairment which are time-dose related to the various drugs abused.

Anti-histamines, almost without exception, have soporific side effects in at least some users. In many cases the individual may not have been forewarned by his physician and may not realize that his mental alertness is gradually being impaired. "Drowsiness can be a particular hazard because it may not be recognized by the patient, and because it may recur after seeming alertness."¹⁶ We are not aware of any abuse of those medications, but the net effect in the unwary is not unlike that of the depressants.

*The Guide to Drug Hazards in Aviation Medicine*¹⁸ provides abundant information on the undesirable effects of the entire range of medicines in current use. It relates primarily to aviation personnel whose duties, in general, require an extreme degree of mental alertness and physical coordination.

Indirect effects of drug abuse are related to the general pattern of behavior manifest by the drug dependent individual. There is often deterioration in work habits, poor at-

tendance or frequent tardiness, poor motivation to complete an assigned task, inattention to the job at hand, and frequent temper outbursts. Alone, or in combination, these tend to create situations which might result in injury or accident due to the disregarding of safety procedures or work rules. These people create frequent interpersonal problems on the job which can effect the performance of other workers. They may constantly borrow money or, if the opportunity presents itself, steal from fellow employees or from their employer. They may suddenly disappear from their work stations at times when they may be needed, or hide in closets, storerooms, or stairwells to take their drugs. Fires in these sites may be caused by heroin addicts who have been heating their heroin to dissolve it prior to injection. The need to raise additional money for the purchase of drugs, which is most acute in the heroin addict, can result in constant pilferage, especially of safety items which must be kept in exposed, accessible sites; e.g., brass hose nozzles, fire extinguishers, and anything which can be pocketed will be removed by an addict if the item can be turned into cash. In some instances, accidents may result because vital parts have been stolen; in others, in the event of an accident, the tools to prevent further damage or loss will have disappeared.

Associated deficits, for our purposes, are those deficits not related primarily to a specific drug or to reactions to that drug but secondary effects related to the manner in which the drug is introduced into the user's body. Today, more and more frequently, this is by needle. Material may be introduced under the skin—"skin-popping," or into a vein—"mainlining"—whereby large quantities of a given drug can be rapidly injected into the blood stream. The sensations attainable in this manner bear little resemblance to the effects derived from the relatively slow absorption into the system through the gastrointestinal tract. The material injected is almost always contaminated; adulterants; diluents, and binders may provoke tissue foreign body responses; and the needles used for injecting are invariably unsterile. Consequences of the above include tetanus in "skin-poppers"—in fact, in one study in New York City there were as many cases of tetanus occurring in the relatively few addicts as occurred in the entire remainder of

the population of the city, with the vast bulk of the deaths among the drug abusers.¹⁷ Hepatitis; malaria (now rare), fibrosis of the lungs with right-sided heart failure and diminished pulmonary function, lung infections, endocarditis (infections involving the heart valves), and tuberculosis are found in "mainliners."¹⁸ These conditions are each major insults to the functioning individual and will severely hinder his ability to respond physiologically when added stresses are suddenly thrust upon him. These disabilities may not *per se* cause accidents, but they most certainly do not help those so afflicted to successfully circumvent an accident.

This lengthy and detailed discussion of the deficits associated with drug addiction and the related increased tendency for accidents to be incurred by these groups are of no meaning unless drug abusers represent a significant factor in the work force, or at least in the available labor pool, seeking employment. At the present time, there are no available statistics concerning the prevalence of drug addiction in our nation's employed population. However, the available labor pool, from which additions to the employed are drawn, reflects the employed group. One of the major areas of drug screening performed by the laboratory with which I am associated is pre-employment screening for drugs of abuse. In preparation for this paper, the results of 10,198 urine samples submitted to our laboratory for pre-employment screening were reviewed. These samples were obtained from individuals who were found acceptable by personnel departments and sent for physical examinations before employment. They were submitted by concerns throughout the country with a concentration in large cities; in particular, New York City. There was no predominant industry, although the majority appeared to represent white- rather than blue-collar jobs. In this sample, addictive narcotics were present in 1.1 per cent of specimens (morphine represented 0.95 per cent; other narcotics, .15 per cent; barbiturates and amphetamines (in an approximately five to one ratio) and other drugs in 2.1 per cent; and quinine alone in 6.5 per cent of the specimens.

Heroin is excreted in the urine as morphine. Quinine is a major dilutant of heroin. Four-fifths of the specimens positive for morphine also contained quinine. This finding

strongly suggests heroin usage. The remaining fifth may have taken morphine or may have used heroin which had not been diluted with quinine. In either event, all of these people had in their bodies addictive narcotic drugs introduced into their systems within approximately a forty-eight hour period before the urine sample was taken. For all purposes, these are drug abusers. In the 2.1 per cent of the specimens which were positive for other drugs, many may have been prescribed by a physician for legitimate medical reasons. These would each be capable of verification by the physician who prescribed the medication. Many of the remainder are probably abusers of these drugs.

The largest group is that positive for quinine. Quinine is found in many soft drinks and drink mixes (e.g. tonic, quinine water, bitter lemon, bitter orange, etc.) and in a wide variety of medications. But it may represent the quinine dilutant of heroin. Quinine may persist in the body and be expected in the urine in detectable amounts for as long as five days after the last intake. Heroin is usually not detectable after some forty-eight hours. In the interval between these two limits, only the quinine may be detected in urine. By contrast, some 200 specimens—not included in these statistics—were submitted for pre-employment screening from a plant located in the Piedmont region of North Carolina, in an area where drug addiction is not a problem. The applicants were predominantly for blue-collar jobs. In this group, *not one* specimen was found to be positive for morphine or for quinine. The total absence of specimens containing quinine in this group leads us to the assumption that many of the individuals with urine samples containing quinine did not get this quinine in a soft drink or in medication but in the course of heroin injection.

The three categories mentioned comprise 9.8 per cent of the total group of urines sent for pre-employment screening. One out of ten applicants might have to be called back to the medical or personnel departments for further questioning and evaluation. Approximately one out of every hundred applicants screened by personnel is a definite narcotics user. If each of these had been hired, there would be 100 addicts in a plant employing 10,000 people—a major problem from any and every point of view. So, there is a problem!

We must now consider what to do about it. It is obvious that it is far easier, cheaper, and safer to eliminate drug dependent individuals before they are employed, rather than after they have been put on the books, joined unions and caused accidents.

Detection of drug abusers must be considered for several groups. There may be pre-employment screening of all applicants (selective individual screening may run afoul of the Civil Rights Act of 1965); routine annual checking of all employees; or selective checking of employees who become impaired on the job or who present absentee or illness problems where confirmation is desired. Management must also decide policy as to those drugs which are considered absolutely off limits; for example, heroin, which is illegal in all jurisdictions in this country, as opposed to the amphetamines, barbiturates, or tranquilizers whose users may in some cases be acceptable for employment despite absence of confirmation by the individual's physician that these drugs have been prescribed for specific medical reasons. Compounds like Darvon, an analgesic, may also be abused, and judgments must be made concerning these individuals. Quinine presents a most difficult area for evaluation. In some concerns, it may not be used at all as a criterion. In others, the applicant may be rejected unless he can furnish a satisfactory story. In still others, assessment of each individual situation may be made.

We agree with the government study panel on individual crimes of violence of the National Commission on the Causes and Prevention of Violence, appointed by the President, which concluded that marijuana should be legalized.¹⁹ We feel that far too much effort, at far too great a cost both to the individuals apprehended and to the government, is being expended on the prosecution of the marijuana user to the exclusion of more serious drugs of abuse. Nonetheless, we are convinced that marijuana is a dangerous drug. At best, the habitual marijuana user is in a category quite analogous to the habitual drinker. The use of either of these on the job should be disqualifying. Methodologies are being refined for the practical detection of marijuana.²⁰ Management must reach decisions as to the acceptability of the marijuana user so that when

techniques are readily available for their detection, a policy is available.

The pre-employment screening for drug users should take place at several levels. The applicant's work history should be examined for any gaps which may represent periods of hospitalization or incarceration. Separation from previous jobs may require further scrutiny. The medical history may indicate previous episodes of jaundice or hepatitis, of tetanus, bacterial endocarditis, malaria, or skin abscesses. As mentioned previously, each of these may be a sequel of addiction.²¹ The individual's attire, demeanor—lethargy, nervousness, inappropriate responses—or behavior may suggest intake of one drug or another. The "needle tracks" of heroin addicts may be obvious if the forearms are examined. In fact, in one concern, the industrial nurse does the checking. All applicants have their blood pressure taken by the nurse. She routinely checks both arms for needle tracks at this time. A complete physical examination by the plant physician is, of course, most desirable.

✓ The only positive, objective method of detecting drugs of abuse is by chemical screening. The preferred body fluid is urine, since almost all of the drugs with which we are concerned are excreted and concentrated in the urine. It is essential that every effort be made, including direct observation of the individual passing the urine if necessary, to ensure that the urine submitted for examination is the applicant's and is the one passed at the time of examination.

In the case of an employee involved in an accident or impaired on the job, urine samples should be obtained under conditions similar to the above.²¹

Techniques for urine screening, each sensitive on the order of one part per million, are thin layer chromatography, gas-liquid chromatography, and recording spectrophotofluorometry.²² Thin layer chromatography utilizes a glass plate with a layer of silica gel one one-hundredth of an inch in thickness on one face. A minute drop of the material to be tested is applied near one edge of the plate. The plate is then partially immersed in a mixture of organic solvents. These solvents move up the plate, by capillary action, in a broad front carrying along the materials to be tested. Different compounds, under similar conditions, will migrate up the

plate at relatively constant rates for each compound, permitting their separation. The plates are viewed under ultraviolet light for fluorescence and sprayed sequentially with chromogenic reagent sprays. The migration, fluorescence (if present), and reactions to the sprays permit tentative identification of a large variety of compounds.

Gas-liquid chromatography operates on somewhat similar principles. The sample is volatilized into a gas stream passing through a long column packed with an appropriate material. A mixture of compounds can be separated, due to differences in their rates of transit through the column (retention time). Appropriate detectors coupled to recorders will give characteristic identifiable patterns for many compounds.

Spectrophotofluorometry utilizes the ability of certain compounds or their derivatives to fluoresce when exposed to light in the near ultraviolet range. Characteristic fluorescence curves can be obtained with appropriate detectors. Quinine and morphine are readily detected with great sensitivity by this technique.

Each of these techniques are sensitive, precise, and quite specific. A positive test will frequently result in an applicant being rejected and stigmatized as a drug user. False-positive tests imply that a non-drug user has been falsely stigmatized. The company loses, for no reason, an individual who might have become a valued employee. In turn, the company may find itself subjected to litigation by a justifiably irate rejected applicant. Moral and ethical considerations of fair play dictate that every effort be made to reduce false-positives to zero. False-negative results mean that drug users are successfully passing the screening procedure established. Too many such false-negatives vitiate screening and lead to distrust of all screening programs.

The techniques described, in proper hands, can provide the medical and personnel departments with accurate screening reports with a minimum of false-negative results, within the limits of sensitivity of the tests. If appropriate confirmatory tests are employed there should be no false-positive ones. It is our opinion (and practice) that a positive result by one of these techniques should be confirmed in all instances by one of the other methods. Since these are independent meth-

ods based on different properties of the substances studied, there are virtually always sufficient parameters to identify a specific compound within reasonable limits of confidence. For practical purposes of speed and economy, thin layer chromatography, at present, is the method of choice for large-scale screening with confirmation of positive findings by gas-liquid chromatography or spectrophotofluorometry.

What are the roles of industry, in particular those of the corporate safety officer, the personnel manager, and the medical director, in drug abuse? They must be the experts to which management can turn for expertise in setting corporate policy.²³ They must guide screening programs for job applicants and for annual screening of employees. They must investigate by appropriate techniques those employees involved in accidents and impaired on the job. They must be able to refer drug dependent individuals to treatment centers and know where treatment centers are located. Concerns should set policy on cooperation with treatment centers to employ former addicts under treatment, if the center feels that the individual is a good risk for employment. Rehabilitation programs for addicts will be of little lasting value if former addicts desiring employment cannot secure such work. There is hardly any motivation to be cured if all an ex-addict can aspire to is the public dole. By the same token, particularly where certain crafts are in short supply, industry will be penalizing itself by not hiring rehabilitated individuals with these skills. If such addicts are hired, the plant's medical department must have available a program to regularly screen these people on a continuing basis at unannounced, irregular intervals to be certain that they are free of drugs.

We most strongly commend to your attention the methadone maintenance treatment programs as pioneered by Nyswander and Dole.²⁴ Methadone is specific only for heroin addiction. It is not effective for addiction to barbiturates or amphetamines. Nevertheless, heroin remains the most dangerous and most destructive of the addicting drugs. Addicts maintained on methadone will almost always be free of evidence of heroin. While in programs, they can be reached for treatment for addiction to other drugs, since multiple drug usage is not uncommon.

Lastly, industry can help by appropriate publicity and the sponsoring of intramural and extramural programs on the dangers of drug abuse.

As a case in point (I am acquainted with their programs and have no proprietary interest whatever), I would like to cite I.T.T. Their well-conceived advertisement warning against "pushers" of drugs—"Help put this friendly corner druggist out of business"—which has been widely circulated; their preparation of programs for their executives, given by experts in the field; and their sponsorship of drug abuse seminars for the community at large—The Institute for the Advancement of Criminal Justice—under the direction of the district attorney of the county in which our laboratory is located, all demonstrate what one corporation can do in meeting this problem. It is obvious that, with time, more and more corporations will be playing active roles in similar efforts.

BIBLIOGRAPHY

1. Newsday—(August 14), 1970 page 21.
2. New York Times (August 9), 1970 p. 5—Editorial Section.
3. Hearings before the Committee on the Judiciary of the United States Senate—81st Congress, Sept.-Oct. 1969, U.S. Government Printing Office, Washington, 1969. p. 290.
4. Ibid. p. 484.
5. Goldstein, David H.: Meeting of the Mental Health Association of Greater Chicago (April 8) 1969. Quoted in New York Times (April 9) 1969.
6. Personal Communication, Norvin C. Klefer, M.D.
7. Personal Communication, Sheila R. Lippman.
8. Willig, Sidney H.: Drug Abuse in Industry; a Symposium, Philadelphia, Pa. May 19, 1970.
9. Winn, Mitchell: Drug Abuse: Escape to Nowhere. Smith Kline & French Laboratories, Philadelphia 1969.
10. Pahnke, W. N.; Kurland, A. A.; Unger, S.; Savage, C.; and Grof, S.: The Experimental Use of Psychedelic (LSD) Psychotherapy. JAMA 212:1866-1863 (June 15) 1970.
11. Ludwig, A.; Levine, J.; Stark, L.; and Lazar, R.: A Clinical Study of LSD Treatment in Alcoholism. Amer. J. Psychiatry 128:59-69 (July) 1969.
12. Krantz, J. C. and Carr, C. J.: The Pharmacologic Principles of Medical Practice, William & Wilkins, Baltimore Third Edition.
13. Wolman, W., Editor: Drug Dependence: A Guide for Physicians. American Medical Association, Chicago, 1969.
14. A. Anonymous: Dependence on Amphetamines and Other Stimulant Drugs JAMA 197:1023-1027, (Sept. 19) 1966.
15. B. Ellinwood, E. H.: Amphetamine Psychosis: Theoretical Implications Int. J. Neuropsychiat. 4:45-54, 1968.
16. C. D. Ladewig; Battagay, B.; and Lahardt, F.: Amphetamine Dependence and Psychosis. Deutsch Med Wschr. 94:101-107 (Jan. 17) 1969.
17. Baden, M. N.: Medical Aspects of Drug Abuse, unpublished.
18. Cutting, W. C.: Guide to Drug Hazards in Aviation Medicine; U.S. Government Printing Office, Washington 25, D.C. 1962. p. 38.
19. Cherubin, C. E.: The Medical Sequelae of Narcotic Addiction. Ann. Int. Med., 67:23, 1967.
20. Sapiro, J. D.: The Narcotic Addict as a Medical Patient; Amer. J. of Med. 45:555-568, (Oct.) 1968.
21. New York Times—Tuesday, Sept. 8, 1970. pp. 1, 32.
22. Mason, M.D. and Rosenkrantz, H.: Personal Communication.
23. Sohn, D., Sohn, S. R., and Scott, L.: Drug Screening in Industrial Nursing. Occupat. Health Nurs. 18:210, (Aug.) 1970.
24. Sohn, D. and Simon, J.: Narcotics Detection and Industry 12:6-9 (Jan.) 1970.
25. Sohn, D.: Screening for Drug Addiction, Personnel 47:22-30, (July-Aug.) 1970.
26. Nyswander, M. E.: The Methadone Treatment of Heroin Addiction: Hospital Practice 2: 4 (April) 1967.

PSYCHIATRIC PROBLEMS

By JOHN MACIVER, M.D.

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In this presentation I wish to provide you with information on the types and numbers of psychiatric problems encountered in the industrial population, in order to give you some idea of the dimensions of the over-all problem of emotional illness. I then wish to make some generalizations based on this data, following which an operational question will present itself: Can we use any of this information to lower the incidence of accidental injury, which remains such an overwhelming national and industrial health problem? Accidents remain the leading cause of death between ages 1-37, the fourth leading cause at all ages, and the primary cause of disability. I then wish to proceed to certain behavioral reactions encountered after the occurrence of significant accidental injury. It is my strongly held opinion that such reactions are poorly understood or appreciated by most individuals who have responsibility—either direct, administrative, medical, or legal—for the injured. As a very practical consequence we have in this country a huge problem in post-traumatic and compensation neurosis, huge in both human and financial dimensions.

What of the prevalence of emotional illness in the industrial population? First, let us keep in mind that the industrial population is a reasonably healthy and selected group. So, if the figures I present seem high, keep in mind that outside industry they are far higher. It has been variously estimated that about 25 per cent of employees have diagnosable and significant psychiatric problems. A few parameters might be set forth initially. There is more behavioral illness (as with physical illness) as a function of aging. There is more behavioral illness as we proceed downward in the industrial pyramid from executive to laborer. The reason for this is fairly obvious: There is a selection process operating on every level of the industrial pyramid, and there is a rather efficient selection not only for overall job capability but for physical and emotional health as well. To make matters still a bit more complex, it should be added that we tend to see different types of emotional

illness at different levels of the hierarchy. One further initial parameter is that of severity. We can roughly characterize an emotional illness, whatever it may be, as mild, moderate, or severe. Fortunately, many problems encountered fall into the mild or moderate category. I have said that 25 per cent of the work population have clinically diagnosable emotional ills. About half that number, one in eight, fall into the severe category. The types are encountered and their frequency are:

Type	Per Cent
Neuroses (including depressive reactions)	5
Personality disorders	5
Psychosomatic disorders (one-half peptic ulcers)	10
Alcoholism	3
Schizophrenia (thought disorders)	1
Affective (mood) disorders	1/3
Post-traumatic syndrome	1/2
Organic brain syndrome	Occasional

The question now arises: Can we make any explicit statements on clear-cut demonstrated relationships between these ills and accident occurrence? Studies done outside industry suggest strongly that there are strong associations between accidental injury and drunkenness (often in the context of alcoholism) and personality disorders. It follows that personnel procedures (plant protection, safety) that bar individuals who are under the influence of alcohol from the work site are important in preventing accidents. Also, in the industrial setting, personnel placement and continuing supervisory observation are no doubt important in reducing the incidence of accidents in all categories, especially in regard to those who fall into the personality disorder category.

At this point the complexities of accident causation should be reemphasized. Simple linear cause and effect relationships are difficult to elucidate in much, though not all, accident occurrence. In general, it might be

said that the incidence of accidents varies with a combination of the amount of exposure to a given (high or low) accident-risk environment in conjunction with temporary or enduring universally found types of human psychological malfunction such as inattention and boredom, fatigue, repressed anger, situational stress such as a home problem, and garden varieties of anxious and depressive feelings. This list has no necessary correlation with the categories of behavioral ills just described. The truth of the matter is that accident potential is widely dispersed in the working population. Accident proneness is largely a myth: one rigorous study indicated that half of a given plant population would have had to be discharged to lower the accident rate any appreciable degree.

I now come to the second half of this presentation: where a significant accident has already occurred. I define a significant accident as one which conceivably could have been fatal. Millions—certainly three or four millions—of such accidents occur in this country each year. These in turn lead to two overlapping but separate categories of behavioral malfunction: post-traumatic neurosis and compensation neurosis. My view is that post-traumatic neurotic phenomena are clearly associated with and a consequence of the individual's brush with death. He has the task after the accident not only of regaining his physical health but of putting his personal world back together psychologically as well.

Industrial Safety Subject Sessions

The symptoms of post-traumatic neurosis are: altered conception of self and world; repetitive sparse anxiety dreams; irritability and startle reaction; explosively aggressive responses; reduced adaptive capacity (ego contraction); reduced work capacity; and muted, flattened effect.

Compensation neurosis features (if there is the possibility of a claim) set in, with what we call "secondary gain." The patient becomes dependent and tends to hang onto symptoms or develop new ones to avoid resuming responsibility. This mostly occurs on an unaware basis; outright malingering is uncommon. Often we see mixtures of post-traumatic and compensation features.

There is one further important complexity. A life threatening accident can trigger an episode of any of the psychiatric illnesses previously mentioned: schizophrenia, manic-depressive disorder, depression, bleeding ulcer, etc.

I wish to make two recommendations here: First, all personnel who handle or are involved with accident cases should be just as versed in emotional first aid as physical first-aid. This most important subject lies outside the scope of this paper. Second, psychiatric consultation should be obtained far more frequently and sooner than is now the custom. The accident victim is terribly afraid and has deep feelings of isolation and loneliness. It takes a high degree of skill and empathy to bring him or her back into the main stream of life once more.

Supervisory Training THE KEY MAN DEVELOPMENT PROGRAM

By JOHN EPPERSON
Training Specialist, National Safety Council

Occupational injury rates are on an upward trend. This has been evident since 1966. In 1961 an all time low of 5.99 was reached, and from that time until 1966 this level remained about the same. It was generally thought that in time the injury rate would again continue its decline. This was not the case, for in 1966 the occupational injury rate began to rise. In 1969 occupational injury rates reported in *Accident Facts* showed 8.08.

It is believed that smaller plants and companies who are unable to justify a full time safety professional are contributing to this increased rate, indicating that more assistance is needed to help these smaller plants control their hazard exposures more effectively. So, over a year ago, another useful tool was developed for first line supervision and made available to all. This new tool is called the Key Man Development Program and zeros in on the first line supervisor: "The Key Man."

The Key Man Development Program is a three phase program consisting of: safety training for supervisors, follow-up services, and an award plan. The objective of the training phase of the Key Man Development Program is to provide supervisors with information on:

1. Prevention of accidents in their work areas.
2. How to reduce operating costs by controlling accidents.
3. The direct relations of loss of production to accidents. Accident prevention and production go hand in hand, accident prevention is an integral part of production and is part of every supervisor's responsibility.

The Key Man Training Course is a 12 hour, six session course conducted by an instructor who has had accident prevention experience. To aid and maintain course continuity in the training phase, an instructors kit, consisting of the Supervisor's Safety Manual, Instructor's Guide that outlines the six sessions separately, and nine sets of slides relating to nine chapters in the Supervisor's Safety Manual are furnished. The supervisor taking the training course is provided with material that covers class assignments and reference material, such as the Supervisor's Safety Manual, seven booklets, six data sheets, paper, and a Key Man binder.

At the conclusion of the course, each supervisor must satisfactorily pass an examination based on the Supervisor's Manual and is then awarded a Key Man Certificate. A follow-up service provides continuing information designed to keep the supervisor's interest in safety at a high level and provide him with up to date material that will help him train his employees. The award plan recognizes the supervisor for his achievements in accident prevention.

All of these phases make up the Key Man Development Program. Each of the three phases will stand by itself; however, the use of all three phases helps to accomplish the fullest benefits from the program.

To date over 7,000 Key Men have been trained, in about 40 states. The majority have taken the training course through local councils, Industrial Manufacturing Association, A.S.S.E. Chapters, colleges, and universities.

The Key Man Development Program is not a cure-all for the occupational problems of today, but it is a valuable tool that should be made available to every supervisor through his management.

KEY MAN TRAINING — CLOW CORPORATION

By RON COLEMAN
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A generation ago, James B. Clow & Sons, Inc., was a jobber of pipe and plumbing supplies. Today it is a large manufacturing complex of 14 plants making a wide variety of pipe and equipment for handling water and wastes.

Its annual sales are nearing the \$100 million mark. It employs about 3,000 people, but only one plant in the corporation employs 500.

Until 1969, safety programs were handled primarily in individual plants without continuing direction from corporate headquarters.

Safety performance, which included one plant's record of 1,873 accident-free days, varied greatly from plant to plant, depending mainly on the skill and concern of the local operating management.

Variations in safety practice were magnified by the rapid expansion of the company, which was brought about both by growth and by acquisitions of existing plants.

Early in 1969, the management of Clow Corporation, with the emphatic backing of Raymond G. Rinehart, president and chief executive officer, made the decision to embark on a company-wide campaign against accidents. Direction of the campaign was placed in my hands.

We faced at once the problem of creating a sound program in the absence of full-time safety professionals at either the corporation or plant level.

We felt that the immediate need was training—training for myself, for the plant personnel charged with safety responsibility, and for line supervisors. To secure this training, Clow turned to the National Safety Council and the plant safety men were sent to the Safety Training Institute at NSC headquarters to take, first, the *Fundamentals of Safety* course. A number of the men have since returned to take various advanced courses offered by the institute.

In October 1969, Clow sent a considerable delegation of plant managers, safety men, and supervisors to sessions of the National Safety Congress.

Eleven of those attending the Congress from the various plants met at corporate headquarters in Clow's first Annual Safety Meeting.

The session was opened by Rinehart. His opening words gave the meeting and the safety program its keynote. He said, "Safety in a corporate sense is of the utmost urgency. The reason for all of you being here and attending the National Safety Council meeting is because of the urgency and importance of safety."

Rinehart put the safety program at the center of the stage by stressing the effect of accidents on the loss of human resources and on profits:

"In 1969, our safety performance cost \$100,000 for compensation. That is taken directly from our profits. Anyway you look at it, it is bad.

"Our goal for 1970 is a 30 per cent reduction in these penalty costs. Profit is the name of the game, and everything that bears on profit is priority. Safety is part of it, and it must be greatly improved."

He reminded his hearers that one of the basic corporate objectives of Clow is, "To establish a climate in our company, which, through enlightened personnel policies, safe and pleasant working conditions, and a teamwork approach, will provide the highest possible standards of personnel performance to the mutual benefit of our employees, our stockholders, our customers, and the public."

The 1969 conference put forth a plan of campaign for the coming year under the title, *Mission Safety Seventy*. It included a variety of promotional items: pocket protectors, posters, stickers, and banners, which were obtained from the National Safety Council.

Programs of safety incentives for good safety performance were developed in the various plants. At one plant, all employees were given a trip to a big league baseball game. A drawing for a color television set was held at another. Monetary awards to

supervisors and drawings for cash awards for employees were used in other plants. Pens, pencils, key chains, and tie clips were given in some plants and departments with good safety records.

But the 1970 campaign was not limited to promotion. At the heart of the year's effort was supervisory training.

During the year practically all supervisors of Clow Corp. attended a course of six two-hour safety training sessions conducted in or near the plants in which they worked.

The curriculum and materials used were the National Safety Council's *Key Man Training Program*, and the courses were followed up by use of the Key Man award program.

The impact of these courses was great and, according to some Clow executives, had values over and above the safety information conveyed. Other elements of the program for 1970 included:

- Monthly safety inspections with emphasis on housekeeping as well as safety;
- Planned programs of indoctrination in safety for all new employees;
- Monthly safety meetings under the direction of supervisors for all hourly employees;
- The systematic recording and reporting of accident experience, to keep departments, plants, and corporation headquarters informed of accident experience;
- Membership in NSC for all plants and participation by all plant safety directors in the 1970 National Safety Congress;
- Distribution of *Family Safety* magazine to all employees' homes. The *Safe Worker* and the *Industrial Supervisor* are also distributed.

Early in 1970, the plans for Clow's 1971 safety effort had been developed in outline form.

At the heart of the 1971 drive will be the *Zero In on Safety* theme. Plans call for a continuation of the Key Man development and award programs.

There will be some modernization of plant contests and promotions, but improved systems and communications will be emphasized.

The Safety Analysis Method (SAM) will be used extensively, with the objective of developing and maintaining printed job safety specifications on all plant operations. SAM seeks to identify those aspects of each operation in which possible hazards may be encountered. Safe work procedures and the required protective equipment are listed. Copies of the material developed are to be retained by both the foreman and the safety department to facilitate new employee orientation.

It is planned to strengthen the safety communication program, with special emphasis on new employee orientation. *Family Safety*, *Industrial Supervisor*, and *Safe Worker* will continue to be circulated.

Accident records will be computerized in 1971.

The recommendation has been made that all plant safety directors complete at least three courses of the Safety Training Institute: *Fundamentals of Industrial Safety*, *Safety Training Methods*, and *Management Techniques in Safety*.

The 1971 plans also call for greater application by Clow of accepted safety standards, and close scrutiny of compliance with *Walsh-Healey Act* requirements in matters of dusts, fumes, and noise, and with any requirements of forthcoming safety legislation.

Continuing studies of safety procedures and policies, protective equipment, first aid, fire protection, emergency procedures, and security are planned.

The corporation's safety personnel have recommended that Clow undertake an increased concern for off-the-job and community safety.

There is nothing visionary or unrealistic about the Clow Corporation's deep involvement in safety. Clow is in heavy industry, and much of its work involves powerful machinery, the movement of products of great weight, noise, heat, and dirt. The spinning of large diameter cast from pressure pipe on centrifugal machines at Bensenville, the endless struggle against the dust at the Carol Stream plant that manufactures clay pipe, and the varied and sometimes heavy machining operations in Melrose Park are typical of the difficult and challenging situations in which safety must be made an effective force.

President Rinehart gives the impression of being a forceful and demanding executive. When he speaks with enthusiasm of what is happening in safety in his company, he speaks with equal vigor on the values in terms of human well-being and human relations.

He is frank to admit that early in his career (he was still in the sales end of the business then) safety had not seemed to him a vital and important part of the corporate program. His conversion to warm-hearted support of safety efforts came gradually with experience and broadening responsibilities. He is as likely to speak of an accident's cost to the company in terms of the loss of the services of a valued man as he is to speak of the dollars of loss involved.

He stressed that the company has always worked actively in behalf of employee safety. The change to a unified corporate approach to safety begun in 1969 was, he said, the product of a realization that:

- 1) There was a great variation in safety practices and safety effectiveness among the various plants;
- 2) The corporation included many plants that were originally developed outside the Clow Corp., which made variations in practice and effectiveness particularly acute;

3) The corporation could mobilize resources and programs difficult for the individual plant to mobilize alone.

The very extensive use of National Safety Council programs and materials was the one resource to which Clow could turn to produce quickly the sound foundation for a corporate safety program.

For a corporation with widely scattered operations, widely varying practices, few trained safety professionals, and a great variety of operations to develop from scratch complete programs of training, promotion, and other safety efforts would have been difficult, laborious and (perhaps most important of all), very slow.

By using the pre-packaged NSC training facilities, publications, and other materials, Clow could bring a corporate safety program into existence and effective operation in a very few months.

The results of this approach have been impressive. Accident costs of the Clow Corporation in the first eight months of 1970 were down 32 per cent from the same months of 1969, despite the fact that the 1970 costs include a substantial carry-over of costs from accidents occurring in 1969. The corporation's severity rate for the first eight months was down 45 per cent.

SAFETY MEETING EFFECTIVENESS TRAINING FOR SUPERVISORS

By W. L. CLIFTON

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Ontario Hydro considers effective safety meetings conducted by each supervisor with his work crew are fundamental and absolutely vital to a successful accident prevention program. It is generally recognized that education or training in work procedures and work hazards is one of the most important items in an accident prevention program. Regardless of your new employee indoctrination training or your concentrated tradesmen training, if you are to maintain an up-to-date, highly skilled, adequately trained, safety conscious supervisor and crew you must have a high standard of

periodic on the job training and re-training. In our case, this is accomplished in our bi-monthly supervisor's safety meeting which the first or second level supervisor holds with his work crew. Safety meetings held by the supervisor are not an end in themselves but are a means to an end; they are only important in the action taken after the meeting.

Our Safety Meeting Effectiveness Training Course is to assist the supervisor in preparing for and conducting his safety meetings. Before commencing this program, we surveyed a number of meetings being con-

ducted by our supervisors and talked with the supervisors about the meetings. We came to the obvious conclusion that help for the supervisor in making his meetings more effective was one of the contributions that would have the greatest effect in our training in job safety. A program has been underway for five years and has been well received by all groups of supervisors; in addition, we are pleased to note that their meetings have improved accordingly.

Our training course is a two-day program; the first day is devoted to instruction and the second day to practice meetings conducted by each participant. The course Instructor gives constructive evaluation to the participants concerning the practice meetings which they conduct.

The instruction portion, which takes place during the first day, consists of four sessions: communications, techniques in conducting a safety meeting, visual aids, and discussion.

Communications

In this instruction session we have four objectives: to define "communications," to demonstrate one-way and two-way communication; to list and review some problems in communication; and to discuss some of the solutions to these problems.

The instruction sessions are conducted to the extent possible in a discussion manner, since one of the main objectives of the training is to encourage the participants to lead discussion-type meetings. In defining "communications" we ask the group for their definitions, and we list the definitions suggested on the chart board. After receiving a number of suggested definitions, we indicate that "communication" is "the act of understanding and being understood."

One-way and two-way communication is demonstrated by using two charts, each having a number of rectangles located on the sheet in a different pattern. With one-way communication, one member of the group is asked to describe the arrangement of the rectangles on the first chart so that the remainder of the group may reproduce this layout from the first member's verbal instructions. As this is a one-way communication, no questions or discussions are permitted. The resultant reproductions made by the members of the group normally vary appreciably and, in the main, differ very

much from the original which was being described. The above example clearly illustrates that one-way communication is very ineffective.

Two-way communication is demonstrated similarly, using the two charts, except that the group is permitted to ask questions and to discuss the data given by the member describing the layout of the rectangles. The results of the reproductions, as made by each participant, are appreciably better and often are exactly the same as the original. The conclusion which is then obvious to the group is that two-way communication has many advantages over one-way communication and the results obtained are much more complete and accurate. This paper is an example of one-way communication and admittedly reduces the effectiveness in getting my message across.

Members of the group are asked to indicate some problems that they have encountered in communication sessions, in order to once again provide for participation by the group and to initially list some of the common problems. The instructor completes the list by adding any of the main communication problems not suggested by the group. The problems normally covered include the possibility of an attitude barrier between the "sender" and the "receiver"; the sender or instructor may be too authoritative or he may talk down to the group. The receiver may not be listening because his mind is on some other subject or he is engaged in some other activity. Distractions such as phone calls or noise from adjacent rooms also represent a problem. Terminology which means the same to the sender and the receiver is most important; the simplest terminology should be used, and it is important that we do not use words that may have more than one meaning.

Following are some of the solutions suggested: use of words which others understand; do not speak down to the group; remove distractions, e.g., do not accept telephone calls during the meeting; recognize that others in the group have something to offer; encourage each group member to participate and to listen.

Conducting the Safety Meeting

In this instruction session, the following objectives are covered: preparation of the

leader; preparation of the group; meeting procedure techniques; and use of a closing summary.

It is most important for the instructor to prepare himself for his meeting. Initially, he must determine the topic to be discussed. He must then take time to prepare for the meeting. Often, in utility work safety meetings in the past have been held on a rainy day when the crew is on short notice, not able to work out of doors. Following a definite schedule for meetings instead of the "rainy day" procedure permits the instructor to plan and prepare ahead of time. The instructor must know and understand his material in order to communicate it. He should prepare a set of notes to follow and should assemble any instructional material or visual aids that he will use. It is also necessary to plan the facilities for the meeting to insure a suitable location and to insure that all are advised as to the date and time. In order to make use of the discussion technique, he should also prepare a number of questions to ask the group to promote discussion on the subject.

Preparation of the group before commencing the meeting is also very important and is an item often omitted by instructors. If a group is to be interested in a topic and participate in discussion of it, it is necessary that their interest and curiosity be aroused before the meeting starts. The instructor should explain the meeting procedure that he plans to follow, i.e., a talk, a discussion, use of visual aids, etc. and should indicate the planned time for the meeting and whether the group should feel free to ask questions at any time or whether questions should be held for the end of the meeting. It is most important that he should explain the benefit that the group should derive from the meeting and the reason for the subject being important to them. He must display interest and sincerity. It is desirable that he indicate that questions and comments from the group will be welcome. The success of the meeting depends very much on the preparation of the group.

In our training sessions, a number of meeting procedure techniques are described and discussed. It is suggested that the instructor initially should review the topic and the main objectives which he wants to discuss. It is recommended that he chart

all main points so that each member of the group can follow easily. It is also recommended that he not try to cover too much material in a single meeting. It is desirable to put the group at ease and keep them involved; this can be accomplished better by the instructor if he indicates a friendly attitude and one of being willing to listen to the ideas of the group. It is recommended that visual aids be used in every possible application, thus providing for communication by both sight and sound. It is most important that the instructor keep on track or on his subject at all times, and it may be necessary on occasion to bring the group back on the subject should a participant tend to get off the track. The use of related comparisons or analogies is recommended; one example often used in the electrical utility industry is the comparison of a water system to an electrical system; the water system can be seen and is commonly understood by most people, and the use of it as comparison does much to assist individuals to understand an electrical system. It is also recommended that the group leader not read his material too much; it is necessary to keep the group involved to maintain their interest.

In concluding a meeting, an instructor or speaker often lets his voice trail off in volume as he approaches his last sentence. This tends to leave the audience up in the air as to whether he is finished or not. It is recommended that our supervisors use a strong closing in their safety meetings. This closing should leave the group with something to think about and work on. This can be accomplished by a discussion or question-and-answer period summarizing the main conclusions of the meeting. On the other hand, the group leader can use the charted notes to review the main points which were discussed and the solutions arrived at. An effective closing is necessary to insure an effective meeting.

Use of Visual Aids

In the instruction session on visual aids, use of chalk boards or chart boards, illustrative aids, and projected visual aids is discussed.

It is recommended that a chalk board or chart board be used in every meeting situation. This visual aid permits a record of points to be kept as the points are discussed,

and if the notes are carefully kept by the group leader they represent the combined thoughts of the group. The data charted assists in getting and keeping the attention of the group and is most useful in bringing the group back on the subject on any occasion when the discussion has wandered off track. The charted notes also aid in reducing disagreement on what has been previously said, and they tend to stimulate thinking and discussion.

It is recommended that illustrative aids be used where appropriate and when such can be prepared to illustrate the subject of the meeting. In safety meeting situations, which usually cover a work procedure, it is normally possible to prepare drawings, sketches, diagrams, charts, or models which do much to illustrate the item under discussion. If the meeting is concerned with the use of hand tools or similar small equipment, the best visual aid to take to the meeting is the tool itself. In the case of equipment such as fire extinguishers or gasoline safety cans, cut-away models are also most useful. Our supervisors are advised to prepare their illustrative aids prior to the meeting and to make them simple but attractive and large enough for all in the room to see. It is also recommended that they keep such items out of sight until the time of the meeting for which they are to be used; presentation at this time in the meeting makes their use most effective.

Projected visual aids represent one of the best types of visual aids available for safety meeting training sessions. These include movie films, slides, video tape, and other items. Our supervisors are reminded that these items are only aids and that the visual aid itself cannot replace a well planned meeting. If chosen well, they will illustrate a point or theme in the meeting. It is most important that the group leader preview the visual aid before the meeting and that he completely know the contents of the visual aid. It is recommended that he prepare an outline of the contents of the visual aid and the points that he wishes the group to look for; discussion of this outline and these points prior to seeing the visual aid will result in the group's getting more value from the visual aid. In addition, it is recommended that the group be advised that a discussion will be held after the

visual aid is shown. The showing of a visual aid without a discussion concerning its content is often done and, unfortunately, often results in a most ineffective meeting. Obviously, the group leader must make certain that his projection equipment is available, set up, and ready to operate prior to the meeting if it is to run smoothly. Also, in choosing films, it is recommended that they not be longer than fifteen to twenty minutes, in order to hold the attention of the group and to provide for time for discussion after showing of the film. In this instruction session, it has been our practice to show a National Safety Council film, "No One Else Can Do It," for a demonstration of the use of visual aids; at the same time, the film clearly demonstrates the role of the supervisor in the accident prevention program.

Leading a Discussion

In the instruction session in this case, the following four objectives are covered: to define a group discussion; to list some topics that could be discussed at a safety meeting; to discuss some of the problems facing a discussion leader; to suggest some solutions to these problems.

The definition of a group discussion is discussed with the participants in the training session. The participants are asked for their definitions of a discussion, and a number of the definitions suggested are charted. The following definition is then given to the group: "A group discussion is a group of people, under the direction of a leader who meet to (1) exchange ideas or opinions or (2) to clarify information already presented."

The group is asked to suggest topics they consider would be suitable for a discussion-type safety meeting. Normally, ten to twelve items are suggested readily by the group, including safe work procedures, protective equipment, safety rules, and many other facets of the work situation. The result is a demonstration to the group that a discussion-type meeting lends itself to many safety items and that there are many items available for safety meeting topics. It has been a complaint of many of our supervisors over the years that, "I have run out of ideas for safety meetings." This item clearly refutes this statement.

A number of problems face the discussion leader in handling a group discussion. It is our practice to ask the participants to suggest some of these problems. The following are items which are normally volunteered by the group: size of group, facilities, planning, method of getting agreement, the over-talkative person, the quiet person, side discussions, lack of attention or interest, ways to stimulate discussion, and how to summarize at the conclusion of the meeting.

A discussion of the above problems is conducted, with the group being asked to suggest solutions to these problems. The participants' ideas are used as much as possible and it is necessary that the course instructor be diplomatic in using or adapting the ideas suggested. Use of different types of questions by the group leader are explained and illustrated as a means of handling these problems. The following are examples of different types of questions and their use:

1. An open question requires a statement for an answer and therefore forces participation of a group member.

2. A closed question simply requires a "yes" or "no" answer and therefore does not require participation and does not improve discussion.

3. A direct question made directly to one individual is useful as a means of bringing a quiet person into the meeting or as a means of stopping a side discussion between two or more people.

4. An overhead question is made to the complete group rather than to one individual; this type of question tends to stimulate the thinking of each person in the group, as he is aware that he may be chosen to answer the question at any time.

5. A reverse question is a case of the group leader returning a question from a participant back to the participant; this is done when the leader doesn't want to provide all the answers or when he is aware that the participant has some information to offer.

6. A relay question is where the leader relays the question of one participant to another participant; this is also done when the leader doesn't want to answer too many questions or when he feels that the group can answer the question.

It is recommended that the group leader should answer very few questions himself and that he look to the group for as many answers as possible to stimulate discussion and thought. It is our opinion that the discussion-type meeting provides more participation and therefore more learning, and that it results in the data being retained better by each individual. It is also our feeling that this type of meeting maintains interest by involvement. The discussion-type meeting is also more acceptable to the group than listening to a talk by the group leader or to a speech being read.

As indicated, the second day of the training program consists of each participant carrying out a practice meeting. This second day of the program usually takes place one week later so that the participants have had time to prepare their topics. Each participant chooses a topic on the first day of the training session, often from one of the items submitted by the group, and a record of the topics to be used is made to avoid any duplication. During the practice session, each participant conducts a twenty to thirty minute meeting with the remainder of the group as participants. The group instructor then asks the group to give a constructive evaluation of the participant's meeting, and he then follows this with his own constructive evaluation. Emphasis is given to use of the techniques that have been taught and to constructive criticisms to improve the efforts of each participant. A discussion diagram is used to chart the discussion for each practice meeting so that a report can be made to the participant as to the effectiveness of his discussion leading. A very high percentage of the participants in this training program have made excellent presentations in their practice sessions, and it is our opinion that the safety meetings conducted by those who have been exposed to the training have improved appreciably. The usual comment from our supervisors is, "This is an excellent program. I would like to have had it earlier." It is our plan to repeat this training periodically to attempt to maintain the high standard of effectiveness in leading our safety meetings.

"A man's mind stretched by a new idea can never go back to its original dimension."

Zero In on Product Safety

RECOMMENDATIONS OF THE NATIONAL COMMISSION ON PRODUCT SAFETY AND THEIR IMPLICATIONS FOR THE SAFETY SPECIALIST

By WILLIAM V. WHITE

Former Executive Director, National Commission on Product Safety, Washington, D.C.

The National Commission on Product Safety has made extensive recommendations to the President and the Congress—primarily in the form of suggested Federal legislation.

To describe the recommendations of the Commission is a pretty easy chore—I do it all the time. Sometimes in my sleep. But to speculate on their implications for the safety specialist is something else again. This requires that I depict what must still be considered an imaginary situation wherein our recommendations have passed both Houses of Congress substantially in the same form as we made them, are signed by the President, and are being implemented throughout the land.

To date, none of us associated with the Commission staff have dared to do that for fear it would be comparable to sneezing at a seance, or whistling in a dressing room. Many of us have somehow developed a hesitation to speculate on the future for fear of somehow casting a negative spell or a hex on fruitful negotiations.

The National Commission on Product Safety was created by the Congress for a period of two years. We were asked to concentrate our study and investigations in three primary areas: (1) to identify the categories of household products which may present unreasonable hazards to the health and safety of the consuming public; (2) to study the extent to which self-regulation by industry affords protection to the consumer; and (3) to review the scope and adequacy of Federal, state and local laws, including the common law, and the effect of product warranties.

Our investigations involved over 350 categories of household products. We conducted ten sets of public hearings, involving over 22 days of formal testimony from more than 225 witnesses. We contracted for many special studies, arranged for product hazard

analyses of various types, and consulted with experts in the field.

The Commission found that existing controls over product hazards in this country are patently inadequate. They have substantiated a need for a major Federal role in the development and execution of new and stronger methods to protect the American consumer.

In developing our recommendations, we were faced with certain critical questions, such as:

1. Should Federal authority be extended to new and different programs to reduce unreasonable product hazards? And if so, what form should such authority take?

2. In view of some of the frustrations and disappointments surrounding some Federal efforts in behalf of the consumer, what could be done to strengthen such efforts and bolster the position of the consumer in the sometimes intricate and cumbersome regulatory processes?

3. What role should mandatory safety standards play in reducing product hazards?

The Commission concluded with virtual unanimity that broad responsibility for the safety of the consumer should be vested in a new conspicuously independent Federal regulatory agency. They have, therefore, recommended to the President and the Congress the passage of a Consumer Product Safety Act. This Act would create a permanent Consumer Product Safety Commission which would consist of five Commissioners appointed by the President with the advice and consent of the United States Senate.

They have recommended an independent agency, concerned exclusively with the safety of consumer products, for good reason. We believe very strongly that if such an organization was subordinate to a larger agency administering other equally compre-

hensive or more glamorous programs, the emphasis on product safety would suffer. Protection of the public interest will be strengthened if the agency has authority to make final decisions on its own, free of restriction by a parent agency or department.

The Consumer Product Safety Commission would have strong regulatory and enforcement powers, as well as broad service functions. I will now briefly describe the powers and responsibilities of this proposed organization:

Recommendation 1: "That the Commission be invested with authority to develop and set mandatory consumer product safety standards where industry's own efforts are not sufficient to protect consumers from unreasonable risks of death or injury."

When industry markets products which are not unreasonably hazardous, then there is, of course, no need for Federal intervention. On the other hand, when unreasonably hazardous products are marketed due to neglect of safety factors, the inadequacy of voluntary standards, or the failure of some few manufacturers to meet the requirements of voluntary standards, then Federal action is required.

Recommendation 2: "That, in addition to authority to promulgate consumer product safety standards, the Commission be empowered to seek a court order to enjoin the marketing of specific products of individual manufacturers which create an unreasonable risk to the safety of the public."

We believe that by instituting a judicial proceeding for an injunction to prevent the marketing of a hazardous product the Commission should be able to protect the public without disturbing the entire production of one manufacturer or of an entire industry. Such proceedings may be particularly useful in the case of new products presenting foreseeable risks, or in the case of noncompliance by individual manufacturers with an otherwise adequate voluntary standards program.

Recommendation 3: "That the new Commission be given the authority to employ a range of methods to secure compliance with its various safety measures and that it be provided with authority to use such sanctions as are necessary and appropriate to the type of violation and degree of hazard."

Most manufacturers welcome safety measures that are fairly applied, uniformly enforced, and impose no undue burden. Never-

theless, a few are indifferent to publicity and apathetic about product hazards. Most protect themselves by incorporation or insurance against personal liability or loss. Presently, no Federal law of broad scope provides for recall of dangerous household products or for an injunction of sales when circumstances warrant. The mere existence of such authority to impose such sanctions should make their use rare.

Recommendation 4: "That the Commission be empowered to conduct public hearings and otherwise obtain data or expert opinion about consumer products; to require witnesses to testify or provide pertinent documents; and to deputize its employees or state or local officials to conduct reasonable inspections and investigations related to the reduction of product hazards."

We have found that one of the most direct and economical techniques of developing information is to schedule hearings and call witnesses with expert knowledge or firsthand experience. Inspection of premises is also a reasonable method of securing compliance with responsible manufacturing practices that affect public safety.

Recommendation 5: "That the President appoint a Consumer Safety Advocate to the Commission staff with specific responsibility to represent consumer interests before the Commission. The Advocate would take up consumer complaints against the Commission, evaluate implications for consumers in present or proposed standards or rules, suggest the need for new standards or rules, issue public statements, and take issue with actions of, or inaction by, the Commission."

We believe this to be an extremely imaginative and innovative recommendation. Consumers need a Federal official with sufficient powers and resources to act exclusively as spokesman and representative regarding unreasonably hazardous products. No private consumer organization has the technical and legal expertise and funds, or the time, to devote to this critical task. Quite as private enterprise requires counsel to represent its interests in dealings with agencies or government, the public requires an Advocate who will defend consumer safety against exploitation, excess, or neglect.

Recommendation 6: "Creation of an Injury Information Clearinghouse within the Consumer Product Safety Commission with responsibility to collect and analyze data on

product injuries and to assure widespread distribution of information about defective products, the degree of hazard, and the nature of proposed remedies."

Information relative to consumer product safety can be useful to manufacturers, consumers, and government alike. Such information can indicate which hazards warrant remedial actions and could help the Commission establish its priorities. Along similar lines, we've recommended that the Consumer Product Safety Commission have authority to support states and localities in product safety activities or projects in surveillance, injury reporting, hazard reduction, research, and training.

As states and municipalities traditionally have served to adapt national programs to unusual local conditions, they have also been a source of original and innovative techniques and ideas in legislation and public administration. They provide an indispensable channel and source for the feedback of information about product safety and the effect of safety regulations.

Recommendation 7: "That the Consumer Product Safety Commission, in cooperation with the Secretary of Commerce acting through the National Bureau of Standards, be authorized to accredit private laboratories which are qualified to test and certify compliance with specific product safety standards. We further recommend that the Commission be empowered to require independent testing of consumer products which present unreasonable risks."

By the same token, we believe that the Consumer Product Safety Commission should have a modest laboratory facility to conduct safety research and to develop technical information for use by manufacturers and standard-making groups.

Some other recommendations pertain to the role and function of agencies of the Federal government. For example, the Commission recommended that the authority of the Federal Trade Commission be rigorously applied and, if necessary, expanded to apply to any certification program which misleads or deceives the consumer as to the meaning of a certification.

It recommended that existing programs of the Small Business Administration be expanded to authorize granting of long term, low interest loans to assist small businesses in meeting requirements of product safety

standards. This would involve amending the Small Business Act to expand the existing concept of "product disaster" loans to make available such loans when small businesses faced competitive disadvantage caused by engineering, testing, retooling, or related expenditures necessitated by safety improvements.

Similarly, it recommended that the Federal government, through its purchasing and insuring agents, utilize its influence on the American marketplace by looking to established safety standards and, wherever practicable, new safety designs in selecting products for Federal use. Federal agencies should also provide both manufacturers as well as consumers with acquired information about hazards in consumer products.

The Federal government possesses an enormous amount of technical expertise, applicable to product safety considerations. We believe that technical experts from any Federal agency should be authorized to participate in voluntary standards-setting activities—excluding cases where there would be a real or potential conflict of interest, of course. This additional involvement of Federal personnel could serve to give the consumer a more effective voice in private safety programs.

Several Commission recommendations concern the legal rights of injured consumers. For example, the Commission recommended that injured consumers be permitted to file claims for treble damages, as well as class action suits, in the district courts of the United States against manufacturers who knowingly or willfully violate Federal consumer product safety standards. A similar recommendation is that the doctrine of strict tort liability be applied uniformly in state and Federal courts and that state legislatures modify obsolete statutory provisions which unduly impinge on the consumer's right of redress for injury.

And speaking of the states, the Commission recommended that a mandatory Federal safety standard for a consumer product preempt any state or local standard with appropriate provision for exemption where clear and compelling conditions in the state may make it necessary.

Lastly, in the way of recommendations, the Commission has addressed itself to the international scene. We believe that products imported for sale in the United States should

be denied entry if they violate Federal consumer product safety standards or regulations, or are deemed to be unreasonably hazardous. We believe that the government of the United States should strive to close the gap in legislative authority which now exists between this nation and other industrial countries of the world. We further recommend that this nation lend support to international standards development and that it prohibit the export of hazardous products to other countries.

Each of these recommendations by the National Commission on Product Safety could be discussed separately and at considerable length. I've reviewed them in a "nut-shell" fashion for you in the interest of time. However, it doesn't take an undue amount of imagination to see that a fruition of these recommendations could have vast implications for the work of safety specialists everywhere.

First—and foremost—the safety specialist would have a strong, and effective agency of the Federal government to turn to for assistance. From grants-in-aid for local programs and projects to the latest in up to date authoritative injury data; from relevant technical information concerning product standards to films and pamphlets for local distribution.

A safety worker could refer case information and consumer complaints to such an agency with assurance that careful review and consideration would always be given by

knowledgeable safety experts. To some extent, consumer products suspected of being hazardous could be submitted to the laboratory facility for examination and testing.

I would hope that if such a Consumer Product Safety Commission became reality there would develop a strong and effective interrelationship with safety experts throughout the United States, involving a constant exchange of information, ideas, suggestions, and solutions.

Those of us who helped to formulate these recommendations believe that this type of highly intensive effort is a pre-requisite for adequately coping with the present day problem of consumer product related injury and death. We believe that a strong and independent Federal role in product safety is absolutely necessary for assuring the American consumer his basic right to safety.

However, the future remains somewhat unclear. The recommended legislation has been introduced in both the House of Representatives and the Senate, where it will be competing with dozens of other proposed measures which address themselves to the Federal government's role in product safety.

Those of you who support the work of the Commission and who agree with its findings might share your views with us; we'll probably respond by complimenting you on your great wisdom . . . and politely suggest that you might want to share your thoughts with your Congressman too!

ORGANIZATION AND SYSTEMS FOR PRODUCT SAFETY

By M. F. BIANCARDI

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There is tremendous opportunity, as well as need, for the safety specialist in the design, manufacture, and marketing of commercial and industrial goods, as well as consumer items. The broad concepts and the specifics that we will review are applicable to all kinds of products.

I have been associated with product safety endeavors for about ten years on a part-

time or fulltime basis. During this time some basic approaches and systems related to this evolving specialty have been identified. During the past two to three years, systems that apply have been defined and refined. Diagrams, charts, and outlines have been produced that can be shared.

Product safety is an extremely complex product characteristic. Unless each of us

and each organization manufacturing a potentially hazardous product recognizes this, we will miss our mark of achieving optimum safety—that degree of safety which may vary from item to item but blends harmoniously with the other product and life objectives the public may be seeking.

Substantially, there are two parts to the overall product safety system—an internal component and an external component. These are tied together by the product itself, which is part of both. The relationships within an organization that designs, produces, and markets a product we have likened to the proverbial chain, to show that internal functions must link together to produce a product that satisfies the customer's safety needs and desires. Key positions in this endless chain are given to the marketing organization.

Let's zoom in on a typical manufacturing company or plant and see how the responsibilities for product safety spread themselves among the many functions of marketing, engineering, manufacturing, legal, and coordinating services. In your company the coordinating services might well be provided by the safety director. Here, just as in employee safety, there is a responsibility to assist management in organizing activities to meet safety objectives, assisting in their implementation and evaluating their effectiveness.

But, how does the safety director perform these broad functions? What specific duties should he have? Broadly, his function objectives should be to help engineering, marketing, and manufacturing management integrate safety knowledge, skills, and techniques into product design, manufacturing, and use so as to reduce product accidents, aid customer acceptance, and minimize product liability and losses.

His specific responsibilities and duties should be to:

1. Develop product safety responsibilities for pertinent operating and staff positions and aid in integrating them into existing position descriptions.
2. Devise means to assist operating management in communicating product safety responsibilities to their personnel.
3. Devise and recommend training and development activities to improve the safety and loss control skills of line personnel.
4. Provide a source of readily available accident and safety data and references for use by operating people.
5. Provide safety consultation on product design, manufacture, and application.
6. Aid product accident investigation, accident analysis, and defense against unwarranted claims.
7. Recommend systems that will aid functional and operating departments to meet their responsibilities for safety.
8. Develop communications and feedback systems to aid product safety and loss control.
9. Maintain liaison with business, professional, and governmental organizations on standards, regulations, and other matters pertinent to product safety.
10. Represent the company on committees dealing with safety matters bearing on company products, or assist other company people in such committee activities.

So much for what the product safety specialist might be doing. How does he do them? Time will not permit a discussion of all the techniques and processes that might be applied by the product safety specialist, but let's take a look at two of his functions and responsibilities: (1) providing consultation in product design, and (2) developing systems that will aid functional and operating department. At this time we'll focus on a fairly simple, straightforward analysis system that can be used by the safety specialist as well as the design engineer to make product hazard analyses.

The loss producing factors that have to be evaluated are product hazards, product failure and malfunction, advertising and warranty, operating instructions, and internal controls. We believe all hazard and loss exposures arise out of or are controlled by these factors. For a loss potential evaluating system we suggest each factor be evaluated separately and then a composite summary be made.

Through checklists which have been developed, this system permits a step-by-step identification of hazard sources (or energy modes), hazards, and specific product component involved. It guides one into consideration of man, environment and time factors, application of controls, and conformity with codes and standards so that potential consequences in injury property damage and down

time can be determined. From these conclusions an evaluation of potential injury and damage (how frequent, how severe) can be made.

We are heartened by the receptivity that manufacturers are showing to these some-

what definitive approaches for organizing and implementing product safety activities. We hope you find them not only interesting but useful, and that you will have the opportunity to apply these systems or some of your own making to your own products.

ASSISTANCE FROM TESTING ORGANIZATIONS TO INSURE PRODUCT RELIABILITY

By DEREK BARTON

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In this paper we will show how testing organizations can assist to insure product reliability. Two words in the subject bother me. Take the word "insure." I hope that no one will go away with the impression that UL or any other testing laboratory is in a position to "insure" that a product is reliable or that it is absolutely safe. I would prefer to leave such a role to the insurance companies. The word "reliability" seems to suggest a scope of operations much broader than that undertaken by UL. Our involvement with a product is pretty much limited to the aspects of safety to life and property. Reliability is a factor for consideration only insofar as it affects safety. The basic objective of an independent testing laboratory in the context of the broad subject being explored here is to assist in getting safe equipment into the hands of the consumer.

The full service independent testing laboratory such as Underwriters' Laboratories has three basic capabilities which it utilizes to achieve the broad objective. These are (1) standards development, (2) engineering investigations to determine compliance of products with those standards, and (3) a listing and factory follow-up service to provide for the identification and periodic audit of products found acceptable under the engineering investigation.

First, let us consider standards. Product safety commences with product safety standards. UL has played a significant and leading role in the development of product safety standards throughout its 76 years, and it is proud of that role. I do not mean to suggest that UL has done the job by itself. Standards development by its very nature must be

a cooperative effort. Good standards consist of a proper mix of good engineering, common sense, and benefit of field experience. Assistance is obtained from a number of sources representing industry, government, and the consumer or user. Representatives of product manufacturers work with the Laboratories' engineers through the mechanism of Industry Advisory Conferences. Feedback on field experience is obtained from engineers associated with governmental enforcement authorities and insurance interests serving on the various engineering councils of the Laboratories. Various individual consumers and representatives of consumer organizations provide review and input through the vehicle of UL's Consumer Advisory Council. For certain product categories, we have organized commercial-industrial users groups to secure the benefit of experience gained regarding the performance of listed products in the field. All comments and suggestions are given serious consideration. However, in the final analysis, UL standards represent the judgment of UL engineers as to the features and performance necessary to achieve a reasonable level of safety.

Consumer product standards must, to be effective, take into consideration the use and maintenance practices of the user. This is a difficult problem, because there is an apparent information gap relating to the proper use of personal consumer products. In the occupational safety area, codes and practices have been developed and used successfully by industry and government to safeguard workers on the job. But with respect to the use of consumer products off the job, there

is a lack of codes or practices toward which product standards may be oriented. Regardless of the difficulty of communicating proper usage to the ultimate user, it is not practicable to develop product standards which would make products "idiot proof" so as to relieve the user of all personal responsibility. However, a realistic safety product standard should recognize the limited ability of the consumer to be completely informed and proceed on the basis of establishing safeguards against reasonable use and likely misuses of the product. Misuse can be minimized by features of design, but hazards of misuse cannot be completely eliminated except by elimination of the product, in most cases.

Unfortunately, certain classes of products contain inherent use hazards which cannot be eliminated by design without destroying the utility of the product. In many cases, such hazards are sufficiently well recognized that the user can be expected to protect himself against the hazard. In other cases, the hazards are latent or hidden and require special consideration: The approach taken by the safety standard is to reduce inherent hazards as much as practicable and then bridge the remaining gap of safety by informing and warning the consumer of the hazards which cannot be completely safeguarded.

Today's consumer products change with advanced technology, materials, and processes. The free enterprise system is predicated upon the maximum utilization of techniques that produce better performance at the same or less cost to the consumer. A progressive manufacturer who spends considerable time and resources to develop a product innovation which he hopes will give him a competitive advantage is not willing to withhold his product from the marketplace while his competitors catch up. It is essential, therefore, that standards be capable of change within a suitable time frame to avoid stifling incentive and innovation. UL builds flexibility into its standards by means of the equivalency concept. This permits the judging of product features not contemplated at the time the standard was written. Also, the tremendous reservoir of engineering talent and years of experience permits UL to evaluate new and novel products for which no prior standards have been published. UL is able to establish applicable safety requirements necessary to provide

adequate safeguards regardless of whether or not the requirements appear in a published standard.

Having adequate standards would be of little value if the manufacturer was not encouraged to produce the product in accordance with the requirements. Under this country's system of free enterprise, the manufacturer has, within certain limitations, the freedom and responsibility of determining the nature of the product that he will place on the market. Industry grows and prospers solely on the basis of satisfying the needs and desires of consumers. Generally, consumers are unable to make valid judgments regarding product safety because the features which make a product safe or unsafe are frequently not detectable by persons not informed in such matters. Recognizing this fact, authority for protecting the unwary consumer has frequently been established at various levels of government by the granting of broad police powers. For example, where the National Electrical Code has been adopted as law, the local authority having jurisdiction is responsible for deciding upon the approval of equipment and materials. In a number of localities, consumer protection is provided by "sales control laws." The persons responsible for enforcing the various laws are generally not able to determine on their own whether or not the product is reasonably free of hazards. The duly constituted authority, as a practical matter, relies on experts in making that determination. The "experts" generally take the form of independent testing laboratories.

This brings me to the second main function of the testing laboratory. Many manufacturers contract with independent testing laboratories for the engineering evaluation of their products with respect to a nationally recognized product safety standard. In the case of UL, its work, with few exceptions, is limited to determining compliance with its own standards. However, UL is prepared, when in the public interest, to conduct investigations with respect to other nationally recognized standards.

An essential part of the engineering investigation is the proper selection of representative samples. UL provides the manufacturer with two options. Generally, representative production samples are selected so that the results of the investigation may

be conclusive. But a method frequently used is for the manufacturer to submit prototype samples with the understanding that they will be compared with production samples after acceptable laboratory results are obtained. This provides the manufacturer with a high degree of assurance that his product will comply before he moves into final production.

After it is determined that the manufacturer's production complies with the applicable safety requirements, UL establishes the third and what we consider to be a very essential ingredient of the product safety system. We call it the Listing and Follow-Up Service. Most any manufacturer is able by concerted and determined effort to produce samples of a product that will comply with the safety requirements. But the real test is whether or not the manufacturer is able or willing to consistently produce the product in accordance with the standard.

Under UL's Follow-Up Service, the manufacturer is authorized to apply the Laboratories' registered Certification Mark to his production that complies with the Laboratories' requirements. He agrees not to apply the Mark to products which do not comply. UL inspectors make periodic inspections at the factory and frequently select samples for counter-check at one of UL's main testing stations to determine compliance with the requirements. Should examination or tests disclose features not in compliance with the requirements, the manufacturer is required either to correct the product or remove the Mark from the product. UL provides an essential function in auditing and supplementing the manufacturer's own assurance program, but the Laboratories' service is not designed nor intended to, and from a practical point of view could not, relieve the manufacturer of primary responsibility for his product.

For the consumer to derive benefits from this system, it is necessary that he or the responsible authority looking out for his welfare be able to identify products produced under the Service. This need has resulted in UL revising its system of Listing and Marks applied to products. Most types of household products may now be identified as complying with UL's requirement by the appearance of the symbol UL on the product. Some products bear a label bearing the Mark "Underwriters' Laboratories, Inc.

Listed" together with the name of the product. Under our revised system of marking, the appearance of these Listing Marks on the product is the only method authorized to identify products produced under the Listing and Follow-Up Service.

To better acquaint the consumer with the Listing Mark and its meaning we have developed a small fact sheet. Several million copies have been distributed to consumers through various channels. It says, "You have seen it a million times, but have you thought about what the UL symbol of safety means to you?" Then it goes on to explain in simple terms the significance of UL's Listing Marks. The brochure is available in reasonable quantities. Arrangements may be made to obtain large volumes at cost.

While research may not be considered to be a normal function of a testing organization, Underwriters' Laboratories does have a number of persons conducting basic research on a full time basis. In addition to this formal research effort, on-going research is conducted by our project engineers as a part of their evaluation of new products. In an effort to improve the level of safety of household appliances, UL has increased its activities in the areas of hazard research and standards review. Greater emphasis is being devoted to the study of mechanical and thermal hazards. Additional work is being done to determine the effects of electric leakage current on human subjects. More specifically, an effort is being made to determine what level will cause a reaction by the subject leading to a potential side hazard, such as the spilling of hot liquids or the dropping of objects. A study is being made on the use of ground-fault circuit-interrupters in the home involving installations in approximately 100 different locations throughout the United States. The purpose of the investigation is to determine the effectiveness of ground-fault circuit-interrupters in preventing injury from electrical shocks, the possibility of making installations in homes, and the determination of the frequency and consequences of false tripping of the devices.

You are all aware that the standard way to remove a plug from a wall receptacle is to "grab hold of the cord and jerk." UL is in the process of determining the characteristics of the force impulses resulting from such action with the objective of

developing a standard test procedure for judging the adequacy of the connections between the cord and plug terminals.

In the area of mechanical hazard evaluation, a project of widespread interest involves the determination of acceptable limits for sharp edges and points on surfaces of appliances.

Encompassing electrical, thermal, and mechanical hazard areas is a project, almost completed, concerned with finger profiles as they may relate to accessibility of electrically live parts, thermally hot parts, or mechanically hazardous parts through openings in enclosures of appliances. In this investigation we are using 300 human subjects consisting of 100 male adults, 100 female adults, and 100 children. The objective is to prepare specifications for accessibility probes that can be applied to various categories of appliances.

I have recited only a few of the current research activities to emphasize the capability and importance that UL attaches to research and the contribution that it makes to the product safety standards setting process.

It takes a rather large and diverse organization to provide the services outlined above. UL has approximately 2,000 employees organized into six engineering departments and a Follow-Up Service Department. The engineering departments are located at four testing stations. Follow-Up Service inspectors are located in approximately 200 inspection centers in the USA and in 28 foreign countries.

More than 15,000 companies subscribe to the services of Underwriters' Laboratories.

Approximately 27,000 engineering jobs covering new or revised products are completed each year. More than one billion labels bearing the Laboratories Listing Mark are issued annually. Over 200,000 factory inspections are conducted each year.

We feel that Underwriters' Laboratories is performing a significant contribution to a voluntary system of product safety. I hope that I have been able to convey a feeling of the wide ranging capabilities of UL in the areas of standards development, product evaluation, and factory follow-up service to assist in getting safe equipment into the hands of the consumers.

The professional industrial safety expert can perform a significant role by assisting in the vast educational effort that is needed to help individual consumers properly use and maintain today's array of highly complicated and specialized appliances. Many millions of persons working in industry have been taught the value of safe working practices, safe working conditions, and safe equipment. These people have been made safety conscious in their places of employment by the direct promotion efforts of industry and labor working through safety experts.

It would seem natural to utilize this same know-how in bringing to this large and important segment of our population the same awareness and concern for safety in the home environment. I strongly suspect that this is really the point of the off-the-job safety program. The information that you need is available from various sources such as product manufacturers, trade associations, insurance companies, and safety oriented testing organizations such as UL.

The Army Safety Program

OPENING REMARKS

By HOWARD PYLE
President, National Safety Council

Each year it is my pleasure to introduce a program that has become one of the features of our National Safety Congress. Traditionally we have invited one of our member companies that has been nationally recognized for having developed an outstanding accident prevention program over the years.

I believe it is rather apparent from the band and the stirring music that we are breaking with tradition. Industrial organizations have pulled out all the stops with regard to speakers and visual aids, but none of them has had an overture like this!

As I stated, this year we decided to break with tradition. We thought . . . the time had come . . . to recognize the fine programs that have been developed and are in operation in many government agencies. Specifically, we believed that perhaps one of the armed services could provide the fact-producing and stimulating program that this Congress audience deserves.

All of the services are engaged in ongoing and effective programs and it was

difficult to make a choice. (For example, the Air Force recently earned the President's Award for their program). We decided that we would make a seniority choice. The U. S. Army is the senior service and as such should receive our first consideration.

Examination of our own award records indicated that by our standards the Army was really deserving of our recognition. Since 1943, the United States Army Safety program has earned 24 NSC Awards of Honor. . . . This will be the seventh consecutive year that the Army has qualified for this award. Only one other industrial member has earned more of these top awards in the same period of time.

But let's let some of the key individuals who direct the program tell us how it was accomplished. It is with extreme pleasure that I introduce the Hon. Eugene M. Becker, Assistant Secretary of the Army, who will in turn introduce the other individuals who will present this program.

TOP COMMAND SUPPORT

By HON. EUGENE M. BECKER
Assistant Secretary of the Army (Financial Management)

Governor Pyle, I thank you and accept again, on behalf of the Army, the Council's coveted Safety Award of Honor. Commanders, supervisors, soldiers, civilian employees, and safety personnel at all levels share in this honor. I, in particular, am rewarded and fulfilled by your repeated recognition of our endeavors and accomplishments. We did not strive with awards in mind. Our inspiration was the conservation of human lives and other vital resources. In addition, our inner consciousness has always been there to remind us that

everyone and everything destroyed by accident impairs our ability to fulfill our destiny to defend this great nation.

The subject of safety is not new to the Army. Ever since the days of the Continental Army, commissioned officers have been held responsible for the safety and welfare of their soldiers. This concept has become traditional. We have built on this philosophy until more recent times when a streamlined and sophisticated safety program was established which embraces not only active Army personnel but also civilian

employees, National Guard, Army Reserves, dependents, contract personnel on-post, and all material wherever located in the world. The duty and obligation of every non-commissioned and commissioned officer to protect and care for his troops has been traditional ever since there has been a United States Army. Notwithstanding, our integrated safety program as we know it today didn't come into existence until about twenty-five years ago. A departmental-wide program employing all the principles and techniques of accident prevention was established by a War Department regulation early in 1946.

To perform its basic mission, the Army must maintain itself in a state of constant combat readiness. This requires maximum efficiency and effectiveness of all operations and activities. We cannot afford useless and irresponsible mistakes, especially those that lead to tragic and wasteful accidents. There are many aspects to our continuous efforts to prevent accidents, and anything that interferes must be dealt with swiftly. For example, in this century, the Army has reduced death and illness due to diseases and has thereby increased its mission capability. The more dramatic illustrations which come to mind are the isolation of causes and the cures for malaria and yellow fever and the successful use of penicillin. We have taken the same approach toward accidents because they, too, are looked upon as a departmental disease that must be cured.

The safety program can be no better than the top command support which it receives in day to day management. Each commander has full and final responsibility for consistently employing accident prevention efforts. The services of trained and competent safety professionals are available for guidance and assistance in the development of safety policies, procedures, and controls. This decentralized approach to safety management utilizes participation by all as its basic ingredient. Commanders and supervisors know that their responsibility for safety is integral to their overall re-

sponsibilities and that a good accident prevention program enhances the successful accomplishment of their operations. Our records indicate constant reductions in the frequency of accidents and injuries. This does not mean that we have reached the end of the line in making further improvements. It does mean that we will collectively have to look for further solutions to prevent the ever present potential of accidental loss of manpower and resources.

We must continue to apply the professional approach to safety. Our modern and sophisticated weaponry requires the application of systems safety techniques. These are not always related directly to injury prevention but can substantially reduce equipment failure which, in turn, will lower human loss and materiel loss—thereby increasing combat effectiveness. It is our intention to continue and to expand the scope of our activity in support of this concept which will pinpoint potential accident causes while an item is still on the drawing board or in early test and evaluation stages. Army and industry efforts in safety are dependent upon each other. Designing, manufacturing, and maintaining modern equipment, weapons, and materiel demand extensive liaison and cooperation by all. We will make every reasonable effort to encourage and maintain this cooperation in the implementation of necessary safety requirements.

It hurts to learn, after the fact, how easily most of our accidents could have been prevented. Injuries or loss of human lives cause not only untold grief in the home but disrupt defense activities and represent an irrecoverable loss of national resources.

This Congress provides the opportunity for all safety professionals to meet and exchange ideas. It will provide answers to many questions and advance the team effort for safety. The results will not only benefit the Army and industry but also our country and our Allies. I personally solicit your continued support on behalf of safety in the Army and the nation.

THE ARMY'S OBJECTIVE

By LT. GEN. W. T. KERWIN, JR.
Deputy Chief of Staff for Personnel, U. S. Army

Americans are rightfully proud of our heritage of freedom, our customs, and our traditions. We recognize that the individual has the right to enjoy a long and useful life. When a man enters the Army he brings with him these same rights. He has the right to expect that he will be provided with a proper place in which to train and live. He will be armed with the proper weapons, equipment, and tools. We will help him devote his energies to his job without undue danger to his life and health. We recognize that the business of the Army is controlled violence. Wherever there is violence someone will get hurt. But we believe that the soldier can learn his military skills without being subjected to unnecessary hazards in the process.

We have the same obligation to the civilian who, as part of the Army team, supports our soldiers—he, too, is entitled to the safest environment possible.

The Army's objective is to be organized, trained, and equipped for prompt and sustained land combat. Accidents hinder the Army in attaining this objective. My concern as the personnel manager for the Army is to provide the best trained soldiers and workforce possible and, at the same time, to assure a high level of safety, health, welfare, and morale for all members of the Army team. You have often heard us say that people are the most precious resource of the Army. Each man who dies or is disabled as a result of an accident is a loss to the Army and to our nation. The need to reduce these losses is an urgent one. It was for this reason that the Army Safety Program was established twenty-five years ago. Our accident prevention program, totally integrated into all Army operations and situations, is uniquely an American concept—a concept that has been copied or adapted by the armies of many of our allies.

The Army owes a debt of gratitude to the far-sighted business executives, labor leaders, and the National Safety Council who early in the 20th century formalized

an accident prevention discipline. Today, the Army and many other government agencies have developed sophisticated and comprehensive safety programs. The federal safety effort has received impetus from strong endorsements by several Presidents of the United States. On October 24, 1969, President Nixon issued a Safety Policy for the Federal agencies that emphasized the concern of his administration over the human suffering and economic waste caused by accidents. He pointed out that department or agency heads play a major role in the elimination of accidents and directed that:

1. If a department or agency has an effective program in this area, it should be continued.
2. If it does not have an adequate program, one should be developed.
3. If the program needs additional resources to make it effective, resources should be provided.

This Presidential concern for reduction of accidents is shared by the Army. In 1885, one of every four soldiers was accidentally injured in the course of the year. Today, annual Army injuries have been reduced to one for every 87 soldiers. Civilian injuries occur at the rate of one for every 320 employees. We are not satisfied with this progress, however. The challenge to achieve further reductions must be met.

Many of the accident prevention problems that face the Army are like those experienced by large corporations. Others are peculiar to the Army because of our operational situations. Consider the mechanized division of today. When today's soldier closes with the enemy he must have the tremendous mobility and fire power that modern warfare demands and which intricate scientific and technical devices have provided. The typical armored division today uses more than 22,000 weapons of all types, and more than 5,000 vehicles. With this mass of equipment, safety hazards assume major proportions.

Additionally, the Army is always in a state of flux, never static, never the same, despite the appearance of sameness. The great variety of missions include civil defense, air defense, civil disaster assistance, military assistance programs for our allies, military and civil construction, research and development, support of NATO and SEATO and, of course, the maintenance of our forces in Vietnam and Korea.

Complicating the diversity of our many missions, our annual military personnel turnover rate approximates 38 per cent. This alone would confound personnel management in private industry. Add to this the fact that more than 40 per cent of our Army personnel are located in foreign countries. Varying social and environmental

conditions, traffic laws, literacy rates, language barriers, and unfamiliar customs all add to the complexities of the problems we face. It is in this context of diversity that we must conduct our safety program.

This challenge can be met only by each of our commanders. He must bear the responsibility for his command's safety record. The safety officer, as the commander's staff advisor, can provide him with the expert advice on how to prevent accidents. But a good safety program will have as its prime characteristic the direct support and interest of the commander. He is the one who must insure that his staff works closely with the safety director, to provide the total effort required for effective accident prevention.

ARMY SAFETY PROGRAM

By THOMAS H. WILKENSON
Director of Safety, U. S. Department of the Army

The United States Army cares enough about the welfare of its personnel to implement the largest and most comprehensive corporate type safety program in the world. The Army operates in all fifty states, two large overseas commands in the Far East and Europe, with Army personnel employed in some seventy-four foreign countries. Counting regular military and civilian personnel, plus the regular reserve, National Guard, ROTC, and over 275,000 foreign national employees and dependents living on Army installations, the Army Safety Program embraces over 3,000,000 people. The Army engages in nearly every occupation and service known to the civilian community. It is big, complex, widely dispersed, active, and highly motivated.

The safety policy of the Army is to reduce and keep to a minimum accident manpower and monetary losses, thus providing greater safety to Army personnel, more efficient use of Army resources, and advanced combat effectiveness.

The Army safety program provides for an aggressive, comprehensive, continuous, integrated accident prevention effort compatible with the mission of the Army throughout all echelons of command and

in every operation and activity. The program is designed to create safe conditions of operations and employment, and to promote safe practices by military and civilian personnel on and off duty, world-wide. The command safety program at each echelon involves all phases of safety and is directed toward the prevention of all accidents.

The management of safety in the Army brings the staff into contact with Federal and non-Federal national agencies, state and local agencies, unions, councils, associations, services, manufacturers, professional groups and foreign instrumentalities.

The staff responsibility for implementing the program originates with the Secretary and the Chief of Staff to the Deputy Chief of Staff for Personnel on whose staff resides the Director of Safety. All Army staff agencies have an obligation to actively support the Army safety program on a day to day basis.

The command responsibility for implementing the program follows the chain of command to the smallest activity to include rank and file personnel. Involved in the command flow are the numbered Armies, Corps, Divisions, training centers, research centers, depots, arsenals, proving grounds,

missile sites, manufacturing plants (inert and explosive), military missions, military assistance advisory groups, experimental stations, and a multitude of other varied high risk activities, some removed from Army headquarters as many as seven echelons.

Our primary concern is for the safety of people. The scope of the program embraces all personnel: military on and off duty, twenty-four hours a day every day of the year; civilian employees of the United States Government while in a duty status, with appropriate emphasis on off the job safety; contractor employees working on Army installations; dependents residing on our hundreds of military installations; foreign national employees of host countries where the Army is located; and thousands of non-Army persons who visit our activities for liaison and other reasons.

The Army is interested not only in the safety of people but materiel as well. For example, tanks, guns, missiles, vehicles, aircraft, and all types of equipment and materiel. The program extends to the protection and conservation of all buildings and grounds.

Another way to look at the scope of our safety program is in terms of activities, all of which are accorded various degrees of special interest and concern: industrial safety, range, flying, public, explosives, water, traffic, fire, recreation, radiological, nuclear, and off duty safety.

It is noteworthy that the scope of our program includes the reporting of all accidents. Every accident that occurs incident to an Army operation or activity which results in disabling injury to any person or \$100 or more damages to any and all property is reported to Headquarters Department of the Army. Accidents resulting in lesser consequences are reported to unit commanders at the post or activity levels. Significantly important is our regular practice of analyzing both causes of accidents and causes of injuries. We focus our attention first upon analysis of accidents; then, analysis of injuries. This gives us an additional and broader base from which to work.

We portray the program in the form of an arch. To be most effective, the program is built on a foundation of coordination.

The arch is composed of six action activities and command action. First is administration, which includes planning, developing, directing, coordinating, and evaluating accident prevention implementation.

Next is training, which embraces the overall effort to integrate practical and effective safety instruction into all training procedures, operations, and activities. This includes intensive career training for over 800 full time civilian safety personnel and thousands of part time safety officers. Developing and maintaining an effective work force of safety careerists is in itself a sizeable task, large enough to be made a separate subject.

Briefly, we operate four-week courses in safety organization and administration at Fort Benjamin Harrison. The Army Materiel Command offers a sizeable battery of short and long range courses on various safety specialties. A special training program takes college graduates of various engineering disciplines and puts them through two years of intensive safety engineering study. We enroll twenty internees in this program each year. Successful completion earns a Master of Science degree in Industrial Engineering with a Safety Engineering option from Texas A&M University. Each year approximately 5,000 military and civilians enroll in off-campus correspondence courses covering many safety subjects.

Next is promotion, through which we constantly strive to build safety consciousness in the minds of all Army personnel.

Vital to accident prevention is safety engineering, whereby professional effort is systematically applied to provide safe design and to eliminate or control hazardous environment.

Next is the development and implementation of standards of conduct to guide formulation of standing operating procedures, plans, and specifications.

Finally, there is accident reporting, from which is derived a factual estimate of the situation that enables commanders to direct appropriate corrective measures.

The keystone supporting the arch is command action, which is as essential to success in preventing accidents as it is to the success of any military mission.

The staff services of a program director are provided at departmental, major command, and installation levels. The safety director is the technical advisor and coordinator of program activities among the staff agencies. Command safety programs at every echelon include all of these activities covering every aspect of safety.

Our basic concept in the Army, stated quite simply, is that all accidents are preventable and a program of prevention wisely executed must be geared to correct faulty behavior in terms of unsafe acts, faulty environment in terms of unsafe conditions, and to arrange for safe interaction of the man-environment relationship. Materiel is important only when related to people and the attainment of missions.

Experience has taught us that in 85 per cent of all accidents our primary concern is with faulty behavior of personnel; in 13 per cent our primary concern is with faulty environment; the remaining 2 per cent generally are charged to "acts of God." We are not unmindful that there exists the interaction of both unsafe acts and unsafe conditions in most accident situations. It doesn't really matter whether we are dealing with military, civilian, or foreign national personnel, screwdrivers or missiles, pushcarts or tanks, tugs or aircraft—the principle is the same. The complexity and technology may vary widely, but the heart of accident prevention is controlling the acts of personnel and the conditions under which they perform. The correction of faulty behavior may run the gamut from a brief verbal admonishment to medical correction, including psychiatric treatment, while the correction of faulty environment may range from improved housekeeping to the concept stage of research and development.

Resolution of the problem is a matter of effective identification, evaluation, and correction.

There are basically two general approaches to the execution of safety programs in industry and government. One is a centralized vertical type; the other is a decentralized horizontal type. Both types can be and have been employed with success. The centralized vertical approach requires a large staff of talented and specially trained people who review in detail the actions of everyone on the staff to be sure

that safety requirements have been met in all respects. Much too frequently technical channels, instead of command channels, are followed in an attempt to obtain quick results. Various aspects of safety are inclined to become compartmentalized instead of integrated. There is a natural inclination to impose, from the top, numerous safety requirements on commanders or plant managers. Since 1957, the Army has developed a highly effective version of the decentralized horizontal type program, with a small staff in the Army headquarters. From staff agencies and the safety office there is a horizontal flow of actions. From any of these points, as appropriate, information and guidance moves downward through command channels for implementation. We have placed as few restrictions on field commands as feasible. The responsibilities for the performance of these various functions are spelled out in Army Regulations.

We feel that the Army approach is getting better results with less people, less cost, less management oppression, and less command friction than organizations employing the centralized vertical type safety management concept. Our concept provides for the full utilization of the capabilities of all internal staff agencies in the fields of specialties for which they are most knowledgeable and otherwise responsible. It is this concept of management that makes the Army safety program a fine program, yet it is often misunderstood. Safety is a responsibility of command, and commanders at all echelons must assure that accident prevention measures and controls are placed into effect. The staff, including safety personnel, are responsible for managing and coordinating the safety efforts of commanders. We have found that the decentralized horizontal concept is more responsive to the needs of commanders. To illustrate, we will trace the responsibility for certain phases of accident prevention within the Army staff and in several of the major commands:

The Deputy Chief of Staff for Personnel has General Staff responsibility for the development and administration of a system of decentralized safety management throughout the Department to include (1) central policy, (2) overall program control and direction, and (3) program evaluation. This is the focal point for our safety program.

However, the entire Army staff has a responsibility to support the program within the missions and functions otherwise prescribed for them in Departmental regulations.

The Deputy Chief of Staff for Personnel provides the authority for other staff agencies, and certain major commands. These in turn are accountable to him for the discharge of specifically assigned safety functions. Included is the Deputy Chief of Staff for Military Operations, who is responsible to see that safety is considered in military plans and operations. The Deputy Chief of Staff for Logistics is responsible to see that safety is considered in materiel, installation construction, transportation, and the like. The Assistant Chief of Staff for Force Development is responsible for operational and technical safety in nuclear weapons and aviation. The Surgeon General is responsible for industrial hygiene, occupational health, and radiological health. The Provost Marshal General is responsible for traffic control, law enforcement, and traffic accident investigation. The Chief of Engineers is responsible for construction safety, fire prevention and protection, and nuclear reactor health and safety.

The Commander of the Continental Army Command is responsible for safety in his vast organization, plus the tremendous task of integrating safety into all military training doctrine, activities and operations.

One of the most challenging safety responsibilities falls on the shoulders of the commander of the Army Materiel Command. In addition to his command responsibility, he must, through the application of

system safety, provide for product safety for the entire Army.

The coordinated effort of the Army through the decentralized and horizontal safety management concept has established program characteristics which we have determined are essential to a successful safety program. Leadership interest and direction keeps the program strong and vital. Our policy is concise, meaningful, workable, and published widely.

The organization is structured to departmental needs. Functions have been established and published. Responsibilities have been carefully defined and assigned to cover all phases of the program. Objectives are set and reset periodically. Accidents are accurately investigated and reported. Data analysis of accidents and trends are followed closely at every echelon.

Risk analysis in terms of the reliability of personnel and materiel are analyzed. Systems safety engineering is applied throughout the life cycle of materiel. We educate our personnel through training in assigned tasks, reinforced by motivational caution. Rules and standards are enforced by firm but just disciplinary actions. Inspections are frequently conducted of all operations and activities. Program plans, elements, and characteristics are evaluated periodically to strengthen weaknesses.

Finally, outstanding effort and achievement are appropriately recognized through individual and command awards. Tying these fifteen program characteristics together are elements essential to all management: communication, coordination, and cooperation.

SAFETY IN TRAINING AND POST ACTIVITIES

By DONALD S. BUCK

Director of Safety, Continental Army Command, Ft. Monroe, Va.

The United States Continental Army Command, or "CONARC," as it is known, is the Army's largest field command. It consists of five numbered Armies and the Military District of Washington (geographically, the entire Continental United States) plus Puerto Rico and the Virgin Islands. Headquarters, CONARC, is located at historic Fort Monroe, Virginia, our oldest continuously garrisoned fort. CONARC consists of more than three-quarters of a million persons, including approximately 400,000 permanent party military personnel; 275,000 transients such as students, trainees, and medical patients; and 100,000 civilian employees. Officers, soldiers, civilians, and contractors make up the family of Army personnel. Each of them, and each military dependent, is embraced by the Army Safety Program.

CONARC's primary missions relate to training the officers and men of the United States Army. More than a million military personnel, officers and enlisted men, will be trained by CONARC this year. This training, in which safety is incorporated, starts for each recruit at one of the Army Training Centers. Here, the soldier completes his Basic Combat Training, which includes two hours on traffic safety. He learns to fire his weapon safely, under direct supervision. He learns the other fundamental skills essential to becoming a soldier, such as how to cross streams safely. Each soldier whose assignment requires exposure to deep water is taught to survive, either by swimming or by "drown proofing." For his own safety, he learns to function as a team in the combat situation.

Next, the trainee learns his military skill or specialty during Advanced Individual Training. This phase includes at least nine hours of instruction on practical accident prevention.

Next, the soldier may attend one of 25 Army Service Schools which provide programs of instruction in military specialty areas or academic subjects, such as transportation. The Army Transportation Center at Fort Eustis, Virginia, is the home of the

Transportation School, which provides instruction on all types of military transportation, including truck, aircraft, water craft, and railroad. This training embraces both conventional equipment and special equipment. For example, a support mission of this school in Virginia is to train men to operate a snow train which transports supplies across the frozen Arctic.

At other Army Service Schools, soldiers may study electronics, aviation, or foreign languages. Approximately 300,000 military personnel attend Army Service Schools annually in a collective effort to produce and support that most important commodity—the fully trained and best equipped soldiers in the world.

Soldiers must learn how to safely and properly maintain and fire missiles; to operate tanks; to drive trucks in convoy even during darkness, without headlights, under blackout conditions; to quickly traverse rough terrain without accident to protect themselves and their weapons while crawling beneath live fire; and to quickly and safely operate complex equipment and weapons.

After completion of basic and advanced training, soldiers are assigned or detailed to a CONARC military installation. Each installation is a combination of city, fort, and industrial complex. Each has the safety problems that beset any large city, such as airports; railroad, transportation; recreation; traffic control; hospitals, where babies are born, and the sick receive treatment; commissaries or stores; transporting children to school; and housing areas.

At each installation men must be taught how to achieve safety and efficiency in various operations commonly found in any community, such as warehousing, maintenance, service stations, sewage disposal, and road construction.

In addition to these functions and activities, which are normal for any big city, the military installation has training areas where men are taught how to safely engage in operations common to military require-

ments: how to handle weapons, to safely transport military materiel, to operate tanks, to launch missiles, to employ camouflage for safety, and how to protect the head from injury by wearing the metal helmet, which is the soldier's "hard hat."

Soldiers must learn to use their weapons quickly and accurately while under fire. The safety shield, worn by the trainee, protects face and eyes during realistic training called "quick kill," in which he is subjected to direct fire from BB guns from hidden positions. He safely learns to quickly detect and effectively react to hidden enemy positions, thus contributing to his safety later on in a combat situation. The soldier learns that, to be safe and effective, he must constantly strive to prevent accidents which might disable him or damage his military equipment. This concern for safety is incorporated into all military occupational training.

The soldier learns that proper maintenance also helps to prevent accidents. He learns to utilize safety equipment, such as life jackets which are required for deep water operations. He is taught to comply with prescribed safety standards even when operating in the field under difficult conditions. He learns to apply lessons learned in combat.

Some soldiers learn how to use special instruments to detect the presence of radioactive materials. Other soldiers learn how to decontaminate persons who have been exposed to these hazardous materials.

Some of this military training is conducted outdoors. Some is conducted indoors, using "live instruction," often in large educational complexes.

Much of our classroom instruction is accomplished by closed circuit television.

Automation is used to facilitate training. A responder shortens the time required for examinations. The student pushes a button to record his selected answers which are punched on data processing cards. Thus, his scholastic effort can be quickly scored and evaluated by data processing equipment.

Some safety training is conducted on a man-to-man basis, such as safety briefing just before take-off.

Safety in training is essential to reduce the risk in hazardous activities such as air-

borne operations. Long before the men are permitted to jump from aircraft, they must successfully complete intensive training. For example, they must develop a high degree of physical fitness and confidence. They are required to practice and repractice the proper techniques of jumping and landing by leaping from the 34-foot "low tower." Next, after learning technique, the student progresses to the higher, free-fall tower, where he continues to practice under the direct supervision of instructors who use a public address system to counsel him all the way down to assure a safe landing on freshly plowed soil below.

This intensive safety instruction continues even in the aircraft, where the jumpmaster gives last minute instructions, and checks and double checks the equipment.

Only after it has been determined that the men are trained and ready, the equipment has been checked, and the environment, the wind, and the terrain are right, will the men be permitted to jump. As a consequence, military equipment is landed intact and undamaged, and men are landed safely, able to carry out their missions. This emphasis on safety-in-training applies to every kind of military operation and to all types of equipment. It is incorporated in every phase of training. It is reinforced periodically, and whenever change in operation or design occurs. It applies to both work and play. Military personnel are taught how to prevent accidents while operating aircraft, tanks, and boats, and how to avoid injury while boxing, playing football, water skiing, or sky diving.

Safety is also integrated into the training on railroad construction; building bridges; flight training; welding metals; motor transport, and rappelling from aircraft or cliffs.

Safety in training is emphasized in learning how to maintain complex equipment; how to transport materiel by aircraft; or how to transport gasoline in the Arctic in large, pneumatic tire-like fuel tanks.

It is no accident when, despite the many hazards encountered, our equipment consistently reaches the destination free from damage and ready for use. Nor is it surprising that Army motor vehicles, despite youthful drivers, are involved in less than one accident per 180,000 miles traveled, a distance equivalent to seven times around the earth.

"All work and no play" does not apply to the Army Safety Program. We are deeply concerned in minimizing and controlling the hazards associated with off-duty activities. To assure optimum safe condition of their privately owned vehicle the men conduct a pre-holiday safety check in our automotive hobby shops. Our periodic safety inspections include the tools and equipment found in our Special Service craft shops. Safety is emphasized on the skeet range, where men shoot for fun and relaxation. Our gymnasiums incorporate safety in design and in the use of equipment. Our swimming pools are closely guarded and equipped with essential safety and life saving equipment. Pleasure craft operated on waters under our control must carry all the safety gear called for by Coast Guard and state regulations. Good housekeeping helps to prevent accidents in the day rooms. All aspects of hunting safety are emphasized by our Sportsmen Associations at hunting lodges.

How does safety function in a high risk operation such as the Army? Safety starts with planning, where it is integrated into every operation, exercise, and lesson plan. It continues to be stressed at every level until the safety requirement is reemphasized in the field just before the start of any operation. It is emphasized in Officer Candidate Schools and Non-Commissioned Officer Academies. It is stressed in every phase of training.

Commanders and staff receive professional guidance from safety personnel who periodically go to school on campus to update their knowledge of safety management and safety engineering, or they may burn the midnight oil on extension courses pertaining to safety.

One of our most extensive and successful safety training efforts is the National Safety Council's Defensive Driving Course. This eight hour driver improvement course was adopted by CONARC in 1967 to offset privately owned vehicle accidents, and it was made mandatory for all soldiers under 26 years of age. Since then, more than 540,000 soldiers have completed DDC, surely the largest driver training effort ever attempted.

We feel that DDC was largely responsible for the 16 per cent reduction last year

in the total number of CONARC soldiers killed in privately owned vehicle accidents. Each year some 200,000 soldiers complete their military service and return to civilian life. They should be safer drivers in the community because of DDC.

Driver improvement training is not limited to automobiles. The motorcycle is a growing safety problem. In the defensive driving classes for motorcycles, the student acquires the skill and knowledge to help him safely ride his two-wheeler. He learns the importance of wearing the protective helmet. He learns how to maneuver the vehicle around sharp corners. He is taught how to conduct a safety check to prevent accidents and breakdowns on the highway.

Safety training is an unending requirement directed to ever-challenging problems. The vital messages are constantly beamed to the target audience in various ways, such as an outdoor billboard, located where large populations will see it. Safety messages are displayed when and wherever needed. Where feasible the message on the safety sign will convey both the specific requirement and the reason for it.

Displays, such as a wrecked car beside a safety billboard, reinforce the safety message. We cannot control the weather, but we do control operations when hazardous weather adds to the risk factor. Exposure to these safety messages starts upon entering military premises, and a safety message which informs the viewer of the current status of safety will be one of the last things seen before leaving the military installation.

Command concern for the safety of the soldier is evident wherever military operations are conducted. For example, reflective and high visibility materials are issued and required to be worn to safeguard marching troops from motor vehicle traffic particularly when visibility is limited. The soldiers who wear the safety attire move ahead to control traffic at intersections until the troops are safely across.

Safety is not forgotten in personal defense training. Padded ends are used on pugil sticks, chest and groin protection, face shielding, and safety helmets shield against injury. The action may become quite spirited but it will remain safe as possible.

Soldiers learn that each weapon is equipped with a safety lock, and its use is stressed until it becomes habitual. All hazardous equipment incorporates a variety of built-in safety factors; for example, the arming pin on the hand grenade, the fail-safe mechanism of a missile, and special footwear designed to resist penetration by sharp objects and also to provide cushion and support.

A blank firing adapter attached to the muzzle of a rifle deflects the wadding and particles ejected during the firing of blank rounds, thus permitting point blank fire at personnel. It eliminates the danger of injuries formerly associated with blank firing, and provides for the realism so vital in learning to handle a weapon under fire.

The soldier is taught the importance of safe cover. One example, is the barrier utilized by a grenade thrower. After releasing the weapon, the soldier will dive behind the protective barrier, safe from blast and fragments.

AMC'S SYSTEM SAFETY ROLE

By G. LANDON FEAZELL
Chief of Safety, Army Materiel Command

The Army Materiel Command is best described by its motto, "Arsenal for the Brave." Simply stated, its mission is to supply our soldier with the best of everything he needs to live, to fight, to move, and to communicate. To do this, we produce items ranging from repair parts to complete weapon systems. Assigned to the command is a network of 86 military installations and more than 100 activities.

With its headquarters in the Washington, D. C. area, AMC operates through nine subordinate commands. Their names depict the commodity service and function for which each is responsible. The headquarters furnishes over-all policy. The commands are the middle manager, and the separate installations execute the materiel programs.

Our safety program is based on a balanced effort in each of the elements described in the arch presented earlier by the Army Director of Safety. At each level of

Another approach to safety is the highly trained and well equipped rescue teams stationed proximate to hazardous activities. Their job is to go quickly to any accident scene and minimize injuries by first aid, medical care, and firefighting.

The hazardous noise levels encountered on our firing ranges are safely offset by protective ear plugs and muffs.

The net result of CONARC's aggressive safety in training effort is a steady reduction of accidents in a high risk operation, with significant savings of lives and money. Despite the numerous hazards associated with military operations, our men and our women are safer in training, safer in combat, and safer in recreation.

CONARC's accident problems are not by any means entirely solved, but they are greatly improved on all fronts. CONARC seeks to train each soldier and each employee to do his job properly, because we know that any job done properly is a job done safely.

command, down to individual installations, there is a full-time safety staff. Accident prevention expertise is tailored to the activities of the command or installation, its special mission and the commodity it manages.

AMC is a major employer. To protect its own resources from accidental loss, safety functions must be implemented, matching in depth the complex activities of the command. Except for troop safety activities, our safety functions are comparable to a large industrial conglomerate with geographically dispersed operations in many fields. Typically, each safety officer is concerned with establishing safe procedures, adapting training, programs to local needs, conducting inspection of operations and facilities, performing accident analysis, and evaluating corrective action.

In this presentation, we will concentrate on the product safety aspect and the use of

certain system safety principles as we do it in AMC. This element of the safety program is essential in achieving product safety and, ultimately, bears directly on the effectiveness of the Army.

To assure that the optimum degree of safety (within developmental constraints) is designed into materiel and is maintained throughout its life cycle, an integrated management and engineering approach is necessary. In brief, the goals are (1) to identify, evaluate, and eliminate hazards to personnel and equipment as a basic part of the design effort; (2) to establish control over hazards which cannot be eliminated; (3) to minimize the risk associated with new items and their production; and (4) to reduce the need for retrofit or rebuild to improve safety after the barn door is closed.

Major Army systems or materiel pass through these four phases or stages during their life cycle. Safety is an active function in each. The phases listed here represent a condensation of the formal Army life cycle management plan. As we examine the safety activities conducted during each phase, we will see what the safety functions are and how they are integrated into the development process to provide the Army and other users with the safest and best equipment possible.

During the concept and development phase, the Army envisions the new system or item required to meet a threat or to satisfy an operational need. Once the decision is made as to the type of item required—for example, a missile, small arms weapon, tank, or other system—the formal safety activities begin. The type of item to be developed determines which command safety office will be responsible.

As the operating requirements are defined, appropriate safety characteristics are defined as a companion task. Safety personnel will ask questions such as:

1. What hazards are normally found in this type of item?
2. What new technologies are involved that require safety studies?
3. What hazards may be encountered as a result of the operating requirements the item must face?
4. Is there any special safety design or test that must be co-developed and performed?

The answers to these questions are derived from the accident history of similar systems and hazard analyses of the item and its components. An example of one technique is the fault tree analysis. It is basically a logic diagram which can be used to trace events and determine the probability of occurrence of the pre-selected undesired event. Results from such analysis are used in establishing the safety characteristics for the item.

At this point, safety personnel working with the designers create a system development plan. This plan becomes the master guide for the development of the system. It includes all operational requirements and others, such as safety.

The system development plan becomes a part of the package sent to private industry for bids on development of the materiel. Contractors submit proposals which are then evaluated. A part of this evaluation is an examination of each contractor's proposed system safety activities. If the item to be developed is complex, potentially costly, or involves advanced technologies, the contractors will be required to supply prototype hardware for evaluation.

If this is the case, testing for safety begins at this point. Prototype hardware is tested by the developer and the test and evaluation command, if necessary. Examination of the extent to which the hardware meets safety characteristics is an integral part of this and all future evaluations.

Most often, this evaluation of competing proposals will narrow the field to a single contractor, who then receives a contract to develop the system. The contract contains any special safety requirements that must be met to qualify the end product.

Contractor performance and the development status of the system are reviewed as the next step. Based on these reviews and initial testing, safety and development personnel are now able to complete the design work necessary to determine the final configuration of the hardware. At the same time, appropriate safety criteria are incorporated into draft operation and maintenance manuals. Examples of safety guidance might be radiological, range, nuclear weapons, aviation, or explosives, depending upon the type of materiel under development.

Safety criteria for production, test, and ultimate disposal are also generated during the test and evaluation phase. A variety of tests, each designed to evaluate a specific requirement, are performed during the testing cycle. This cycle consists of the developmental tests already discussed, and the engineering and service tests.

Using developmental data and the requirements of the system development plan, the responsible command prepares a safety statement. This document lists the known hazards in the item and any procedure to safeguard personnel and equipment during subsequent full scale tests.

Based upon safety information provided in the safety statement, the engineering tests are then performed by our engineers. Testing is accomplished in such a manner and with the necessary protection to minimize the exposure of personnel to any hazards previously identified.

The next step is preparation of a safety release. It is issued by test and evaluation command, summarizing the safety data obtained from the engineering tests. The safety release document describes any specific hazard remaining in the system, together with the operating limitations necessary to reduce the hazard to personnel during the service tests, which are performed next.

Military personnel conduct the service test. They operate the equipment for the first time exactly as it is intended to be used, after issue to the troops. It is here that the man-machine interface highlights any design changes not identified earlier in the development. If the item makes it through this test, a safety confirmation document is prepared.

This document specifies the extent to which the system meets the safety requirements, together with associated recommendations. Armed with the safety confirmation and other test results, the need for any final design changes are determined. The system documentation is then used as a basis for headquarters Army level decision to: (1) produce the system; (2) continue development; or (3) terminate the project.

Assuming the decision is made to produce the system, a contract package is written for production. The package will contain safety design criteria for the item itself,

and safety guidance relevant to production. We have found that the use of safety data items (a standard statement of a safety required) greatly assist the developer in writing the contract.

Our product safety activities continue as the contract is let and production begins. In addition to the safety data furnished in the contract, the contractor receives a safety survey of his physical facilities and his safety program. This is the pre-award survey. Safety personnel continue to appraise the contract status. They participate in the test of initial production items to assure that the safety requirements of the contract are met.

Following production, the item is issued to the troops. If our system safety work has been performed well, the Army will realize the benefit during the field use and maintenance phases. At this point, the system will have inherent in it all of the features necessary for safe operation and maintenance by the user troops.

Any required changes to the item are reported rapidly through Army equipment utilization procedures. First priority is given to changes necessary for improved safety.

Pre-planning is essential for safety in the disposal phase. Some items are inherently too hazardous to simply declare them surplus and release them to the general public. It is for this reason that ultimate disposal was considered during development and test phases. Disposal instructions, techniques, and special treatment, if required, are already provided for in the system documentation.

To put this subject of product safety in its rightful perspective, the subject of transportation must be highlighted.

Although transportation responsibilities are not solely vested in AMC, this is a dynamic function with safety problems of new dimensions, involving industry and government. Recognizing this situation and the new technologies required to package, load, ship, store, and issue, transportation is considered in all phases of the materiel life cycle.

Private industry and the Army are daily concerned with the standards for safe transportation of hazardous materiel. Keeping these standards current with technology ad-

vances is a never ending task. The burden rests with your agencies and mine to develop extra protection for transportation of hazardous items never previously envisioned nor required.

Implements of war, by their very nature, are often unique and require special provisions to transport. Yet, in order to put that item where it is needed, the Army must move it from point to point as expeditiously and safely as possible. The systems and product safety concept is utilized in this requirement.

By a review of the materiel life cycle management plan, together with the systems safety functions I have described in each phase, you have seen a thumb nail sketch

of our product safety program. We continue to face many complex safety problems, as there are items still in the supply that were produced before this program was developed. We are convinced, however, that the approach is right for our needs as we strive for excellence in producing materiel safe for the purpose for which it was intended.

The product safety element is a valuable factor in the effectiveness of the Army Safety Program. You may find some of these principles to be helpful in the manufacture-sales relationship, and perhaps they could be applied in industry in meeting its challenge to assure safe products to the consumer.

ARMY ENGINEER

By WILLIAM B. MURPHY
Chief of Safety, Army Corps of Engineers

The Chief of Engineers is both a member of the Army Staff and Commander of the Corps. One of his principal missions is to build facilities of many dimensions for the Federal government and you the public, through the services of civilian contractors. Another function of the Chief of Engineers is staff supervision of all military facility repairs and utilities in support of Army installation operations. In capsule, with the participation of private construction firms, the Army Corps of Engineers is the largest construction organization in the United States. All hazards characteristic of the heavy construction of buildings, bridges, tunnels, dams and locks, launching pads, and underground installations are day to day problems with the Engineers: working at great heights, lightning, heavy material handling and storage, heavy excavation operations, exposure to drowning, fire, etc.

To picture the magnitude of military engineering projects and hazards, consider a launching pad at Cape Kennedy, Florida; a base hospital at Fort Benning Georgia; construction of a 580,000 barrel underground oil storage tank in Sasebo, Japan, which is equivalent to three football fields laid side by side.

Equally imposing are public (or what we call civil works) construction: Bonneville Dam and Locks in the Northwest; Weber Falls Dam and Locks in Oklahoma; McAlpine Dam and Locks under construction in Kentucky; Green Peter Dam in Oregon; bridge construction; Libby Dam in Montana.

Contracts for the construction of military and civil facilities are negotiated by Army District Engineers. Compliance with safety standards, embodied in the Corps General Safety Requirements Manual are made a part of each contract. These requirements identify all anticipated hazards and required safeguards. All work has previously been reviewed by hazard analysis procedures. Failure of a contractor to comply with safety provisions of the contract results in the contractor being called to account and may lead to suspension of the project until safeguards are established.

In conjunction with the function of facilities engineering, the Corps of Engineers is responsible for the fire prevention and protection phase of the Army safety program. The primary objective is to obtain a non-combustible environment and safe egress for occupants of all buildings and facilities.

A continuous program of inspection, analysis, correction of fire hazards, and fire emergency capabilities has been in effect in the Army for many years. The fire prevention and protection phase of the total program is a special subject which applies all of the principles, concepts, policies, and regulations of the total accident prevention effort. The great emphasis given fire prevention has made it possible for the Army to establish a mortality rate of five per million population from 1952 through 1970, compared to the national average of forty per million.

The most recent, and certainly the most exciting and challenging, responsibility of the Corps is nuclear reactor health and safety. Dealing with a relatively new technology, the great challenge lies in the high stakes of any possible miscalculation. The Army has three power reactors and five research reactors. I am sure you are aware that power reactors are sources of heat and electricity. Less well known is that our research reactors are used for determining radiation effects on Army materiel.

Health and safety reviews are made of all new reactor designs and for the construction of the reactors and their operations. These reviews are performed to assure that the highest safety engineering concepts, nationally accepted codes, Atomic Energy Commission regulations, and Army requirements are followed to assure the greatest possible protection to the health and safety of operating personnel and the general public.

Through the Corps of Engineers, the Army is more closely related to public recreational safety than is generally known. For example, the recreational area at Scott

Kerr Reservoir, North Carolina; a camping site at New Hogan Reservoir, California; and Horsethief Lake State Park, Washington.

According to the Federal Flood Control Act of 1944, the Corps constructs and operates public parks and recreation facilities in reservoir areas under control of the Army. Access is provided the public to the waters impounded behind the dams. These projects have become the nation's most popular and heaviest visited recreational areas. Over 254 million visits were made to Corps recreation reservoirs in 1969. The Corps has constructed 350 lakes providing 28,000 miles of shore line. Public use of water resource projects includes areas where you can swim, fish, camp, or take part in other outdoor activities.

The Army is most diligent about the importance of developing and maintaining the public safety in these recreational areas. While enforcement of safe conduct is obviously a responsibility of local authorities, the Army does everything it can to provide a safe environment for boating, swimming, water skiing, and other activities, identifying restricted zones, marking hazardous areas and providing safety instruction and guidance to the public are constantly carried on.

The Army Engineer Corps has one of the oldest command safety programs in the Army. Seeds planted back in 1933 have produced amazing results. Private contractor firms reduced their overall employee frequency rate from 111 per million man-hours worked in 1935 to three per million in fiscal year 1970—a 97 per cent reduction—while the Corps injury rate was reduced from 17.4 in 1935 to 2.97 in fiscal year 1970.

OVERSEAS COMMANDS

By A. B. GARDNER
Deputy Army Director of Safety

One of the greatest safety stories ever written is how the military services, particularly the Army, having captured and energetically employed the concept of conserving human lives and other resources through accident prevention, took this concept to the people of other nations—to France, Italy, Germany and other European countries, to Japan, Korea, Okinawa, and now Vietnam. In Europe we have seen persuasion, promotion, and motivation built upon the barest, minimum safety standards. In Japan we have seen the tabe give way to the safety shoe and the oxcart give way to the motor vehicle. In Korea we have seen the A-frame give way to modern methods of transporting materials. The lives of millions of people of other nations have been touched by the American concept of accident prevention.

We have been confronted with language barriers, local laws and prohibitions, national sensitivities, and semantics. We helped organize and support the Japanese Traffic Safety Council and their Industrial Safety Council; we were active in organizing the Korean Safety Council. The same is true for Okinawa. We trained thousands of foreign nationals to become safety inspectors, safety officers, and safety engineers. At the present we employ, on a full time basis, nearly 150 foreign nationals in our Army safety staffs overseas. They are doing a magnificent job.

In our overseas operations we have personnel exposed to temperatures ranging from 120 degrees on the one hand, to 50 degrees below zero on the other. These temperature extremes present special safety problems and require special equipment.

It would be impractical to attempt to report all of our overseas operations. Therefore, I will confine my remarks to our activities in the Pacific area. Headquarters, United States Army, Pacific, is located at Fort Shafter, Honolulu, Hawaii. We have troops and operations in Hawaii, Japan, Korea, Okinawa, Thailand and Vietnam. Supporting our troops are nearly 200,000

local nationals. These people work in depots of the most primitive types, many situated on and just off the beaches, ports where substandard equipment and methods are more often the rule than the exception, and rebuild shops.

When we first began to employ Japanese firms to perform our equipment rebuild work their injury frequency rates were often above 120 disabling injuries per million hours worked. Today their rates are well below the U. S. national all-industry rate.

We have had many problems overseas—substandard construction, facilities, and conditions. Commanding a mechanized Army over primitive and hazardous terrain and roads with populations unaccustomed to the presence of our heavy equipment, driving on the left side of the road or on single lane roads, hastily constructed bridges, and the presence of undetonated explosives have always been troublesome.

Never satisfied with anything but progress, we will continue to carry on our fight against accidents. The war in Vietnam is the first time the United States Army has taken its safety program into a combat zone, and it is paying off.

Our program characteristics, plus the activities shown in the program arch, described by Mr. Wilkenson, developed to the advanced degree that exists in the Army today, have resulted in progress not believed possible in former years.

In the year 1943 we first began to keep track of data in the civilian personnel category. We have gradually reduced our injury rate 88 per cent and our fatality rate 89 per cent since 1943.

We have reduced our military injury rate 85 per cent and our fatality rate in this category 59 per cent since 1944.

In the "Other Personnel" category, which includes everybody but regular Army military and their dependents and United States civilian employees, we have shown a steady

reduction of 51 per cent for the injury rate and 68 per cent for the fatality rate, since 1948.

In Army motor vehicle operations, the reductions of accident and fatality rates since 1946 were 74 per cent and 83 per cent respectively.

Finally, our aircraft accident rate has been reduced gradually 87 per cent, and our fatality rate in aircraft accidents has been reduced 55 per cent since 1952. As you know, our modern aircraft are much larger in personnel carrying capacity; thus, if a crash occurs, more people are involved.

Industrial Safety Subject Sessions

THE SURGEON GENERAL

By MAJOR JERRY L. GREGG
Office of the Army Surgeon General

The Army Surgeon General is also a member of the Army Staff and Commander of many hospitals and medical facilities.

The mission of the Army Medical Department is best expressed by the motto, "To conserve the fighting strength." To this end, our modern and sophisticated medical facilities, equipment, and techniques are utilized by our skilled medical personnel to return the injured and diseased to productive activity with a minimum of suffering and loss of time.

Our efforts are directed first toward the prevention of trauma and disease through comprehensive safety and preventive medicine programs. Medical input to safety is through preventive medicine, several elements of which interface directly with the safety program. We are directly concerned with the preservation of the health of both military and civilian personnel.

The Industrial Hygiene Program consists of surveillance of all industrial operations on all Army installations to identify health hazards associated with these operations and to institute measures to reduce and control such hazards. Examples include noise, dust, gases, fumes, corrosive liquids, radiation, and many others. Each installation is required to maintain a current listing of all industrial operations and hazardous chemicals in use. In addition, specially trained industrial hygienists from area medical laboratories or the Army Environmental Hygiene Agency perform routine and special surveys at all installations at least once every three years to determine adequacy of control measures. This program is engineer oriented in that the approach to hazard control is

primarily through engineering such as changes in equipment design, provisions for ventilation systems, or installation of barriers or shields.

On the other hand, the Occupational Health Program is oriented more toward the individual. It consists of pre-employment physicals, vision screening, audiometric examinations, and specialized testing, such as routine tests for pesticide workers. Our occupational hearing program is particularly aggressive and includes baseline and routine audio-metric examination and provisions for hearing protection ranging from ear plugs for the troops on firing ranges, ear muffs for boiler plant workers, to sound-attenuating helmets with built-in communications for helicopter pilots. Coupled with this is a concerted effort to minimize noise production in new equipment and to develop systems engineered to protect the worker from noise sources, thus eliminating the need for ear plugs or muffs.

In conjunction with these examinations, the occupational health physician prescribes appropriate protective devices such as noise protection, eye protection, respirators, and others.

The Radiological Health Program is many sided and involves both ionizing and non-ionizing radiation as well as nuclear reactors. The common peacetime sources of ionizing radiation are medical and industrial x-ray, medical and industrial applications of radioisotopes, nuclear reactors, and particle generators and accelerators. The Army control program is based upon and conforms to the guidelines set forth in federal standards.

Radiological hygiene surveys are conducted at least once each three years by paramedical personnel at each Army installation which has any source of ionizing radiation. Medical radioisotope laboratories are surveyed annually.

All workers who are occupationally exposed to ionizing radiation are enrolled in the film badge program by which a continuous cumulative as well as acute exposure record is maintained. If either the cumulative or acute exposure exceeds established limits, the worker is removed from occupational exposure and the case is evaluated by Army medical consultants. The worker may or may not be returned to the same job, depending upon the outcome of the evaluation.

Until recently, the single most important non-ionizing radiation source has been microwave radiation associated with communications and radar equipment. With the advent of lasers and the increasing popularity and availability of microwave cooking ovens, these sources have become increasingly important. Ovens are checked for leakage around doors and other functional areas to insure safe operation.

All sources such as lasers and microwave producing facilities are surveyed at least

once each three years by paramedical personnel. Of course, maintenance and operations personnel perform checks on a routine and much more frequent basis as well. Radar and communication installations are checked to insure that the primary beam does not sweep inhabited areas and that the scatter and leakage emissions do not exceed established levels.

Laser applications are surveyed to insure that personnel have been trained in the safe operation of the equipment, that safety procedures are being followed, and that protective eye wear is worn when required. The eye is the human organ most susceptible to damage from non-ionizing radiation. Therefore, comprehensive and very detailed preliminary and routine eye examinations are performed on personnel occupationally exposed to this type of radiation.

In summary, we consider the safety and the preventive medicine programs to be mutually complementary, and we are proud of the achievements of the combined programs. The benefits derived in the form of reducing pain, suffering, and disability, as well as manpower loss, with their resultant economic impact on the Army and, ultimately, the taxpayer, are rewarding indeed.

Industrial Noise

NOISE CONTROL THROUGH REGULATIONS

By F. A. VAN ATTA

Asst. Dir., Research & Technical Office, Bureau of Labor Standards,
U. S. Dept. of Labor

We are really concerned with people—people who do not hear as well as they once did because of the places they work. The fundamental mission of the Department of Labor is to promote the welfare of working people. We try to keep that in mind and if you read the regulations with care you will find that they are really written around the idea of protecting people.

We have been in the business for longer than you might think. The Walsh-Healey Act came into effect in 1936. It stated "... (e) That no part of such contract will be performed nor will any of the materials, supplies, articles, or equipment to be manufactured or furnished under said contract be manufactured or fabricated in any plants, factories, buildings, or surroundings or under working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees engaged in the performance of said contract. Compliance with the safety, sanitary, and factory inspection laws of the State in which the work or part thereof is to be performed shall be prima facie evidence of compliance with this subsection." Prima facie does not mean certainty—it means just what it says, "at first glance."

In 1960 the Department decided to take a second look at the prima facie bit. The result was the Walsh-Healey Regulations of December 1960. Those regulations said, in essence, that the Secretary of Labor had taken a second look and had decided that the minimum level of environment which would be considered administratively to be in compliance with the Act would be those stated in the regulations. The important thing to remember about those and our present regulations is that failure to comply with them is not, necessarily, a violation of the Act. The violation is to provide an environment which is, in fact, unsafe, unhealthful, or unwholesome for the employees working on the contract. The Department must prove this as a matter of fact in every instance when some-

one is brought to a hearing under the Walsh-Healey Regulations. What it really amounts to is that if your conditions are in compliance with the regulations we will not cite you, but if you think that you can convince a hearing examiner or a judge that your conditions are perfectly satisfactory you are not obligated to follow the regulations. Your contract says only that you will provide a safe and healthful environment for your employees.

Those 1960 Regulations said, about noise, that it must be reasonably controlled as a means to reduce fatigue and the probability of accidents. When the Bureau of Labor Standards got the responsibility for the safety and health part of the Walsh-Healey Act in 1964, we immediately started on a revision of the regulations which, we felt, left much to be desired in many areas. We wanted to follow the guidance of the safety community so far as possible by using the voluntary consensus standards as the basis of our regulations, and we did use them. When we got to noise, however, we found no voluntary standards and no proprietary standards. We did find some company standards in a few of the largest companies, the Air Force Regulation 160-2 of 1956 and 160-3A of 1960, and a number of private proposals.

We had no doubt about the real loss of hearing among people in certain crafts. It had been known as folklore for generations. I was raised in a working man's family in a small town, and by the time I was 10 I knew that the men who worked in the planing mill and the blacksmith shop—now it would be called a forge-shop—were deaf. It had been known as an institutional thing in this country at least since the publication of the report of the Z-24-X-2 committee of the ASA in 1954. That report showed, although it was not stated in the written conclusions, that all of the groups studied who were exposed to much over 80 db in any of the audible octave bands showed some loss of

hearing. The Z-24-X-2 committee did not write a standard because they felt that they lacked information about the amount of information which should be considered to constitute an impairment and about the amount of hearing loss which should be attributed to aging. They also were searching for a magic number which would make it possible to express the hazard potential of a noise in terms of a single, easily determined quantity.

By the time we were starting to write our regulation some of these problems had been pretty well solved for us. The medical profession had defined disability as a function of hearing loss. The real definition is that it is a hearing loss which begins to interfere with the understanding of speech in sentence form. Notice that that does not imply the ability to recognize every syllable or even every word. It means that it is the beginning of difficulty in getting the sense of a sentence as a whole. The working definition is that it is a hearing loss in excess of an average of 25 db (ISO-1961) in the three octave bands centered on 500, 1,000, and 2,000 Hz, which are most important to the understanding of speech.

We also had some pretty good estimates of the amount of hearing loss to be attributed to aging in a population. Since the hearing loss due to noise exposure adds to that due to aging, that is a most important point. It turns out that to age 65 and to 2,000 Hz there is no effect of aging under our definition.

There also was, by the time we were ready to work on our regulation, a considerable body of data which indicated that our magic number should be the "A weighted" sound level. It is, perhaps, not too surprising that the "A" weighting which was devised to give an indication of the relative loudness of sounds should also give an indication of their relative ability to damage the hearing mechanism.

Having accepted these definitions, it remained to decide what part of the population we wanted to protect. Because of the normal variability among people, it is never possible to set a standard for exposure to materials or to energy which will protect the whole of any population which is exposed. Generally, threshold limits are designed with the intention of protecting 90 per cent or

more of an exposed population. We had, by late 1967, two estimates. The first was that of the Intersociety Committee on Noise Exposure Control, representing the four scientific organizations most closely concerned with the problem. These curves are a summary of the result of all of the major investigations to late 1966. They show that at 85 dbA about three per cent of a population exposed throughout a working lifetime will have some impairment as a result of the noise exposure. This is probably not significant in view of the scatter of the data points.

The second set of data are adopted from some work which William Baughn of General Motors presented at the International Congress in Mexico City in 1967. They represent, I think, the most carefully studied large group of employees in the world. They show a significant impairment in about eight per cent of the population exposed at 85 dbA and about 17 or 18 per cent of those exposed for a working lifetime at 90 dbA.

On the basis of these figures, we proposed, in September 1968, a basic limit of 85 dbA for habitual exposure to steady state, broad band noise, with some adjustments for less than full shift exposure and provision for the use of personal protective devices in situations where the noise could not be well controlled by engineering or administrative means. After a rather extensive public hearing, we finally came out with the present regulation on May 20, 1969.

They provide for a basic level of 90 dbA for continuous exposure with a trade off of five db for each halving of the exposure time. This includes a 3 db allowance for interruptions. Impact noises must be limited to 140 db peak pound pressure level. It is important to note that this is a double requirement. In a punch-press department, for instance, it is necessary both that the instantaneous peaks of the impact noises from the large presses be below 140 db and that the continuous background noise be below 90 dbA. In a forge shop you will probably find a background noise, mostly furnace noise, well in excess of 100 dbA. There will also be impact noises from the hammers. The furnace noise can be controlled, and must be. The impact noise cannot be controlled but may well turn out to not be the problem.

When the noise cannot be controlled by administrative means or engineering means,

it is required that a hearing protection program be administered. In the broad sense a hearing protection program consists of all of the things which can be done to bring the noise exposure to an innocuous level, but for this purpose we think of it as comprising the following steps:

1. Initial audiograms for personnel whom the noise survey have shown to be excessively exposed.
2. Installation of a personal protective equipment program with enough persuasion and coercion to make it effective.
3. Repeat audiograms at appropriate intervals to assess the effectiveness of the personal protective equipment program and administrative controls.

Such a program is not a part of the regulation and we probably could not require it. We do think that the regulation requires the employer who has noise levels in excess of those listed in the table to protect the hearing of his employees and be in a position to prove that he is protecting it. If anyone can figure out another way to prove that he is in fact protecting the hearing of his employees we will accept it with enthusiasm.

We do have some evidence that such programs will work very effectively even on a completely voluntary basis if they are properly administered. This illustrates some results which have been reported by Tom Summar on a completely voluntary program covering about a thousand men, of whom about seventy per cent participated. The non-participants in this case provided a built-in control group.

We have not made a really big thing of the enforcement of this regulation. We make noise surveys in the places which we inspect for compliance with the regulations under the contracts programs at the times when they come up for inspections in the regular course of our business. The one special effort which we have made is to train our inspection personnel rather carefully in the techniques of this sort of inspection. About seventy-five of them have now received a one week course in the techniques through the help of the Bureau of Occupational Safety and Health of HEW.

We still do not have any really solid statistical evidence as to what is being accomplished by this regulation. We do have some qualitative impressions. We know that there has been a notable increase in the demand for the services of both audiologists and acoustical engineers over the past several months. There has also been a notable increase in the number of manufacturers of equipment who call us about means for reducing the noise levels of their machinery. We have noted that the National Machine Tool Builder's Association has just produced its first standard procedure for determining the noise levels of machine tools and that the Society of Automotive Engineers has recently completed "A Study of Noise Induced Hearing Damage Risk for Operators of Farm and Construction Equipment." This is also a first for that industry.

One rather surprising thing about these regulations is the wide coverage they are coming to have. You may be familiar with the survey of 2,000 industrial plants which was recently conducted by *Occupational Hazards* magazine. It showed that 73 per cent of the plants responding now have some form of noise control or hearing protection program or both. That is not too impressive, because 77 per cent of those plants hold contracts under either the Walsh-Healey or the McNamara-O'Hara Acts and they are the people for whom the regulations were written. It is more impressive that the various states are now beginning to adopt very similar or identical regulations which are of general application to all industry within the state. New Jersey and Michigan have recently adopted such regulations. California, New York, Rhode Island, Oregon, and Washington are states where we have heard that the adoption of a similar type of regulation is actively being considered. Whether this movement among the states becomes wide spread is probably only of temporary importance, since the Congressional prognosticators still tell us that the passage of a Federal safety and health bill is only a matter of time. That bill is certainly going to be of general application and there is a very high probability that it will be followed by a similar regulation.

MEASUREMENT AND CONTROL OF NOISE

By WILLIAM M. IHDE
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Before you start it will be necessary for you to know where you are going. I have been called in on many jobs because the client had started on the job by making some assumptions which are not technically correct and, also, costly. There are no miracles in noise control. There are no special devices that "suck up" sound and cure problems. Application of basic principles, however, can make many improvements and sometimes improve the situation until it is within reasonable limits.

Control Begins With Measurement

No problem in acoustics is solved unless we know the extent of our problem and what kind of a problem it is. Let us look first at what we are measuring.

Sound is generated by a vibrating surface causing air to be compressed and expanded periodically. These variations in pressure move at a velocity of about 1,100 feet per second away from the source. The rate at which these pressure variations repeat is the frequency of sound, and wave length is the distance between successive compressions or expansions. So much for the medium.

I have just described a very simple type of sound called the "pure tone." What we generally meet in real life is much more complex and not so easily defined. It obeys all the laws that the pure tone obeys but is made up of far more frequencies, and they appear in a random fashion. Sometimes they have a periodic character, and many times they do not. At times they have pitch, which means they are either low in sound or very high in sound. Contrary to what many people think, pitch is not merely frequency, but more than frequency. It is that attribute of the human hearing sensation that permits man to order sounds on a scale from low to high. It has the unit measure of "Mel."

The instrument used for measuring sound is the sound level meter. It reads numbers that are called dB's. Some people think these are units in themselves; they are not. A decibel is a ratio and does not have units until the reference is specified. Not only that,

it is also the logarithm of a ratio, which means adding dB's is done in a very special way. Because it is a logarithm, adding dB's algebraically is the same as multiplying together the two numbers the logarithms represent. For the purpose of our discussion it is only necessary to know that dB's do not add together in the usual way.

Why do we use dB's? The reason is that the powers we are dealing with cover a tremendous range. Any linear range covering a range of 10,000,000:1 would be impractical to use, so the engineers and physicists have compressed this scale into one which is linear over the range we use. There is some reasonably basic mathematics involved in its application, but for our use we should merely remember that a dB represents a ratio and is a constant percentage whatever size it is. What is important is its change, such as 80 to 83 dB, or 100 to 103 dB. These two number changes represent the same percentage change even though they are different in size. What should be remembered is that a three dB increase is the same percentage, whether at 10 dB or 100 dB.

Why Measure?

It is easy to justify measuring. This is to remove the opinion which may at times be suspect. Suppose we have a party celebrating "The Riot of the Dirty Old Men," which I understand will be on November 25th. November 26th may be pretty rough for some of us, and we might expect some problems in deciding what is noisy and what is not. In fact, everything might be noisy. For this reason we need an unbiased opinion which could well be that of the sound measuring instruments.

When to Measure

Any time you need to put numbers on quantities it is best to use a quantitative device which will give the numbers needed. The Walsh-Healy specifications call for 90 dBA for an eight hour exposure period. It is necessary to know if you meet or exceed this limit and by how much. You can not estimate this level since a human ear is not

capable of establishing a precise level every time it is asked.

What to Measure and How

Many quantities are needed in a noise problem. If the job is to enforce or monitor the Walsh-Healy specifications, then one needs to measure only the A weighted sound levels.

If one is required to do something about the noise then one should measure the spectrum of noise with an octave band analyzer. This instrument is used to separate the total spectrum into octaves of noise. By knowing what this distribution is we are able to select the best approach to solving the noise problem.

These instruments all should be calibrated. A very handy device is a simple calibrator which provides a tone that not only permits you to adjust the gain of your instrument but also checks the condition of your microphone. This instrument should be used each time the sound level meter or the octave band analyzer is used.

In the Walsh-Healy specifications a time exposure is spelled out which says in effect that, if the level is 90 dBA, then an exposure time of eight hours is tolerable. If, however, the level is 95 dBA, then only four hours is tolerable, and every time an increase of five dBA occurs the exposure time must be halved. This is true until 115 dBA is reached, after which any exposure is too much.

Many times the process has less than two hours' during the whole day, with much more time being spent in a lower level. There are many ways to accumulate this information, such as sending a man out to record a reading every five minutes or so. Guessing is another way, which is not very good but seems to be done a lot. My preference is recording with a sampling device such as the Model 100 A. This instrument shows the levels by placing dots on a pressure sensitive paper. Where these dots are most dense is the actual level, and other dots can be noted and weighted as to their relative importance. This is a definite advantage over a continuous pen recorder when running at such a slow speed.

By using such a recording it is possible to determine the equivalent nine hour exposure when levels are higher than 90 dBA but are intermittent. This may be an important piece of information for noise control purposes.

When measuring sound with a sound level meter or an octave band analyzer, do not point your sound level meter at the noise source and stand behind the meter. This can give some errors that are substantial. Stand to the side, so less noise is reflected off the body. This improves the reading's accuracy, particularly if there are middle frequencies present. The ideal way is to put the microphone on the end of a cable and stand away from it.

Data and Its Use

It is important to take data so you have records of your noise control program. When you are defending yourself against a hearing loss claim, your only defense is your records. Data on the employee's hearing as well as the areas of exposure are necessary.

It is well to develop a data form for use by all your investigators. Several forms are available. The principle to be kept in mind when making up your own form is to gather enough information so that anyone can pick up your data and repeat your measurements.

Control Principles

In control, there are usually three areas of concern: the noise source; the path; and the receiver.

The noise source is the most important area of concern and provides the greatest rewards in control. If you cut the noise source generation in half, the noise level is cut in half. So all noise control programs should begin with a consideration of the noise generator and what to do with it.

One method when buying new equipment is to specify that it meet a quiet specification. If you can avoid buying a noisy machine your noise control problems are lessened.

If you have a noisy machine, vibration isolation helps to eliminate low frequency radiation and will isolate against structure-borne noises.

Barriers will interfere with the noise path to improve noise level at the receiver's position. If complete barriers are not practical, partial barriers can help, particularly at high frequencies.

The complete barrier or enclosure is the most effective way of controlling noise. Its main problem is that it generally interferes with production unless very carefully de-

signed. Help should be sought if you do not have the necessary experience to do the job.

Sometimes it is easier to enclose personnel than it is to quiet the noise source. This solution is quite practical, particularly if the process is fairly automatic, and should be considered when other solutions seem too difficult.

Ear defenders are a last ditch procedure. The program is difficult to sell to employees, difficult to administer, and usually is ineffective if the ear plugs are not worn properly.

The most effective ear defenders are the ear muffs; sometimes these are worn with

"Swedish Wool" also. The combination is very effective in high noise levels that can not be silenced easily. Even this can be bad if an improper seal is made with the ear muffs.

Even after all this, you should still maintain a good audiometric program. This is the monitor which tells you the rest of your control program is working. If you are still showing loss in hearing, then your people showing the loss should be moved to less noisy areas.

Remember, Walsh-Healy is a hearing conservation program.

Fleet Safety

THE IMPORTANCE OF FLEET ACCIDENT COST CONTROL

By CAMPBELL G. DEWEY

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In the motor transportation business, fleet accident costs can be critical. They can be a matter of life or death for the company and have been, on many occasions, so their importance is usually fairly well recognized in a company in the transportation business. However, for the company with what we call an incidental fleet, the situation may not be as dramatic and often is not recognized.

But what is an "incidental fleet?" It can be a fleet of service trucks calling on customers making repairs. It can be delivery vehicles such as for dry cleaning, a dairy, a department store. It can be trucks used by a manufacturing company to shuttle parts from one plant to another. (I recall one of these I serviced a number of years ago. It was strictly a workmen's compensation account as far as I was concerned, but when I inquired about this transfer of parts from one plant to another, I found they were operating about 50 trucks. Many companies which are in the business of transportation as such do not have that many.) Or this incidental fleet can be a fleet of salesmen's cars to bring in the new orders on which the business depends.

In each of these cases, the operation of these vehicles is essential to the business. The service must be provided either by the company's own vehicles or by some equivalent such as the common carrier. In the "old days," you could have your deliveries made with a horse and wagon and often equipped your salesman with a carriage. There was less of a problem then, because horses are fairly reliable animals and almost never have three martinis for lunch.

The cost of these operations is a part of your cost of doing business. How much impact this cost has on your profit and loss statement depends on many factors. To say that this cost would put you out of business might be an exaggeration in most cases, but it certainly can be an important factor.

Usually the firm that goes out of business has other very basic problems besides accident costs. Indeed, I think we can safely say that fleet accident costs or any other accident costs are a reflection of the quality of management of a firm. It is the old story of whether you are going to manage the problems or the problems are going to manage you.

If you want to find out just where you stand in controlling your accident costs, there are a number of ways to find out. One method is to add these costs up on a piece of paper or even make a chart for the next Board of Directors' meeting. You can start with insurance premiums for the fleet, the bodily injury and property damage coverages, collision coverage if you have it, and don't forget cargo coverages. To this you must also add: collision damage below the deductible; rental of substitute vehicles; compensation for the injured driver; hiring of substitute drivers; overtime for special delivery; lost sales, possible loss of account; excess maintenance; and public relations damage (your trucks are an ad for your company).

You can add these things up and compare the total with your profit for last year, or you can express it as a cost per pound or per case or per gallon or whatever unit is appropriate to your company's product. It's often most interesting to express it as a percentage of profit.

There are various ways to find out whether you are better or worse than other firms in businesses similar to yours. The National Safety Council publishes a booklet every year called *Accident Rates*. You can look in this book and find out what the accident frequencies are for firms in your business or in other businesses. You will note that there is considerable variation between the various types of enterprise. When you look in the detailed breakdown for each

division, you will find that the difference in frequency between the best and worst may be a factor of 10 or even 100. You can check your frequency against these and you can tell whether you are among the best or the worst or some where in the middle. You should remember that these NSC figures include all moving accidents, all those where the vehicle was not legally parked. Therefore, they may be including some that you have left out because the damage was very small.

There is another way to check your performance against other similar concerns. This is one which your accountant and your boss will probably understand better. That is to look into your insurance rate. Insurance rates are fixed by the territory in which you operate, the type of operation which you are running, the number of vehicles and, last but not least, your own accident experience.

Your territory and your operations produce the average rate, but you produce the final rate. Insurance companies know what the average losses are per dollar of premium in the various classifications. They take your losses and compare them with this average. Special formulas are involved to take care of credibility factors, but in the last analysis, if your losses are higher than the average, you pay more. If they are lower, you pay less. Depending on your size, and credibility, you can go to 50 per cent credit or 50 per cent debit. What this means is that you can buy a dollar's worth of insurance for 50 cents or you may have to pay \$1.50 for it. This information is probably not shown in detail on your bill for

insurance premiums but your agent or broker can get it for you.

Of course, if you are a big enough concern, you can qualify for what's known as retrospective rating, which amounts to a cost-plus formula, in which the company takes your losses, adds a percentage to cover the expenses of processing them, and sends you the bill. In this manner, you can buy a dollar's worth of insurance for as little as 20 cents or you may have to pay two dollars, depending on what your fleet accident costs are.

Incidentally, this process can be applied to a single line such as fleet, or it can be combined with other coverages such as workmen's compensation, general liability, etc., to achieve what is known as a composite rate, often expressed in terms of premium per dollar of sales. If your firm is large enough and you can control your losses, I'd suggest you look into it.

If your firm is not large enough to qualify for this kind of treatment, you can still save money by shopping around a little bit. It is no secret that rates vary from one company to another. If you are a good risk, you can make deals. But, of course, if you are not a good risk, you have to insure with anyone who is willing to take you.

Clues to trouble are when you have difficulty getting coverage, when your agent puts you in a different company every year or two, or sudden sharp rises in premium.

To sum up, fleet accident costs are important. They can be critical. They can be a matter of life or death for the company. But what the importance of fleet accident costs and their control is to your particular firm is a question that only you can answer.

SETTING STANDARDS OF DRIVING PERFORMANCE

By GEORGE E. BLEUEL

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Situated in the community where I live are a number of branches of prominent national manufacturers. They employ some pretty sharp, forceful safety engineers to look after approximately 8,000 employees. We work closely with each other, so I'm as much at home with industrial safety problems as I am with those incident to transportation. My colleagues have come to realize that half of their economic losses from accidents, including much absenteeism and so forth, are the result of a single cause—motor vehicle accidents. These involved company driving personnel in company equipment and employees in their personal cars. As an immediate step, we are jointly working on what we intend will be a saturation with the N.S.C. Defensive Driving Course.

In Session 1 of the course it is brought out clearly that anyone who drives anything is in the transportation business. A mother driving her child to school is in the transportation business. So what does all this have to do with the Motor Transportation Conference? Simply this; of the total national outlay of \$22,700,000,000 for all types of accidents (home, industrial, etc.), \$11,300,000,000 or almost exactly half goes for one type loss—motor vehicle accidents.

I submit that a far larger percentage of the total motor vehicles operated, more than we ordinarily think of or realize, are operated under some form of management or corporate control. Whether a small business or large enterprise controls one, ten, or ten thousand motor vehicles, it is an absolute necessity for the firm to recognize that it is in the transportation business and have an effective safe driver/vehicle program.

Carried to its logical, potential conclusion the overall effect could indeed be dramatic. Failure to recognize this is at least like Joe Louis' famous statement, "I always wished I could do something with my hands—never could." Can't we do more with our safety knowledge in the art of driver accident avoidance?

In the infancy of the transportation industry and before so much diversification of holdings came to be, a man and his truck

had only one source of income. He had to go from A to B with a commodity and end up with a little more money than it cost him to do it. He quickly found out that a single accident could put him out of business. It was easy for him to recognize a loss, but it took a long time to evolve our present day formula for accident avoidance.

In the interim we went through three phases:

1. The bad luck era, during which it occurred to few people that adequate foresight could prevent a collision at an intersection. As Harry Emerson Fosdick said, "Bad luck is a poor alibi."

2. The legal blame era came next, wherein the big question was, "Who was at fault; who violated a traffic law? Who will pay?" And all during this period the toll climbed. It hadn't occurred to even a handful of people that all of the attendant problems, agony, and economic loss could be avoided if the accident wasn't allowed to occur in the first place.

3. Enter Phase Three. The concept of preventability and defensive driving make the scene. Born of economic necessity in the transportation industry, Phase Three quickly began reducing the accident rate, which in the trucking industry is currently something like 80 per cent lower than in the early days. In the past 10 years alone in my own company, we have achieved a reduction of 60-70 per cent.

Phase Three is the standard of driving performance we're talking about. It begins with the rule of preventability: "A preventable accident is one in which the driver failed to do everything reasonably possible to prevent or avoid it." The companion rule of Defensive Driving means "A fit driver driving a sound vehicle making no driver errors and avoiding the consequences of the errors made by other drivers." It's no more complicated than that. Unfortunately still far too many motorists, drivers, are still operating back in Phase Two. They haven't been taught or exposed to Phase Three. So there is our job, our challenge. As members of industries, governments, we are in a

powerful position to control, train, and provide incentive for vast numbers of drivers.

Let's look at an accident example and the effect of pre-established standards which could have prevented it. A slippery pavement is a hazard, but it comes into operation and is an accident causing factor only when the driver goes too fast, or hits his brakes, or turns too suddenly. Then a skid can occur, and the driver loses control of the vehicle. What he hits, if anything, and the severity are mere chance at this point. However, if the driver adjusts his speed and behavior to conditions of road, weather, and traffic, he "defends" against adverse factors and doesn't have the accident.

Alertness in a driver or driver candidate is a requisite and amounts to an attitude of continuous watchfulness for what is going on ahead, alongside, and to the rear. The alert driver sees everything, mentally disposing of those things which are not hazards and, with a blinding speed a thousand times faster than our best computers, evaluates, catalogues and then acts on those factors which might or will have an effect on his safety. The trait can be learned and developed.

Foresight and alertness add up to the ability to anticipate potential or real problem situations far enough in advance to avoid involvement entirely or the worsening of a condition. A safety check of the vehicle prior

to departure is long range foresight. Adjusting speed or lane position a mile from a construction zone is short range or immediate foresight. Staying out of the way of a drunk is, too.

Standards of knowledge, judgment, and skill, round out the requirements for a high performance driver. In summation, all accidents are preventable or not preventable. Most accidents are preventable.

The standard of professional driving is to drive without a preventable accident. The adoption of this standard as a company standard of safe driving performance is the first step in organizing a program for vehicle accident avoidance. It should appear in every job description for driving personnel, whether they are classified as driver, salesman, salesmanager, or president. It's only a dream until put into practical application and use.

See what your motor vehicle losses and involvement are, if you haven't already done so. Go to your management with a sound set of driver standards for *all* your drivers and your recommendations. Get involved in score keeping and recognition of a driving performance well done. Thomas A. Edison in a conversation once said: "Results! Why, man, I have gotten a lot of results. I know several thousand things that won't work." Setting driving standards does work and does get results.

DRIVER TRAINING AND SUPERVISION

By ROBERT J. FORMAN

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I have approached the subject of Driver Training and Supervision with the impression that industrial safety engineers are looking for facts and ideas concerning their fleet problems that we, directly involved in motor transportation, could provide broad information about. It is not my purpose to become deeply involved in what we are doing in Greyhound, because we have a large fleet; we are the largest motor carrier of passengers in the world. This enables us to do many things in safety training and supervision that others can not support with staff

and budget available. To illustrate, Greyhound has 10,000 drivers who drive 5,300 vehicles 1.3 million miles every 24 hours. That is about 2½ round trips to the moon. As a result, Greyhound's management learned early that if we were going to control our accidents, safety must have the full support of all management, beginning with the president down to the first line supervisor, and adequate budget for programming. In a very real sense, safety is like a wheelbarrow—it goes no place unless it is

pushed, and it needs pushing from the top. *Who Is a Professional Driver?*

Thinking in terms of your fleet: you are a manufacturing company, you make a product as opposed to providing a service, and you have a fleet of cars and trucks that are having accidents. Unlike the accident problem inside the plant, where you are holding your own or improving, your fleet accidents are not under control. This is your real objective, controlling your accident problem. How the other fleets in the motor transportation industry are doing accident-wise may reflect on you as an industry, but has no other value. Your objective is maintaining or improving your company's accident experience.

Perhaps one of your fleet problems is that your drivers don't really think of themselves as professional drivers. If a man must drive a motor vehicle to do his job, regardless of what that job is, he is a professional driver. Whether he is a salesman, a pipefitter for a utility company, a repairman, or delivers a product, he is a professional driver. Your driver must be made aware of this important fact that he is a professional driver and that it is his responsibility to drive accident free.

This may sound rather obvious, but many companies who have a fleet never tell their drivers how they want their vehicles driven. I do not mean that you tell them to drive safely or carefully. I don't know what "drive safely" means to everyone. For example, if you were to ask the first 10 people you meet what does driving safely mean, you would get 10 very different answers. You should tell your drivers that they are considered professionals and, as a "pro," how they are to drive your vehicle in precise terms.

At Greyhound, we tell our drivers that we want them "to drive our vehicles in such a manner as to identify accident producing situations soon enough to take reasonable action to avoid a collision." This is our standard of safe driving performance, and this instruction can be effectively related to any traffic situation on our highways.

Setting employment standards for your employees should include standards for him as a driver, as well as other job standards such as a repairman, salesman, or whatever

his other job is going to be. As a driver, a salesman must have an acceptable motor vehicle record. How this man drove during the last five years is an excellent indication of how he is going to drive in the next five years, unless you do something about it, and this brings us to training.

Types of Driver Training

Basically, there are three training concepts that apply to all job classifications in industry. First, there is structured new driver training. The use of the word "structured" is for a specific purpose. Structured training is based on the concept of programmed learning, or programmed instruction, which is utilizing in training the knowledge that has been developed on how people learn. I recommend that you build your training needs around this concept for maximum results.

With a new employee, you very often have a unique opportunity. He generally is more willing to modify his driving habits at this time than later when he is on the payroll. After all, he wants to satisfactorily complete his training to get the job, so he'll try to drive in the manner that you want him to drive. Use this opportunity to develop new driving habits.

The second category of training is in-service training, and again I refer to specific structured training. In-service training should deal with those problems that are most frequently occurring in your fleet. This information can be developed from your accident analysis. Your in-service training programs should provide effective countermeasures to your primary problems.

The third and final type of training is specialized refresher training. You have a driver with a problem, and you either solve his problem or you lose him because of accidents and/or other work problems. These drivers that are building a record are accidents going someplace to happen, and they will happen. Whether they are an employee in a factory or a driver behind the wheel, we must resolve their problems and salvage them or their problems become more severe and you must fire them. Specialized refresher training, then, is dealing with a man's particular problem based on his performance up to that point and planning the refresher training to resolve the problem.

Basic Training Elements

There are three basic elements that must be considered in developing your new driver training. First, develop your standard for driving skill evaluation, for these are the motor skills of driving the vehicle. You must define your standards: following in traffic, turns, use of signals, proper parking, etc.

Second is the development of sound judgment by the driver to use his driving skills wisely. It has been said that a chimpanzee can be taught basic skills of driving, but he does not have judgment and, therefore, he cannot successfully drive, although you may often wonder about some of the drivers on the road today.

The third and final element is attitude. The man who is motivated to do his job properly and has the necessary skills and judgment will be an accident-free driver. Therefore, every effort should be made to hire mature employees and work to motivate them during your initial training program.

In developing your in-service training program, budget is normally your number one problem in relation to the number of drivers to be trained. First, you should look at the existing training programs that can be molded to fit your needs. For example, the National Safety Council's Defensive Driving Course is an excellent beginner. Or, if you want to train a trainer, the Smith System of Driving is good.

You can also develop your own program utilizing outside services and materials from various sources. The National Safety Council, The American Trucking Association, the Private Truck Council, and your insurance company are just a few of the many sources available to you. The National Safety Council's Motor Transportation Department has many services, films, booklets, etc., that are available to you. Using these materials, you can structure your own program.

If your fleet is large enough and you have the budget, you can create your own program completely suited to your own needs. For example, all driver training programs used by Greyhound are created by Greyhound for Greyhound and specifically fit our needs. Keep in mind, however, that we can spend \$50,000 on a program and our

training program development cost is only \$5 per driver. When defining your training objectives and how you want to accomplish them, the cost benefit ratio must be considered.

Refresher training, as noted above, is trying to work out specific problems with a driver who has a poor accident record, a poor performance record; the fellow who will not or can not do the job the way you have instructed him. These employees must be dealt with on an individual basis. You sit down with the man, define his problem, and use your training resources to modify his behavior into an acceptable pattern.

To summarize training, first determine your training needs, budget for it, and build effective programs. Also, be prepared to expand your own knowledge by outside reading on the subject of driver training. In the fleet area, as well as the industrial area, there is an increasing abundance of literature available on all problems of fleet accident prevention.

Basic Driver Supervision

It is very difficult to supervise drivers in a fleet operation, and the number of methods is therefore limited. Unlike the supervisor in the factory who has the employee under his immediate supervision at all times, when your driver goes out the front gate, that is often the last time you may see him until quitting time. You can't afford to send a supervisor along with him, and this lack of immediate supervision is what makes your fleet supervisory problem with drivers an entirely different situation.

The motor transportation industry has developed the following basic approaches to solve this problem. The one most frequently used technique is road patrol. Most motor carriers have specified routes which their vehicles travel, which makes this method workable. Greyhound has 17 safety superintendents throughout the United States and Canada who have road patrol as one of their primary duties, and road patrol is our primary supervisory method.

If it is not possible for you to conduct your own road patrol, there are often road patrol services available to you from your insurance company, and a number of commercial independent companies are available that provide this service on fee per road check basis. Many will give you photos

showing your vehicles with a speed record, location, following distance, etc.

Another supervisory method used widely in the trucking industry, and to a lesser amount in the bus industry, is the speed-time recorder, or tachograph. These devices are installed on your vehicle and record, on a paper disc, the speed, engine idling time (coffee stops), and running time of a vehicle on a 24 hour basis.

Other companies use a call-in system. The driver will check in every two hours, tell where he is, and report his progress on his day's activities.

The method you use to supervise your drivers depends on the objective you want

to achieve with your driver supervision. If your type of operation has drivers running throughout the countryside, then it is impossible to use road patrol. The speed-time recorder devices can be helpful, depending on your problems and needs.

In a transportation fleet, the primary objective of driver supervision is to identify poor driving or driving habits that are accidents going someplace to happen and, secondly, to monitor the driver's productivity. If your primary objective in supervising your drivers is to maintain productivity, then you should approach this task accordingly and your problem will require different kinds of solutions.

ACCIDENT RECORD ANALYSIS AND FACT FINDING

By JOHN A. DE PEW

Fleet Safety Consultant, Rock Island, Ill.

Some years ago, I was requested to audit a firm for the National Safety Council Fleet Safety Contest. It included both trucks and company vehicles. The records of the trucks and their appearance passed without fault. The cars were something else. On inspection, two cars revealed obvious involvement in accidents. Requesting the reports as to how the damage occurred, I received only a blank stare and palms up gesture from the safety director. He quietly explained that vice presidents were driving when the damage occurred. He added, "We don't ask such officials for vehicular accident reports." Obviously, the audit somewhat reduced the company's standing in the contest.

Why is this story related? To bring out the necessity for full and complete reporting. If one exception is made, the corner-stone of your entire safety program begins to crumble. Following are five steps taken from National Safety Council publication, *Better Driving IS Better Business*. I recommend they be added to your program if not already in practice.

1. Adopt a definition of an accident.
2. Require drivers to report every accident.
3. Discuss each accident with the driver involved and decide whether it is preventable or non-preventable.

4. Keep a systematic record of safety performance on each driver.
5. Post the results so that all drivers may see.

Let's quickly summarize these five points.

1. Definition of an accident, taken from bulletin just mentioned—"Any contact between employed driver's vehicle and another vehicle, person, or fixed object which results in death, personal injury, or property damage. Such contact must be reported as an accident regardless of who was hurt, what property was damaged or to what extent, where it occurred, or who was responsible."

2. Requirement to report every accident.

3. Discuss the accident. This is easier said than done. First the discussion leader must fully understand preventability. He must be able to see over and beyond the driver's story. The more time elapsed between the incident and the interview, the more the driver is convinced he is without fault. Especially so if the other party involved was arrested and he escaped this added trouble.

4. Keep a systematic record of safety performance on each driver. How can you do your job properly without adequate records? A simple card record (by individuals) relat-

ing date, type, preventability, and cost will be a valuable tool when interviewing a driver on his latest accident. You can tell if he needs retraining or is developing some bad driving practices. The same type record is necessary for all accidents within the fleet.

5. Post the results so that all drivers may see. A bulletin board posting as suggested, naming the driver and classification as to preventability along with the date, is most necessary for a complete program. Sometimes after the posting static is generated between drivers because they feel the classification is unfair by their information and standards. This becomes a good index as to how well the program is being received. It also indicates you must review your classification procedures from time to time.

Constant studies and reviews must be made of reports to know the facts of what is taking place in your fleet. One must ferret out the who—what—where—when—why—how of each and every accident. To a great degree your analysis will be predicated on the completeness of vehicular and driver interview reports. If you are going to do a good job of prevention you need good tools with which to work. Complete reports and summaries are good tools.

While I was employed as a safety director a report of an obviously preventable accident crossed my desk. It was the first one from that city driver in more than eight years of accident free employment. The interview report attached was far from adequate. Two weeks later another similar type accident report was received from the same man. In a short while, a third. In a personal interview with the subject I soon learned his trouble. He was purchasing a new home.

The problems of moving his family to a new neighborhood, children entering different schools, and facing greater house payments was just too much. He mentioned it would have been better to take time off or take his vacation to clear up all the details. But most important was for me to learn that had the proper interview taken place after the first accident, the second and third probably would not have occurred. This all happened five or more years ago, and the last time I checked he is back to the old good habits of driving accident free.

In *Better Driving IS Better Business*, Dr. Karl Menninger, chairman of the famous Menninger Foundation in Topeka, Kansas, has stated, "Today we would rather say that accident proneness is something that all of us have more or less, and more on one day than on another. The question is, what is your accident-proneness level today? It fluctuates with various factors: resentments stemming from childhood, weariness, fatigue, a series of disappointments. And sometimes these feelings lead to an accident."

Still quoting from the *Better Driving* booklet: "Does this mean that the busy small fleet manager is expected to become a psychiatrist in addition to his other duties? Certainly not. But being aware that much sub-standard performance can have a psychological basis, he can be more understanding and effective in dealing with it."

As Dr. Menninger so ably points out, fact finding is most important. Let me hastily add learning all about anything is most difficult. And attempting to learn why people do certain things is a never-ending job, but to me a most interesting one.

Loss Control Thru Associations

PROJECT SAFE—USA

By EUGENE L. NEWMAN

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Project Safe—USA presents a plan for a new and United Safety Action program, promoted by the U.S. Department of Labor to assist in the national safety program effort.

Last year, some 9,500,000 workers were injured, 2,200,000 disabled, and 14,000 died as a result of industrial accidents. The effect on the national economy is measured by some 245 million man-days lost due to work accidents, resulting in staggering financial losses. The consequences of these often preventable accidents are appalling, in both human and economic losses.

Experience demonstrates that what is being done to combat the accident toll is not enough, as injury rates are not going down in most industries. It has also been demonstrated that industrial efforts must be supported by concentrated organized programs involving definite actions by all organizations and persons involved.

Usually, State, Federal, and county governments, labor groups, industry, and associations can implement a well organized and coordinated program, because their efforts can be concentrated to reach intraorganizational groups having common interests. Sponsors of this type can launch and promote successful safety programs, such as *Project Safe—USA*, and become leaders in support of this national safety effort.

This program is designed as a "self-help" plan. The concept: making available a basic prestructured safety program, easily adaptable to almost any specific need.

The program outlines the basic elements of an action safety program and can, with slight improvisation and augmentation, be adapted to suit the programming needs of any industry, State, labor group, or association willing to sponsor and coordinate the program plan.

The Department of Labor has provided the basic working plan for *Project Safe—USA* in the form of an outline. It illus-

trates typical slides to be used with instructions for suggesting the type of data to be inserted (common to the industry, sponsor, or association), and to orient this data to suit audience needs.

The suggested materials can, after augmentation, be developed in very effective visuals (slides, flip charts, and/or transparencies) to lend necessary impact to the presentation. Suggestions are made on how to present the program and actions to be taken by the sponsor to keep the program "alive."

The program is structured in four parts. Part 1 consists of a selling presentation to be held at a regional, district, chapter, or other major division meeting of the sponsoring master organization. For example, this may be presented in conjunction with a regular annual meeting of a local group or at the national meeting of a major organization. This may be done by a representative of the U.S. Department of Labor, or by a person designated by the sponsoring organization to implement and monitor the program—the objective being to advise these groups of the program so they may then be the sponsor and present the remainder of the program. Part 2 is training for management. Part 3 is training for supervisors. Part 4 is training of employees by supervisors and the use of this training in the monthly action program.

Part 2 serves as a catalyst to motivate executives and top-level management on the need and economic importance of carrying on an aggressive and continuing action-type safety program in their facilities. This presentation is made by the sponsor. Examples: accident rates, relating specifically to the affected management or organizations; various statistical summaries, illustrating accident facts; and cost indexes, related to employee safety and injury compensations. Per capita costs are used, as well as an interplay on the dollar value and related produc-

tion and sales requirements, to offset such, accident costs.

This part of the program is intended to generate managerial motivation and self-analysis, and act as a stimulus for responsible executives to recognize the need for such a program and to encourage its implementation to all other levels of management until it ultimately reaches all jobsites. The presentation to top management can take approximately 2½ hours—involves dialogue, complemented with slides that effectively portray the economic losses and accident causes, and relates these facts to the industry accident pattern and the value of implementing an effective loss control program.

Orientation for Top Management

Scope and Plan of Program ½ hour
Planning for Safety 1 hour
Safety Organization—Responsibility 1 hour

In preparation for the next phase of the program, the U.S. Department of Labor will, if requested, conduct an institute for training persons chosen by the sponsor to train supervisory personnel. This would require a minimum of 30 hours. These instructors would then conduct Part 3 of the program which establishes a training criteria to orient plant supervisors and workers on the necessary basic training requirements so they can better understand their own safety problems. The safety training should be presented in a recommended pattern and chronology so the recipient obtains a better understanding of the concept of the program. The planned training criteria, coupled with industry oriented accident data and information, are then presented. Because of the variation in plant size and the time limits of available personnel, Part 3 has been designed so the series of safety training sessions can be presented in 1 to 2 hours' duration for each. The amount of training to be presented may be determined by management on the basis of its enthusiasm for the program, desire to improve plant safety, and production schedules. The supervisors using the materials and references provided in their training would conduct the training for their employees. By discussing specific topics each month, the supervisors would carry out the United States Safety Action Program.

A pilot program adopted by the Fabricated Structural Steel Industry is described below. The program sponsor can present these various training units either on a daily or weekly class basis. The total recommended training exposure should be about 20 hours.

Training For Supervisors

First Day—

Scope and Plan of Program.... ½ hour
Planning for Safety 1 hour
Safety Organization—
Responsibility—
Legal Requirements 1 hour
Government Regulations and Laws
Applicable to the Industry .. 1 hour

Second Day—

Accident Causes 2 hours
Inspection for Safety—
Investigation 2 hours

Third Day—

Working Surfaces—Housekeeping 2 hours
Handling Materials 4-6 hours
(Truck, Rail, Bridge, Crane,
Monorail, Conveyors, Lift Trucks,
Cables, etc.)

Fourth Day—

Machine Guarding—Operations .. 4-6 hour
(Bandsaw, Hacksaw, Shears,
Rolls, Drills, Punch Presses,
Benders, etc.)

Fifth Day—

Welding-Burning 1 hour
Electricity 1 hour

NOTE: Selected physical or technical subjects pertinent to industry will also be an integral part of the supervisor's training program.

The sponsoring organization must assume the responsibility for most of the work for its associates and/or membership, and must assume the important role of monitoring and coordinating the program project. A typical chronology might be:

1. Sponsoring organization approves program and designates person or group to be responsible for its direction.

1 Subjects selected for Fabricated Structural Steel Industry only.

2. Sponsor prepares training or educational materials applicable to the industry or occupations. (Examples: How To Inspect Charts, Occupational Safety Aids.)
3. Sponsor obtains data and statistics relative to accident experience in the industry. (Examples: Structural Fabricated Metal Industry Charts.)
4. Sponsor promotes the program with local associates. (Example: Suggested letter.)
5. Sponsor obtains injury rates of participants—prior to program and annually thereafter—making periodic reports of program progress available to U.S. Department of Labor annually.
6. Sponsor provides training sessions for management and supervisory personnel. (Example: Suggested subjects, outlines, etc.)
7. Sponsor makes quarterly review of individual safety program activities. (Example: Suggested form.)
8. Firms or plants participate in organizational meetings and training sessions.
9. Firms or plants provide information on injury rates and program activities.
10. Firms or plants direct own safety programs.
11. U.S. Department of Labor provides consultation and technical services, reviews reports, records injury rate data.
12. U.S. Department of Labor will provide instructor institute training (in group sessions) for those selected by association or other organizations to present training sessions for *Project Safe*.
13. The U.S. Department of Labor will provide, without charge, instructor training outlines to trainers participating in the instructor institutes.
14. The U.S. Department of Labor will make available initial copies of suggested training aids, and give permission to reprint.
15. The U.S. Department of Labor will provide to the sponsor suggested materials for monthly training and discussions.
16. Staff of the U.S. Department of Labor will meet with organized groups or governmental bodies to provide technical programming advice relative to *Project Safe—USA*.

THE GROWING IMPACT OF NATIONAL STANDARDS ON ASSOCIATION SAFETY PROGRAMS

By JOHN R. GREGOR

Exec. Vice President, General Grinding Wheel Co., Carlisle, Pa.

What if there is no impact? What if national standards are not being eagerly sought by associations to add punch to their safety programs?

These were the questions which came to mind as I began to prepare this presentation. At first glance, the subject had appeared straight forward and simple. After all, I told myself, I have been involved with a national standard and its revision for the past ten years and have been thoroughly dedicated to an association safety program for an even longer period. With this background, I

thought, I should have no difficulty in organizing some meaningful comments on the subject area covered by the assigned title.

But then the doubts began to creep in, and I became even more doubtful when I read a statement on the second page of the report of the National Commission on Product Safety. The Commission said, "As related to product safety, self regulation by trade associations and standards groups drawing upon resources of professional associations and independent testing laboratories is legally unenforceable and patently inadequate."¹

So I set out to satisfy myself concerning the title of this presentation, because the answer to my questions had an obvious bearing on the form this paper would take. I read the final report of the National Commission on Product Safety in its entirety. I read some of the bills now before Congress that concern product safety, including the proposed Occupational Safety and Health Act. I read a legal discussion concerning the Walsh-Healy Act and its relationship to safety and health. I spent some time with the administrators of the American National Standards Institute and I spoke with products liability lawyers. Out of all this came an understanding that what I had been asked to discuss here may be true. There probably is a growing impact by national standards on institute and association safety programs, but unfortunately it is not a first order relationship. By that I mean it is not interest in national standards or safety or the excellence of national standards or, indeed, the existence of national standards which has created activity and impact. After all, the American National Standards Institute, under one name or another, has been in existence for fifty years. Why a growing impact only at this stage in the life of that association?

The answer seems to be that the law, or at least products liability lawyers defending clients under the law, has forced an interest in national standards which was not heretofore in evidence. While the recent emphasis on consumer protection by the Federal government has also stimulated interest in national standards, the direction that emphasis will take and the results that it will have on national standards and association safety programs is not yet clear because the result of the government's deliberations in terms of legislation is not yet available.

But in the area of products liability, pressure upon the manufacturer to produce, market, and instruct in the safe use of a product has been increasing for a long time. It apparently began with the landmark case of *McPherson versus Buick Motor Company* in 1916. In this case, the manufacturer was held to be liable to a remote purchaser for injuries caused by a product inherently dangerous when negligently made. In 1960, the case of *Hennington versus Bloomfield Motors* rejected manufacturer's disclaimers and brought in the doctrine of implied warranty.

Greenmond versus Yuga Power Products in 1963 advanced the doctrine of strict liability with which manufacturers have been contending ever since.²

It is the interpretation and application of the law which has generated the impetus behind the new interest and activity with national standards. The dates on the cases which I have just cited tell why that interest has recently increased. It is a fact, and not necessarily an unfortunate one, that in a profit oriented society such as exists under the free enterprise system the greatest motivation occurs when the relationship of profit to sales is adversely affected. Anyone who has been involved with recent awards in products liability suits and who has observed the effect of these awards on insurance premiums knows that this relationship is most certainly adversely affected in this circumstance.

Thus we see increased interest in national standards on the part of associations made up of corporations who are concerned about products liability and who see the specter of government regulations of safety standards peering over their shoulder.

National standards are not new, however. I have already pointed out that the American National Standards Institute is fifty years old and there are groups who can point to experience with safety standards for an even longer period of time. The Grinding Wheel Institute, an association of grinding wheel manufacturers, is a case in point. The Safety Committee of the Grinding Wheel Institute is responsible for the generation and revision of American National Standard B7.1 for the Use, Care and Protection of Abrasive Wheels. This code and changes in it are monitored by a Standards Committee made up of members from nineteen organizations. These organizations include groups representing labor, management, insurance and government, but it is the Safety Committee of the Grinding Wheel Institute which does most of the work involved with keeping the code factual and up to date. This safety code has been cited as one of the best, not only for its content and format, but because of the way in which it is used. For these reasons, it seems pertinent to briefly review how the code came into being because its history parallels the life of the American National Standards Institute.³

What is now the American National Standards Institute or ANSI began on March 4, 1920 as the National Safety Code Committee of the American Engineering Standards Committee. At their first meeting, the committee recommended the establishment of safety codes in thirty-seven areas. Among them was a code for abrasive wheels. The report discussed the then current state of safety in each area, and concerning abrasive wheels they pointed out that a safety code generated by the grinding wheel manufacturers was already in existence.

As a matter of fact, the first edition of the safety code generated by the Grinding Wheel Manufacturers Association was printed in November 1916; by the time the American Engineering Standards Committee met, the grinding wheel Safety Code was in its third revision. I think the introduction to the 1916 code is worth considering. It reads: "Recognizing the lack of appreciation among many users of abrasive wheels, insurance engineers, officials of state labor departments, and state factory inspectors of the important factors bearing on safety in connection with abrasive wheels and recognizing this lack of appreciation as responsible for many easily preventable accidents, the abrasive wheel manufacturers appointed a committee to draft a code of safe practices in relation to abrasive wheels."

It would appear that the problem of educating and the individuals requiring education have not changed substantially in the fifty-four years since this introduction was written, because these are precisely the people at whom the present Grinding Wheel Institute safety effort is aimed.

After the American Engineering Standards Committee made its recommendation in 1920, the existing Grinding Wheel Safety Code was adopted as a tentative standard and with some revisions was approved as an American Standard in December 1924. It was the seventh such standard to be approved under the voluntary consensus code generation system which is now known as the American National Standards Institute. The grinding wheel safety code has since been revised in 1930, 1935, 1943, 1947, 1956, 1964 and most recently in 1970.

As I read the old minutes concerning the beginnings of safety consciousness in our country, I gathered that safety forty or fifty

years ago was very much more a matter of some one individual's personal interest in the subject than it was a question of outside motivating factors as it seems to be today. For instance, Alfred Rousseau, product safety engineer for the Norton Company, is generally recognized as the father of the Grinding Wheel Safety Code, and his successor, Ralph Merritt, held the unofficial title of "Mr. Safety" in the grinding wheel industry until his retirement in 1961.

C. B. Connelley was another safety pioneer. The group that generated the first grinding wheel safety code made reference to the fact that they had drawn heavily from a report of a special committee appointed by the State of Pennsylvania to draft laws pertaining to grinding and polishing. The chairman of that committee was Mr. Connelley, then Secretary of the Department of Labor and Industry for the State of Pennsylvania. The literature shows that he was exceedingly active in the area of grinding wheel safety up until he left the department in 1928. In 1965, when I approached the State of Pennsylvania to adopt B7.1 as its regulation for grinding wheel safety, I had found that the regulation then in existence under Pennsylvania law was B7.1, but it was the 1924 version. The regulation had merely been reaffirmed periodically since that time without change. Apparently, with the departure of Mr. Connelley the interest in grinding wheel safety in Pennsylvania's Department of Labor and Industry also departed. Pennsylvania's present grinding wheel safety regulation is a copy of B7.1—1964, and I am quite certain that it will be a copy of B7.1—1970 when that revision is finally approved.

As of 1935, fifteen states had adopted the code verbatim or had used it in writing their own regulations, and here again Mr. Rousseau was instrumental in achieving this acceptance. Sad to relate, at the present time only fifteen states, although not necessarily the same states as in 1935, have adopted all or substantial portions of B7.1 as law. While the desirability of state adoption has constantly been recognized in Grinding Wheel Institute Board of Directors meetings and the safety committee has frequently been requested to generate a program for expansion of state adoption of the safety code, an energetic approach has not been forthcoming until fairly recently.

This could be construed as evidence that the national standard centered approach to safety as used by the Grinding Wheel Institute is not necessarily successful. But to do so, it is necessary to ignore the substantial gains that have been made in other areas using this approach. For example, the Grinding Wheel Safety Code is recognized and accepted in many areas beyond the borders of the United States. The Federation of European Producers of Abrasive Products have issued a European Safety Code which is an almost exact duplicate of B7.1. Many European countries, including Great Britain, France, and Germany have borrowed extensively from the code. Other countries around the world, including Australia, South Africa, and India, have adopted most of the code for their own use. The code has been translated into Spanish and Portuguese for use in Latin-American countries, and the creation of the latest revision of the safety code has involved correspondence with grinding wheel manufacturers and associations in more than a dozen countries.

A safety code must be favorably recognized if it is to be the focal point from which a safety effort will emanate. While one can suggest many types of safety programs which could be or have been generated and presented by associations, programs which have involved television, radio, and newspaper coverage, direct mail and hand out type literature, pamphlet distribution with the product and in marketing outlets, and probably a dozen more approaches, in all of these programs a safe-use message is the central theme. Certain rules or common sense directives are presented which if followed will prevent accidents and allow for the safe use of the product. Obviously, a safety code represents an excellent set of safety rules around which to build any program of this type so long as the code is reliable. For this reason, and the legal considerations previously referred to, a national standard as the central theme of a safety program seems to me to offer the greatest chance for success.

In the Grinding Wheel Institute Safety Program, the code is the focal point from which emanates a series of efforts, each of which is intended to convey the safety message to its specific area. For example, the code is broken down by "end use" in small

booklets published about each subject. The general format of these booklets is much less sophisticated and the language less stilted than that which is contained in the code. The booklets are intended to be read by operators, foremen, and supervisors directly involved with the use of the product. Because there are no legal ramifications to the booklets, safety problems and their prevention can be discussed in a more informal manner than the "this shall" and "that should" approach which is necessary in the code.

Twenty "do" and "don't" rules have been taken from the code. In pamphlet form, they are sent out with the product to get the safety message to the man at the machine. In larger form, they are made into a wall poster which is distributed to shops or departments using the product.

An educational program for state safety inspectors has been written and presented in many states. The program includes a kit of visual aids which is kept at the Grinding Wheel Institute office for shipment to any desired location.

Safety committee members make themselves available as speakers to various groups. A safety talk built around a series of 35 mm slides has been generated for use by the committee. The program has been presented to industrial users, safety organizations, and to miscellaneous consumer groups.

Films concerned wholly or in part with grinding wheel safety have been produced by the Institute and by its member companies. Only last week, the Grinding Wheel Institute Board of Directors authorized the expenditure of \$35,000 to produce a safety film entitled "American Roulette." It should be available late in 1971.

More recently, another aspect of safety has been given considerable attention by the safety committee and the Grinding Wheel Institute. Technological change in the form of increased speeds and pressures have created the need for more specific knowledge about the product. Changes in products liability law and the apparent direction being taken by Federal lawmakers, along with the new technological level, make it necessary to create a wider variety of standard tests to augment the simple proof test which has been completely satisfactory in the past. For the last three years the Institute has spon-

sored research which, when completed, will lead to a new understanding of safety factors and open the way to the possibility of an industry certification program. The present research program has benefited from knowledge gained by other Institute research sponsored over the past two decades.

The Power Tool Institute represents a contrast to the Grinding Wheel Institute because it is involved with home use products as well as industrially used tools. PTI has generated a safety program using newspaper, radio, and television which produced a total exposure of over 250 million people in one year to a safety message which was formulated around 18 do or don't type rules. It is significant, however, that while Underwriters Laboratory Code 45-1969 has existed since 1950, the Power Tool Institute has had a safety committee since only January 1967. Prior to 1967, safety was one of several areas for which the Engineering Committee of that Institute was responsible.

Matters related to product safety are in a state of flux. Cogent arguments can be supported for government standard generation and for independent consensus type standards. There are serious faults with the present system of consensus standards but even the National Commission on Product Safety which ended up clearly stating that they thought government intervention in this area was necessary did admit that "with a revision of its structure and procedures to respect due process and to assure effective concern with consumer safety, ANSI can make a greater contribution." The Commission enumerated a number of objections to self regulatory or consensus standards. One of these, as I have already noted, is that voluntary standards lack the force of law. However, they can have the force of law if they are adopted as law on a state-wide basis, as is now being sought for B7.1 by the Grinding Wheel Institute.

The Commission objected to the possibility of self service being present in the generation of consensus standards by industry representatives. This question of self service is an interesting one which is always raised in a discussion of safety codes and their relationship to liability litigation. While it is certainly true that safety codes can be written on a self serving basis, it has also been shown that such self serving documents are not long accepted in court, once their bias

has been demonstrated. It therefore follows that if self serving statements can be kept out of the code, that code becomes even more useful to all concerned since its acceptance as evidence in court is assured. It has been one of the philosophical stanchions of the Grinding Wheel Safety Committee that no self serving statements, rules, or directives will be included in the code. The fact that this safety code is consistently accepted as evidence in the courtrooms of our nation is ample proof that this philosophy had been adhered to faithfully with each revision.

The Product Safety Commission felt that consumer representation is inadequate in the consensus standard system, and that the consensus requirement might allow industry representatives to dominate the generation and the content of the code. Aside from the fact that each individual involved with the generation of the code is a consumer, the makeup of the standards committee, if B7.1 is representative, seems to show considerable concern for the consumer representation on the part of the standards making body. On B7.1, five government agencies and a total of eight consumer oriented groups are represented among nineteen groups making up the committee. It is difficult to argue against concern for what might happen. Perhaps the only valid statement that I can make in this area is that in my work with consensus created codes I have found a genuine concern for the safety of the consumer. There is no question but what the requirements of industry are also considered, but I have found the safety of the individual to be paramount if the requirements of industry are at cross purposes with safety. I have seen no evidence of willingness to compromise in this area.

The Commission noted that dependence on industry for financial support made independence of code generating bodies such as Underwriters Laboratories and ANSI questionable. This is an area wherein new consideration may be useful. Donald Peyton, managing director of ANSI, has frequently spoken publicly about the financial difficulty with which that group must contend. Government financial support might be a way out of this dilemma.

Finally, the Commission seemed to feel that consensus generation of codes on an independent basis was not sufficiently responsive to the public and stated that "We find

no evidence that ANSI and similar groups can adequately protect the public except in a context in which the government assumes active responsibility for the adequacy and enforcement of product safety standards."⁴

It does seem clear that products liability law will not become less stringent. It seems equally clear that the Federal government's interest in consumer product safety will not decrease and that more legislation in this area is inevitable. But no matter who ends up with the overall responsibility, those in each industry who have the background required for code generation must certainly be called upon unless the system that evolves is to be enormously expensive. Estimates of the cost of generating a B7.1 revision, if it were not done on a volunteer basis, have run as high as \$250,000. Certainly there is more work to be done. Of the 44 categories of products listed as highest in estimated annual injuries by the Department of Health, Education, and Welfare, 26 are not covered by any industry wide voluntary standard. Even so, ANSI alone is responsible for over 300 safety codes.

It seems incumbent upon those organizations who are involved with standards, organizations which include the American National Standards Institute, Underwriters Laboratory, and the American Society for Testing Materials, to fill the gaps where they exist by generating new standards, to reassess their own procedures so as to make certain that the public interest is best served, to move in the direction of certification of a wide range of products, and to change their regulations to guarantee the frequent updating of existing codes.

In order to be certain that safety regulations cover all vital areas, accident reporting methods must be devised which will expose high incidence sectors. These studies will also pinpoint the need for product improvement or better consumer education where such need exists.

Much wider use of product certification should be initiated. ANSI and Underwriters Laboratory are now collaborating on such an expanded program, and it is to be hoped that it will cover the widest possible range of products. Preferably, certification should be a required part of the national standard adoption procedure.

State adoption of safety codes should be sought by the national standards body instead of by the generating group, as is now the case. In conjunction with this, state and federal funds should be sought to support the standards program.

The impact that national standards now have will only continue if the standards making groups are capable of responding to the challenge of a new public awareness concerning product safety. Self regulatory standards can be effectively maintained only if the system under which they are generated is responsive to the needs of the individuals they are designed to protect.

Recent interpretation of the existing law and pending Federal legislation, along with heightened consumer awareness, have created a need for changes. I have shown that a national standard oriented safety program can be effective, but the standard upon which it is based must be frequently updated if the program is to continue its effectiveness.

Methods of gathering data to pinpoint accident areas must be created and activated. New standards must be written where required, and tighter regulations concerning revision and content of existing standards are necessary.

Published safety factors and industry certification are almost certain to be requirements of the near future. It is most probable that more technical knowledge about many products will be needed before this can be done. Associations should begin sponsorship of such work at the earliest possible date.

The consensus standard system must successfully respond to the requirement for change with which it is presently faced, and which I have just described, if national standards are to continue to have the impact they now have on association safety programs.

REFERENCES

1. Final report of the National Commission on Product Safety, Arnold B. Elkind, Chairman. United States Government Printing Office, June 1970, p. 2.
2. Products Liability and Reliability Machinery. Allied Products Institute, Washington, D. C., 1967, pp. 6-19.
3. American National Standards B7.1-1970 Safety Code for the Use, Care and Protection of Abrasive Wheels. American National Standards Institute Inc., 1970.
4. The final report of the National Commission on Product Safety. pp 47-55.

Physical Examinations MULTIPHASIC SCREENING

By DAVID B. JOHNS, M.D.

Mgr., Preventive Medical Services, Dow Chemical Co., Midland, Mich.

The delivery of medical care is one of the pressing social problems of our time. The focus of public attention currently is on the private sector, but the task of bringing the best preventive health care to the most people is an obligation which occupational physicians must share with their counterparts in the community.

In anticipation of the current crisis in ecology, progressive management at The Dow Chemical Company's Midland Division in 1967 lent their strong support to the concept of routine health surveillance for our chemical workers. This was to insure that they were incurring no incipient illness as a result of exposures in their work environment in spite of good industrial hygiene practice.

Multiphasic health screening is a rapidly growing and changing discipline due to the almost day-by-day advances in technology. We have endeavored during the past three years to constantly up date and refine our techniques keeping in mind our goal of maximum yield of health information at a realistic cost. The periodic refinements that we have made in our program are based on a careful review of our computer stored data by a biostatistician.

The Midland Division health screening program consists of two major portions and many minor portions which I shall discuss no further than to state that they involve checks associated with specific exposures. For example, we maintain a special laboratory surveillance program for employees exposed to cholinesterase inhibitors.

The health inventory is performed by two registered nurses and one audiometrist in a 12x55 foot trailer designed to accommodate our testing facilities. It is designed to be performed on every chemical worker every 12 to 18 months. The time interval varies because of production schedules, vacation time, and weather conditions. Approximately 20 to 25 health inventories are attempted daily. Our total subject population is approximately 6,000 workers.

The following procedures are performed during the inventory:

1. Interval health history plus work history; family history and smoking history (pack-years); height and weight; skinfold measurements to determine true obesity; Blood Pressure and Pulse Rate; Spirometry; Sight Screen; Skin Survey; and Audiometric Evaluation.
2. Urinalysis: protein; specific gravity; ketone; sugar; pH; occult blood; microscopic (if indicated by positive findings on basic urinalysis).
3. Hematology: hemoglobin RBC differential (if WBC is below 5,000 or above 10,000); hematocrit WBC sedimentation rate MC series.
4. Chemistry: total bilirubin; direct bilirubin; indirect bilirubin; glucose (1-2 hr. postprandial) lipoprotein phenotyping (in selected cases); Alkaline phosphatase; SGP-T; BUN; cholesterol; LDH; LDH isoenzymes (in selected cases).
5. Tonometry.
6. X-ray.
7. P.A. portable chest x-ray (14x17).
8. ECG.
9. 12 Lead—Computer Analyzed (Hard copy obtained in all cases for M.D. review of abnormal.) Computer analysis will be implemented in February of 1971.

A physical examination is performed in the central medical department on those who have suspected abnormalities discovered during the screening exam in the mobile health inventory unit. Whether or not an individual "passes" or "fails" the screening phase is determined by our computer program which, at present, contains data accrued from over 10,000 previous examinations. Those who come to the medical department have a detailed review of their history and a complete physical examination by one of the staff physicians. Additional laboratory studies may be performed.

We follow up occupational disease discovered during the exam through the medical department. In cases of non-occupational disease, referral is made to the patient's private physician. Procedures have been designed to assure follow-up on all individual problems.

Quality control procedures have been established on all laboratory work to assure reproducibility of results and to establish confidence levels.

After individual follow-up is completed,

a physician reviews the exams of each production area for evidence of occupational disease, utilizing computer stored data, if necessary, to define any disease trends. He then reports his conclusions to the production department concerned. All exams are then conditioned for data processing and stored for computer retrieval. Our data can be correlated with our acute exposure data covering the past twelve years of our experience and with data gathered by environmental research on plant conditions and exposure levels.

ROLE OF THE NURSE IN THE MULTIPHASIC SCREENING PROGRAM

By SHIRLEY WALKER, R.N.

Medical Dept., Dow Chemical Co., Midland, Mich.

The nurse can be an important link between the physician and the patient in the multiphasic screening program. She sees the patient and makes the initial examination. This includes careful check of the health history, family history, blood pressure, pulse, height, weight, and timed lung vital capacity. She needs a thorough understanding and skill in the use of good interviewing and health counseling techniques. If a patient has a symptom or symptoms that need further perusal, the nurse brings this to the doctor's attention. He then makes the decision as to what should be done; i.e., laboratory work, EKG, chest x-ray or physical examination. If the nurse is positive this symptom is not an occupational problem, she can refer the patient to his family doctor.

The nurse in the multiphasic screening program should have a genuine interest in people. It is important to *listen* to any problem or problems a patient might have. Generally, patients will talk to a nurse and ask questions freely. They feel the doctor's time is valuable and he also needs to be with the seriously ill patients. Many times the nurse can help the patient, and he does not need to see the doctor. The nurse should be pleasant, have a sense of humor, and be neat. The patient's first impression is very important.

Good communications has been our biggest problem. Passing the word along is still a big step that needs much improvement.

Some other problems we have encountered are:

1. Safe areas to park trailers in plant
 - a. No overhead high tension wires
 - b. Noise
 - c. Hazardous materials
2. Scheduling
 - a. Notifying supervision

- b. Notifying the patient
 1. Presently, a letter is sent to the patient's home before the program is started in his area of the plant
3. Diet instructions
 - a. Patient instructed to stay away from fatty foods
 1. Chemistries are done with the serum. Cloudiness caused by digestion of foods, which is normal, may give false positives.
4. Referrals to Medical Department or Family Doctor
 - a. Dependent on
 1. Occupational
 2. Non-occupational
5. What do you tell a patient when he is called to come back to a recheck lab test?
 - a. Sometimes we don't draw enough blood the first time
 - b. Occasionally the blood clots
 - c. Sometimes the result is abnormal and we want to recheck the result
 - d. "If anything serious is found, the doctor will call you in to talk to you immediately."
6. Chest pain
 - a. A list of key questions to use as a guide
 - b. Presently, the questions on health history form are more specific
7. Blood pressure
 - a. A notation is made on form for Doctor to review this
 - b. He decides what needs to be done

This program is conducted because of "our responsibility to maintain the health of employees potentially exposed to toxic materials or hazardous environmental conditions." We are trying to practice preventive medicine. The entire program is voluntary, but those who do not participate are the losers.

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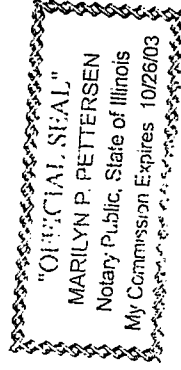
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