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Papers Delivered in the Metals Session

Management Action Programs for Safety Communication and Motivation	George L. Germain	5
Hearing Conservation and the Inter-Industry Noise Study	Joseph Sataloff, M.D.	11
Facts on Backs	Leonard Ring	15
-Safety Considerations When Hiring the Handicapped	J. E. Nichols	17
Officers of the National Safety Council Metals Section, 1977-78		25
Dates for the 1978 National Safety Congress and Exposition		27
Other Volumes/Order Blank for 1977 NSCTransactions	Back Cover	

Metals Sessions

(MANAGEMENT ACTION PROGRAMS) FOR SAFETY COMMUNICATION AND MOTIVATION

By GEORGE L. GERMAIN
Associate Director, International Loss Control Institute,
Loganville, GA

The primary purpose of the five MAPS we will discuss is to help protect four vital Ps: People—Property—Production—Profits. The modern safety program, of course, aims to control accident losses in all four.

Five of the management action programs that are getting more and more attention in professional management approaches to safety are: Training and Development; Motivational Communication; Positive Behavior Reinforcement; Job Enlargement and Enrichment; and Participative Management. Let's discuss each of these briefly.

Training and Development

Leading organizations around the world realize that one of the most essential and productive routes to accident control is to train, to educate, to develop people at all levels. It is not unusual for upper management groups to attend safety/loss control seminars ranging from a few hours to a few days. Middle managers and front-line supervisors often invest a full week, full time, in safety/loss control training programs. Non-management employees receive job orientation (including safety), proper job instruction, special skills training, safety talks, first aid training, on-the-job coaching, and safety tipping.

Three of the critical concepts which all should learn are (1) modern definitions of "safety" and "accident;" (2) a modern model of the accident "cause-and-effect sequence;" and (3) the professional management approach to "control."

Modern Definitions of Safety and Ac-

cident. Here is a modern, functional, workable definition of safety that is getting more and more attention throughout the world: Safety is control of accidental loss. It's more than injury prevention; it's more than preventing injury and occupational illness; it's more than prevention of injury, illness, and damage. It is "control of accidental loss;" it includes both preventing losses and minimizing those that do occur; it relates not only to people, but also to property (machines, equipment, tools, facilities, raw materials, products), to productivity (better efficiency, less lost time, less down time, and so on), and to profitability (don't lose your profits by accident).

A modern, functional definition of accident says: An accident is an undesired event resulting in harm to people and/or damage to property. An accident is not necessarily unexpected or unplanned, but is undesired. Many accidents can be expected; are, in effect, planned; and occur by invitation when we fail to train supervisors and workers properly, when we do a poor job of selecting and placing people when we neglect safety considerations in purchasing, engineering and maintenance, when we do an inadequate job of investigating and inspecting, when we do less than we should by way of safety communication, education, and motivation.

In this definition, the word "harm" includes not only injury and occupational health problems, but also "adverse mental, neurological, or systemic effects. . ."

Finally, damage to property is a significant part of the modern accident defini-

tion. In fact, some studies show that the dollar losses related to accident property damage are at least five times as great as the dollar losses related to accidental harm to people.

A Modern Model of The Accident Cause-And-Effect Sequence. This is illustrated in the modern domino sequence as presented by Frank E. Bird, Jr. in *Management Guide to Loss Control* (Institute Press, 1974). Briefly, this model depicts the "effect" (the fifth domino) as people and/or property loss—both the humane aspects and the economic aspects.

The incident that might lead to loss, the contact (the fourth domino), can be thought of as "an undesired event that could or does result in a loss." It includes not only actual accidents but also "near-miss" accidents. If we can keep this domino from falling, it will not trip the fifth one—the loss.

Right in the middle of the sequence (the third domino) are the immediate causes of accidents and incidents—the unsafe or substandard practices and conditions that we hear so much about. Controlling these may keep the fourth and fifth dominoes from falling. But since these unsafe acts (substandard practices) and unsafe conditions (substandard conditions) are only symptoms of the more fundamental factors behind them, we gain much better control by getting back to the basic causes.

The second domino depicts the basic causes—the origins of substandard practices and conditions. Among the prevalent personal factors that lead to substandard practices are lack of knowledge or skill, improper motivation, physical problems, and mental problems. Among the prevalent job factors that lead to substandard conditions are inadequate work standards, normal wear and tear, inadequate purchasing standards, abnormal usage, and inadequate design or maintenance. Control of basic causes prevents the immediate causes from precipitating the incidents that result in loss.

But the Big number 1 domino that starts the whole chain reaction is lack of control—a function of management.

The Professional Management Approach to Control. We all are familiar with the four basic functions of management: planning, organizing, leading, and controlling. Let's zero-in on controlling. It makes sense to focus on management's control function when talking about what we can do to control accidents, to control injuries, to control occupational illnesses, to control damage, to control waste, to control losses.

You can use the acronym I-S-M-E-C to remember what management control is: Identification of work; Standards for work performance; Measuring performance to standards; Evaluating performance results and reasons; Correcting and commending.

Identifying the management work that must be done for safety is not too difficult. In fact, organizations that are on the leading edge of safety management professionalism have done it for us. Twelve of the most critical activities are: supervisory investigations; first aid; general promotion; protective equipment; personal and group communication; engineering controls; planned inspections; skill and management training; hiring and placement; rules and regulations; job analysis and procedures; leadership and administration.

Standards are the second part of the control system. These are the destinations on your MAP, the goals, the objectives, the results-criteria. Take the activity of "investigation" for instance. Your standard might be: "The following must be investigated: accidents resulting in injury, occupational illness, or property damage over \$500; incidents with the realistic potential of lost time injury or illness, or property damage over \$500. Investigation reports on the approved form should be submitted within 24 hours of occurrence." When you have clear-cut standards, you have something specific to measure against, to see how well you are doing, how well management is doing its

job. *Measurement* is at the heart of management control, and is one of the largest areas of deficiency throughout the world in safety and loss control. But in those organizations that are really getting results, measurement is one of the things that's doing it.

Three important categories of measurement are the three Cs: measurements of *consequence*; measurements of *cause*; and measurements of *control*.

Measurements of consequence include things such as frequency rates, severity rates, lost time, injury rates, damage rates, dollars lost. They are important as a "scoreboard," but do not get at control. Measurements of control get at the Big number 1 domino in the cause-and-effect sequence—how management is doing its work. How well are we doing in gaining compliance with rules and regulations? How well are we meeting our planned inspection standards? How well are we doing in skill training? In brief, how well are we meeting the standards we have set for each identified activity of our program?

Evaluation is the process of analyzing our activities, standards, measurements, performance, and results. It is deciding: Where do we stand? Where must we improve? What must be done? How can we best get it done?

Correcting substandard performance and commending desired performance complete the control cycle. If our measurement and evaluation show, for instance, that our accident investigation performance (quantity and quality) is only at the 65 per cent level, then we do the necessary training, communication, and motivation to bring it up to par. Or if we find that supervisors are doing a 95 per cent job of maintaining compliance with personal protective equipment requirements, we give them positive reinforcement for high-level performance, to help make it a habit.

To remember the essence of management control, remember I-S-M-E-C. *Motivational Communication*.

Among the proven principles of professional management is this principle of communication: "Motivation to accomplish results tends to increase as people are informed about matters affecting those results." What a motivational powerhouse communication can be!

Here are some of the routes to safety motivation through communication: policy, letters, meetings, mass media, standard practices, reports, rules and reasons, orientation, safety clubs, coaching and tipping, safety talks, and appraisals.

Let's take a closer look at just three of these, as examples. A safety policy, for instance, can be a tremendous motivational tool if it is in writing, is over the signature of a key executive, is widely distributed, is referred to frequently, is positive, is made a "living" document for guiding safety programs and activities.

Meetings can be a powerful vehicle of motivational communication for safety. Realizing this, some organizations have set a standard along these lines: "Safety (along with quality, efficiency, and production) will be a part of all regularly scheduled management meetings, at all levels." As psychologists have put it: "What the mind attends to, it considers; what the mind does not attend to, it dismisses; what the mind attends to regularly, it believes; and what the mind believes, it eventually does."

Appraisals, performance discussions, and day-to-day coaching are among the most powerful motivational communication tools. See that safety performance is a vital part of each person's punishment and reward system. See that safety performance is part of your system for giving raises, merit increases, promotions, and other performance rewards.

Positive Behavior Reinforcement

One of the well-known principles of professional management is the principle of recognition: "Motivation to accomplish results tends to increase as people are given recognition for their contribution to those results." People get

more satisfaction from their work when they know their efforts are appreciated. When we give sincere credit to a person who has earned it, we are making it clear that we consider that person an important individual. Recognition for desired behavior (e.g., safe behavior) serves as a reward and reinforces that behavior.

Positive behavior reinforcement is "the immediate behavioral recognition of a desired act." Its psychological basis is amazingly simple—behavior is influenced by its effects. It can be as simple as this: "Marge, I sure do appreciate your attention to safe practices. I noticed this morning, for example, how you put those cup goggles on for every job that calls for them. Keep up your good work for safety."

It isn't difficult. It doesn't take much time, and it pays off in benefits like these: increases safe behavior; decreases bad side effects of overemphasis on punishment; improves job satisfaction; reduces gripes, grievances, and groaning; boosts the supervisor's image; cuts accidents and losses; and stimulates pride of positive performance.

Job Enlargement and Enrichment

There is some indication that monotony and boredom are significantly related to accidents, off-quality, interrupted production, and related losses. And some organizations are finding part of the solution in making jobs bigger and better—job enlargement and enrichment.

Frederick Herzberg and his colleagues at the Psychological Service of Pittsburgh initiated a type of study that has been repeated dozens of times, involving thousands of workers in many different kinds of work. These studies used carefully conducted personal interviews to probe experiences that made people feel "good" or "bad" about their jobs, the effect of these experiences on their "attitudes" and "performance," and the duration of these effects.

In effect, it was found that the traditional factors used by management for motivating workers really didn't

motivate. These factors (e.g., physical working conditions, pay, interpersonal relations, status symbols, and benefit programs) are important—but in a negative sort of way. That is, people are dissatisfied when they don't have them. When they do have them, they are quickly taken for granted and have little or no positive motivational force. Hence, the terms "hygiene factors" or "maintenance factors"—they prevent dissatisfaction and maintain a more-or-less neutral level of motivation.

The true motivating factors were found to be things like responsibility, achievement, growth, and recognition. These factors are centered around the job, the work itself, not the fringes. These are the kinds of things that motivate people positively, that keep them moving toward superior performance, toward excellence.

Job enlargement and, especially, job enrichment are systematic attempts to restructure jobs with the objective of increasing worker motivation. (In the fervor of scientific management we carried task specialization to an extreme; now we are trying to build jobs back up again.) Some of the organizations that have successfully put these techniques to work are the American Telephone & Telegraph Company, General Electric, Texas Instruments, TRW Systems, and Volvo. Evidence suggests that herein lies another possible remedy for the prevalent problems of low productivity, poor quality, high accident rates, high turnover, excess absenteeism, and low morale.

Participative Management

Involvement reinforces commitment. In more and more companies around the world there seems to be a growing realization of the double-barreled motivational power of meaningful management involvement in safety/loss control. First, there is the increased commitment of the managers themselves—reinforced by their involvement, their participation, their doing things for safety. Second, there is the increased safety motivation of

the workers—strengthened by the example their supervisors set.

Here, for example, are a few of the many meaningful ways that managers can show their commitment to safety:

1. By issuing a written safety policy statement, circulating it widely, referring to it frequently, making it a "living," working document.
2. By being actively involved in safety program planning.
3. By taking part in safety award presentations and publicity.
4. By conducting organized tours, audits and special safety inspections.
5. By issuing motivational letters on critical safety subjects (say, once each quarter) to all employees.
6. By being active in accident investigations.
7. By taking part in selected safety meetings.
8. By participating in programs of employee orientation and training.
9. By getting involved in loss control project teams, remedial actions, and follow-up.
10. By including safety performance in their appraisal, feedback, merit review, and reward system for subordinates.

Actions influence attitudes. If you really want to change people's attitudes, work on their behavior. Get them doing things for safety, get them involved, get them participating, and in due time they will become more safety-minded, more committed to safety.

Now here's the other barrel of the double-barreled motivational power of management involvement. When management people up and down the entire management structure are visibly involved in doing things for safety, it

motivates workers as well. They can see with their own eyes that their leaders really do consider safety of vital importance. Example speaks loudly. Forrest H. Kirkpatrick put it beautifully:

"The eye's a better student and more willing than the ear;

Fine counsel is confusing, but example's always clear;

And the best of all the preachers are the men who live their creed,

For to see the good in action is what everybody needs.

I can soon learn how to do it if you'll let me see it done;

I can watch your hands in action, but your tongue too fast may run;

And the lectures you deliver may be very wise and true,

But I'd rather get my lesson by observing what you do.

For I may not understand you and the high advice you give,

But there's no misunderstanding how you act and how you live."

Last is not least. This, in fact, could well be the most important of the five MAPS: Management Action Program 5: Participative Management.

Conclusion

We have taken a quick look at those five MAPS (Management Action Programs) for safety communication and motivation: Training and Development; Motivational Communication; Positive Behavioral Reinforcement; Job Enlargement and Enrichment; and Participative Management. Work at them and they will go to work for you, helping to protect your people, property, production, and profits.

HEARING CONSERVATION AND THE INTER-INDUSTRY NOISE STUDY

By JOSEPH SATALOFF, M.D.
Prof. of Otorology, Jefferson Medical College,
Philadelphia, PA

Preventing hearing loss due to excessive noise exposure has become a serious issue in the United States. In 1969 the Walsh-Healey Regulation, and in 1971 the Occupational Safety and Health Act (OSHA), specified maximum noise exposure and duration periods throughout industry in order to prevent the development of hearing impairment in employees. The Department of Labor, through inspectors and public information, expressed its determination to establish compliance with OSHA. Despite all this attention, occupational hearing loss is still reminiscent of Mark Twain's observation of the weather: "It's been discussed a great deal but actually very little done about it."

A number of leading large companies established excellent hearing conservation programs many years before they were made mandatory by the federal government. More companies are complying in recent years. There are still millions of employees who continue to be exposed to excessive noise levels and who sustain additional degrees of irreversible nerve deafness.

Recently the federal government evidenced its serious concern by forming a committee of 15 individuals to propose noise standards that could be implemented more effectively and enable industries to establish practical hearing conservation programs as quickly as possible. Among the most important noise regulations that may be proposed are the following:

Ninety dBA may be the level at which hearing conservation is compulsory for an eight-hour daily exposure over many years, but the use of ear protectors and hearing testing with medical surveillance

may be required at either 85 dBA exposure or at four hours per day exposure to 90 dBA.

No worker shall be exposed to effective steady state or interrupted steady state sound levels exceeding 115 dBA.

Feasible engineering methods to control noise shall be instituted before any other means are utilized for hearing conservation. The committee was unable to establish a clear-cut definition of "feasibility," and the general consensus is that this definition will have to be established by a court decision. In the interim, every plant should make efforts to study and implement practical noise control measures.

Techniques will be spelled out for doing noise measurement and keeping records.

A medical surveillance program (possibly under the supervision of a licensed physician) will be compulsory in practically all plants with excessive noise.

Audiograms and especially pre-employment baselines shall be done on every employee who is exposed to roughly over 85 dBA for eight hours daily.

Whenever noise cannot be reduced to a satisfactory level, an effective ear protection program shall be maintained.

All audiometric tests shall be administered by a physician, audiologist, or certified audiometric technician. It will no longer be acceptable to have audiometric studies done by an improperly trained individual. The required training for a certified technician is already established in the scientific literature.

All audiometric testing shall be done with properly calibrated equipment in an

adequately soundproofed room, and the presence of temporary hearing loss shall be avoided.

Baseline audiograms shall be taken not later than 90 days after assignment to excessive noise.

All audiogram records shall contain certain specified information.

It will no longer be satisfactory to do an audiogram and file it in the employee's chart without careful examination, since specific criteria are established as to what to do with employees whose hearing threshold changes. This is one of the most important contributions for referring employees for medical assessment whose hearing becomes progressively worse.

Warning notices shall be posted in areas where hazardous noise levels exist. The employer shall provide training in the proper care and use of all personal ear protection equipment.

Each employee exposed to excessive noise levels must be apprised of his noise exposure, and the information must be kept on file and available to the worker at all places of employment. Work records and audiograms must be maintained for the duration of employment plus five years, and all audiometric data shall be made available upon request to an employee's private physician, the secretary of labor, and the secretary of HEW.

Employees or representatives of employee groups shall be provided, upon request, access to environmental noise level data in the work area. Every employee shall be notified of his hearing level if his audiogram shows a specific amount of change from his previous hearing test, and if this cannot be satisfactorily explained the employee shall be referred for appropriate medical evaluation. We must provide proper orientation to management and labor before starting hearing testing, and especially ear protection. We must be certain that every audiogram is interpreted by an expert and proper action taken in each instance. Overlooking a case of acoustic nerve tumor, Meniere's disease, or a readily

curable ear infection without advising the employee can lead to complex problems.

It is apparent that these regulations place a new responsibility upon management to re-assess their present programs and make them more effective. Too many of the programs consist merely of noise measurements and hearing tests; often improperly done. This will no longer be tenable. There are medical folders in plant dispensaries in which 30 per cent of the audiograms are neither valid nor reliable. This could be due to "testee" or "testor" mistakes. The toll is even higher if uncalibrated audiometers and unsatisfactory test environments are taken into account. The audiometric testing program must be accurate and performed by a certified tester, for it is the only effective method of monitoring the use of ear protectors in the plant.

The U.S. Public Health Service has estimated that some ten million people in American industry have hearing losses. Many are noise-related. The nerve deafness resulting from excessive noise exposure over many years is irreversible, but it is almost entirely preventable. The medicolegal and compensation aspects of occupational hearing loss are strong reasons for conducting conservation programs, but by far the most compelling and moving reasons for our concern are medical and humane.

There is growing awareness that no physical handicap can have so many and so serious repercussions on the personality of an individual as hearing loss. Many employees, because of their high frequency nerve deafness, become unable to distinguish speech, especially in groups or noisy environments. Most of them do not attend movies, theaters, or churches, nor do they purchase radios or television as freely as persons without hearing impairment.

This type of hearing loss is poorly compensated by hearing aids. Consequently, many of these employees are excluded from any type of advancement requiring participation in educational meetings or conversations in groups, and

they are deprived of normal enjoyments, becoming outcasts to some degree and occasionally misfits. Interestingly, some of the worst effects on an individual's personality are associated with hearing deficits which seem mild on a numerical or percentage basis. This is because the quality of the hearing suffers more than the quantity, and the quality is sometimes difficult to measure. High frequency nerve deafness, a serious threat to the well-being of our industrial population, is especially critical among the skilled labor group. More and more we are recognizing that even though there may be no substantial loss of earning power, the loss of living power is alarming.

Every industrial plant in the United States should determine whether or not an excessive noise problem exists. Correction of existing problems should be implemented as quickly as possible, even before the new noise regulations are promulgated and possible OSHA inspection visitation. This should be done from a medical and humane point of view, not because the plant is compelled to do so by federal regulations.

Only by an effective ear protection program can management be certain that their employees are not sustaining occupational hearing loss and its attendant compensation and medicolegal problems.

An inter-industry noise study was conducted during a three-and-one-half-year period in order to gather reliable and accurate data concerning the relationship between hearing level and exposure to industrial steady state noise between 82 and 92 dBA. The study was initiated because a critical analysis showed that, in every one of the field studies reported in the literature relating hearing levels and noise exposure, a number of shortcomings existed that invalidated the data as a basis for a national noise exposure standard. At least one of the following shortcomings was a serious source of controversy in each of the studies:

Noise measurements in the work place were not sufficiently accurate.

Histories of the duration of noise exposure were inadequate. Otolologic examinations and histories were conducted by inexperienced persons.

Audiometry was done in an area of high background noise level. Industrial calibration and audiometric technique were not identified or reported. Temporary threshold shift due to recent noise exposure (occupational or non-occupational) was not excluded. Statistics and interpretations of results were questionable.

Proper controls were not used. Employees with hearing losses due to infection, otosclerosis, and other non-noise induced causes were not excluded from the study.

Noise exposures were not continuous or steady state, and rarely were subjects exposed to steady state noise in a narrow band within the broad range of 82 dBA to 92 dBA.

The inter-industry noise study was conducted by specially trained technicians and scientists with vast experience in all aspects of hearing noise. The protocol describes in great detail the objectives of the study, the conduct, and the meticulous supervision throughout the investigation. The following features of this investigation which make it unique are as follows:

The investigation limited itself specifically to the assessment of hearing levels in persons occupationally exposed to steady state (continuous) noise levels between 82 and 92 dBA for many years. The subjects, both experimental and controls, selected for study included working men and women of all ages.

The control subjects were not exposed to occupational noise levels greater than 75 dBA.

All hearing testing, noise measurement, otologic examinations, histories, and data handling were done by the research team in a standardized manner. Three visits were made at each test site, resulting in six audiograms for each subject.

The methods and techniques established prior to the study were followed closely throughout the investigation. Steering committees supervised the conduct of the research on a continuing basis and met numerous times to evaluate criticisms and possible shortcomings. Constructive criticisms were encouraged from every possible source throughout the study.

In order to adhere to the requirements in the protocol, over 200,000 employees in numerous industries were surveyed to find subjects who met the stipulated requirements. Further requirements in the final analysis narrowed the final numbers to a relatively pure or clean sample of test subjects and control subjects. Such a procedure and objective have never been achieved in previous investigations.

The data obtained in the research were never assessed or influenced by any of the researchers who were to analyze and interpret the final results until the field work was completed.

All assessments and evaluation were done blindly so that it was never known if a subject was in a control or experimental group.

Meticulous records were kept, and these are open and available to any serious person who wishes to use them for further analysis.

A great deal of reliable information is expected to come out of the data in the future.

We have just completed the study and have not yet had time for a final report; however, we present the following information as preliminary observations:

1. It seems obvious that for men and for women alike at three lower frequencies (speech), 500 Hz, 1000 Hz, and 2000 Hz, the difference between the exposed and the control groups is not statistically or

clinically significant.

2. At 3000 Hz and above, in both men and in women, there was an observable difference, the significance of which is being further explored. There seems to be little doubt that at the higher frequencies, for one reason or another, the difference between the two groups becomes bigger. This difference is rather modest in women and more pronounced in men.

3. The presence of a larger difference among men than among women raises the question of the possible role of industrial noise and, in addition, the factors of sociocausis. By sociocausis we mean such factors as exposure to snowmobiles, outboard motors, gunfire, and like non-occupational environments.

4. It is unlikely that further refinement of the data will change the results in the lower frequencies of 500 Hz, 1000 Hz, and 2000 Hz. It is possible that further refinement may alter the differences between the exposed and the control groups at the higher frequencies of 3000 Hz, 4000 Hz, 6000 Hz, 8000 Hz.

5. After the initial audiometric entry into the study, subjects were seen annually two more times. It was of interest in this longitudinal part of the study to try to investigate the change in hearing sensitivity over this period of time and to compare the exposed and control groups with respect to these changes.

At a particular frequency, occasional individuals showed a change in excess of 10 dB per year, but these changes were negative as frequently as they were positive, and the average changes per group were all close to zero. None of the groups showed any observable deterioration in hearing sensitivity over the two-year period. There is no evidence that the experience of an exposed group was any different from that of its control group.

FACTS ON BACKS

By LEONARD RING
Ergonomist, Auckland University,
Auckland, New Zealand

Back injury arising from lifting and handling objects has always been a constant and undiminished hazard of the occupational environment. The 1976 report of the U.S. National Safety Council lists 600,000 or 27 per cent of the total number of injuries to the trunk. The State of California estimates 24 per cent of its total injuries to be back and spine injuries, with nine out of ten the result of sprains, strains, hernias, and dislocations.

In 1974, despite a two per cent increase in the labor force and a one per cent increase in the average hours worked, there was a seven per cent reduction in deaths by accident and a 4.5 per cent reduction in injuries. Yet, back injuries rose by one percent, which is another 22,000 victims, and the severity of the injury rose by two per cent.

In the U.S., back injuries cost employers more than \$1 billion annually and account for the loss of at least 12 million work days.

Even allowing that some of the injuries are questionable, it is evident that back injuries are a very serious problem and that lifting is implicated as the most disabling of industry non-specific tasks.

Lifting and carrying are among the activities that subject the body to its greatest physical stress. Despite a great deal of safety propaganda being directed toward this group of industrial accidents, there has been so little change in the relative incidence that an unfortunate complacent resignation toward back injuries pervades industry.

Lately, the introduction of ergonomics has stimulated thought on the part of management, unions, and the men to consider more critically the cost of back injuries in terms of disability and per-

manent disablement.

The pathology of back injury and pain is generally disc degeneration due to a lowered structural resistance to normal wear and tear, complicated by consistent traumatic injury. There is little at present that can be done to reverse the congenital element of back pain; however, the environmental causology leads to two points of view: Either management and other educational organizations have not been effective in their teaching of workers in the present lifting techniques, or the present lifting techniques are not adequate for the worker's daily actions in his particular job, or both.

For the average worker, lifting is a simple action which he prefers to carry out almost on a subconscious level and with a minimum of effort and thought. For this reason, despite the many valuable hours some industries have spent instructing employees on "correct" lifting and despite the propaganda via posters and other media, the incidence of back injuries has remained on a plateau for many years. (Pearson and Ayoub-1975)

Men and women workers are performing such a variety of movements to complete their required work tasks that the lifting technique currently proposed, Hinbury (1967), I.L.O. (No. 3), Peres (1960), i.e., the "kinetic" lift—straight back, bent knees, feet apart, with one foot in front of the other—could not fit into most worker's daily functional pattern. Lifting actions are often performed in confined spaces with bulky loads and paced to a degree that has a direct relationship upon the worker's performance. With such varied work conditions and settings, it is not surprising that the impact of instruction and propaganda is

not effective and he returns to his old habits of lifting.

Emphasizing a straight spine as a key to safe lifting and the prevention of back injuries has obviously failed (Brown 1972), (Ring 1973), (Chaffin 1977), and it has become of paramount importance to find a way of introducing a method of lifting to industry that is simple to comprehend, easy to illustrate and, except for very special considerations of lifting in a confined space, will apply to most situations.

This is the "natural" method of lifting, where the worker performs the action as best suits him. The main element of this

method is to bend the knees and use the legs to take the weight of the lift, allowing the spine to assume an angle that is most comfortable and natural for the worker and his load. The conscious element in this method is specifically bending the knees.

Applying this principle to existing safety communicating media in industry via short lectures directly to the work force reinforced by appropriate posters has produced dramatic results (Ring 1969, Wilson's Cement) Ring 1973, Loughborough University — Unpublished M.Sc. Thesis), (Miller 1975, P.P.B. Industries).

*Index of info Vol. 11,
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SAFETY CONSIDERATIONS WHEN HIRING THE HANDICAPPED

By J. E. NICHOLS

Dir., Employee Relations, Glass Div.,
PPG Industries, Inc., Pittsburgh, PA

A friend of mine tells the story of his experience as a baseball umpire in a class D league somewhere in the South. Naturally, it was a low budget operation, and most often one umpire called the game. The one ump was stationed behind the pitcher, and from that vantage point called balls and strikes and all other plays as well.

On one extremely hot afternoon, he positioned himself behind the pitcher removed his coat, folded it neatly on the ground behind him, and piled the game baseballs in a pyramid on top of his coat. The first batter up proceeded to hit a low fast ball in a sizzling line drive directly at the pitcher's legs. As the pitcher jumped one way to avoid being hit, my friend the umpire, jumped the other direction and the batted ball squarely struck the pyramid of baseballs, scattering them in all directions. Each infielder immediately grabbed a ball and fired it to the first baseman.

That poor guy must have felt much like the safety professional of today, who wants to desperately to do a job, but has so many balls coming his way he doesn't really know which one to grab first.

Our subject is the latest of those baseballs—hiring the handicapped.

On June 11, 1974, the Department of Labor published regulations implementing Section 503 of the Rehabilitation Act of 1973. Proposed amendments to the Act were published by the Department of Labor in August, 1975, and revised regulations were issued on April 16, 1976, with an effective date of implementation of September 17, 1976. This basic law and its subsequent amendments and accompanying regulations have established another client group which employers

must now include under the ever-broadening umbrella of "affirmative action."

These regulations have a direct impact upon the day-to-day activities and decisions of safety personnel and others involved in the selection and supervision of employees. The requirements are common knowledge among most safety and personnel professionals by now. It seems, however, that less attention has been paid to the impact of the handicapped regulations upon the job of the safety professional. Section 503 of the Rehabilitation Act of 1973 was passed to establish "affirmative action" among government contractors for handicapped people. This law was passed because there are still many handicapped individuals who haven't had an equal chance to work or to get ahead on the job, and like other so-called "special interest groups," the handicapped have been able to muster considerable legislative pressure through effective lobbying efforts, demonstrations, etc. The purpose of the law is clear—it is to encourage employers to hire more qualified handicapped people. At the same time, these newly expanded regulations will encourage more handicapped people to enter the labor force and qualify for jobs.

The employable handicapped population of America, between the ages of 16 and 64, numbers nearly 12,000,000 according to the census. About half of all the businesses of America—some 3,000,000—are covered by the regulations. Among them are virtually all of the industry leaders of the United States.

As safety professionals, you can expect more handicapped individuals to be among your work force in the days to

come, and the problem of how to deal with them and ensure their safety on the job is not going to go away.

The basic provisions of the recent handicapped regulations are probably familiar to each of you by now, but before getting into safety considerations for employing the handicapped, a brief overview of these regulations might be helpful.

Every employer who does business with the Federal government under a contract for more than \$2,500 must take affirmative action to hire the handicapped. The concept of affirmative action also applies to job assignments, promotions, transfers, accessibility, working conditions, termination, and the like. For larger contractors, those holding a contract or subcontract of \$50,000 or more and employing at least 50 people, a written affirmative action program must be prepared annually. This affirmative action program must be available for inspection by employees and job applicants.

A handicapped person is defined within the regulations as anyone who: has a physical or mental impairment which substantially limits one or more of his major life activities; has a record of such impairment; or is regarded as having such an impairment. If this definition seems somewhat ambiguous to you, keep in mind the fact that it is extracted directly from the regulations, and regulations are written in Washington, not by employer representatives who have to interpret them. A more practical working definition is as follows: an applicant or employee who has voluntarily identified himself as handicapped, and this has been verified by management; an applicant or employee who has been identified as having work restrictions by the company physician as a result of a placement examination; an applicant or employee who is determined to be obviously handicapped by management through observations.

Let me make a few comments on how the definition may be applied to deter-

mine who is and who is not handicapped. Some applicants may indicate a physical or mental limitation when they apply, but in many cases the alleged handicap may require verification before the applicant is categorized as handicapped. To list every applicant who includes a restriction on his application as handicapped without verification where required will result in inflated and unrealistic applicant flow figures. For example, an applicant may list a hearing loss as a restriction on his application. In this case, management has a right to await the results of a subsequent physical examination or require medical documentation from the applicant before classifying him as handicapped. On the other hand, the blind and amputees, for example, present handicaps which are obvious and should be classified accordingly immediately upon application.

What are some of the affirmative action requirements imposed on employers? The following are some of the things covered employers must do:

1. Prepare a written affirmative action program and update it annually. It may be integrated with other affirmative action programs or prepared separately.
2. Include an affirmative action clause in all government contracts and subcontracts.
3. Assign responsibilities for implementation.
4. Analyze employment and personnel procedures to ensure they contain a careful and systematic consideration of known handicapped applicants and employees for hiring and promotion vacancies.
5. Review medical procedures.
6. Review job qualifications regarding physical and environmental restrictions.
7. Ensure that medical information on applicants and employees is kept confidential and made available on a "need-to-know" basis only.
8. Communicate policy to employees and applicants. Employees must be advised that the AAP is available for their inspection and who to contact if they

have a related complaint. Employees and applicants must also be invited to identify themselves as handicapped.

9. Unions representing employees must be notified of the handicapped policy.

10. Effective working relationships must be established with vocational rehabilitation agencies and other social service agencies who serve the handicapped in the recruiting area.

11. Candidate referral sources must be notified of the handicapped policy.

12. Employers must maintain handicapped applicant files and personnel records of known handicapped employees for at least one year from date of final action or date of termination. Records related to a handicapped charge of discrimination must be retained until final resolution of the charge.

13. An internal complaint procedure should be established.

At the Federal level, written complaints are received by the Office of Federal Contract Compliance Programs (OFCCP), which may delegate investigative duties to a designated agency.

A complaint must be filed within 180 days from the date of the alleged violation. OFCCP or the designated agency will defer processing the complaint for a 60-day period if the contractor has an internal review procedure. If the complaint is not resolved internally within 60 days, the appropriate Federal agency will begin its investigation, which will likely include an on-site visit. Efforts are made by the agency to secure compliance through conciliation and persuasion. Where there occurs a finding of probable cause, the contractor or subcontractor must make a specific commitment in writing to take corrective action before he can be found to be in compliance. Where the complaint has not been satisfactorily resolved through informal conciliation, the contractor shall be afforded the opportunity for a formal hearing.

The enforcement procedures available to OFCCP are judicial enforcement, (including injunctive relief); withholding progress payments; cancellation or ter-

mination of a contract in whole or in part; and debarment from participation of future government contracts.

Our company has had limited experience with OFCCP to date on charges of discrimination under the handicapped regulations. Based on that sparse experience, OFCCP investigated the complaints through a plant visit fairly soon after being notified that the complaint was not successfully resolved during the 60-day deferral period. Before investigating the merits of the complaint itself, the representative from OFCCP made inquiries concerning steps which had been taken at the unit to implement an affirmative action program for the handicapped.

I would now like to relate some of the steps which were taken by PPG Industries to implement these regulations. A corporate policy statement was released by the president of our company, and this policy statement was later repeated in an article in *PPG News*, the corporate newspaper for employees and their families.

A committee was appointed to interpret the regulations and convert them into an implementation procedure framed in language which could be understood by operating personnel. A model affirmative action program was designed for the various plants and field units. Suggested letters to the union and to referral sources were distributed; a suggested memo to be given to applicants advising them of their rights to be identified under the program was prepared, as well as a similar bulletin board notice for employees. But more important than any of these specific measures was the fact that the advent of the handicapped regulations was discussed with managers, employee relations personnel, and safety personnel in a series of meetings long before the regulations became final. This early analysis of the impact of proposed regulations gave us an opportunity to get a head start on two of the biggest jobs which had to be done; i.e., revising the medical procedures and developing oc-

cupation rating sheets.

Our previous medical procedures contained minimum universal standards in such areas as height and weight, visual acuity, hearing, etc., and like many employers, we stayed away from applicants who had any history of back difficulty as though they had the plague. Applicants or employees were previously given one of four medical classifications based upon the results of an examination: "A" meaning okay for any work, "B" meaning okay for certain jobs, "C" meaning an impairment existed prohibiting work but was regarded as being correctable at a later date, and "D", which was a rejection for any and all kinds of work. These concepts were changed in our revised medical procedures manual to the extent that no medical limitations were to be a bar to employment on all jobs, but rather each medical limitation had to be related to the requirements of the specific job in question. The new medical classifications are as follows: "A"—no restrictions required; "B"—restrictions required; "BC"—correctable; "BNP"—non-progressive; "BP"—progressive; "C"—unable to work at any job at present.

Documentation of medical information is extremely important at the hiring stage. The occupation rating sheet to which I referred a moment ago was a tool we developed to enable us to make comparisons between the results of the physical examination and the physical requirements and working conditions of the job. Unit locations list their common occupations vertically. The restrictions which could result from a physical examination are listed horizontally. For each job, the plant safety supervisor, working in conjunction with plant supervision and in some cases union officials, indicates, where appropriate, on the occupation handicap rating form the physical or environmental conditions which are demands of the job. Once completed, the occupation handicap rating sheet provides an easy reference when analyzing the restrictions which

might be indicated on a medical report from a physician. An individual may have a restriction which bars him from some jobs (i.e., a "B" rating) but not others. The occupation rating sheet applies not only to new hires but also to employees returning to work from a disability.

I feel that the transition which our units had to make to meet the new handicapped regulations was less traumatic than it might have been, due to PPG's past history of accommodation to the handicapped long before the coming of the current regulations for government contractors. During and after World War II, several of our plants made the type of accommodations which we are talking about out of the necessities of the situation. During the war, tight labor market conditions forced us to hire employees, in some instances, with lesser physical qualifications than we might ordinarily require. During post-war conditions, many of our employees who returned from military service had war-related disabilities. These conditions forced us to identify those employees who were handicapped, be aware of their limitations, and deal with them on a case-by-case basis. This situation naturally evolved over the years into one which certain jobs became known as "handicapped jobs." With the advent of the recent regulations, the natural tendency among members of management, particularly our safety professionals, was to throw one's hands up in the air and exclaim, "How are we going to do it?" However, after a period of reflection, we said to ourselves, "Hell, we've been doing this already."

Safety considerations for hiring the handicapped begin at the very first step in the employment process and at the very beginning of the work day for the handicapped employee. Is there reasonable access to your reception area, applicant processing area, or work situation for the handicapped? As the handicapped regulations become publicized more widely, you can expect more handicapped individuals to visit your facility to apply for work. Curbs and stairs could

present barriers to paraplegics or quadruplegics in wheelchairs, increasing the chances of accidents due to falls. Can handicapped applicants safely proceed to where they must go to complete an application? If employed, can such handicapped individuals safely proceed to the work station? And don't overlook washroom and restroom facilities, width of doors, height of urinals, etc. These and related questions require careful analysis by the safety professional.

You may at this time be imagining the barriers to the employment processing area within your own organization and wondering to yourself what should be done about them. This type of consideration is germane to a fundamental provision of the handicapped regulations, a provision that I have only briefly mentioned until now and the one that is probably most significant from the safety standpoint; i.e., the concept of "reasonable accommodation." The regulations in regard to accommodation of the physical and mental limitations of employees and applicants are somewhat vague and could imply substantial financial and organizational impact. Specifically, the regulations describe this concept of accommodation in the following words (section 60-741.6(d)): "A contractor must make a reasonable accommodation to the physical and mental limitations of an employee or applicant unless the contractor can demonstrate that such an accommodation would impose an undue hardship on the conduct of the contractor's business. In determining the extent of a contractor's accommodation obligations, the following factors, among others, may be considered: business necessity, and financial cost and expenses."

What is a "reasonable" accommodation? How much hardship is an "undue" hardship? What constitutes adequate "business necessity" to satisfy the intent of the law? What are the limits on the "financial cost and expenses" which must be endured? What are the "other factors" which may be considered in addition to

business necessity and financial cost and expenses?

These are questions which the regulations themselves do not answer, and they are questions for which I, likewise, do not have exact answers. The answers lie within the realm of good, sound managerial judgment and decision making and inevitably contain an element of risk when required to survive the test of government agency scrutiny. Let's go back to our previous examples and see how such judgment might be applied.

Suppose the only barriers to your applicant processing area are a curb at the elevation of the sidewalk from the parking area and two steps leading into the lobby. Cost estimates may show that concrete ramps to accommodate wheelchairs may be installed for several hundred dollars. Some individuals might differ, particularly at a small operation, but for most concerns who expect to be doing business for years to come, I believe that such construction and expense would have to be regarded as a "reasonable" accommodation.

Suppose, on the other hand, the personnel department is located on a second floor with access by two flights of stairs. Do the regulations require the installation of an elevator? Probably not, but there are alternatives in most situations which do not require unique imagination. In some situations, plant guards can be instructed to handle the filing of applications by the handicapped who would have difficulty gaining access to a second floor office. Similarly, personnel offices could be relocated or interviewers can go to an area which is accessible, rather than requiring the handicapped to travel to the traditional interviewing area, which may not be readily accessible.

Likewise, anticipated problems concerning the ability of the handicapped employee to travel to his work station, if employed, may be overcome with a little imagination. In the case of a blind employee, if the job can be adequately performed once the individual is at the work station, a regular escort by guards

or fellow employees to and from the work station may be all that is required to render the blind person employable, or protected walk-ways could be provided.

Severely handicapped employees present the toughest challenge for the safety professional who is trying to apply the principle of "reasonable accommodation" while ensuring that the employment of the handicapped does not lead to situations which increase the unit's accident experience. I would include the following individuals among those who may be regarded as severely handicapped:

1. Deaf persons or those who have greatly impaired hearing in both ears.
2. Blind persons or those who have greatly impaired sight in both eyes.
3. Persons who are mutes or those who have greatly impaired ability to speak and communicate orally.
4. Those without one or more limbs, or individuals who have more severely crippled limbs, particularly the preferred hand; e.g., right-handed with right hand missing or severely crippled.
5. Spastic and/or paralysis conditions which greatly restrict the normal use of limbs.

Many of the solutions to the successful placement of such handicapped individuals lie not in the redesign of the job itself, but rather in the thorough analysis of what jobs exist within the organization which could be successfully be performed "as is" by the severely handicapped employee. All too often, operating management has written into the job descriptions for some jobs unrealistic physical requirements which really aren't essential.

When considering the deaf or those with seriously impaired hearing, jobs without a dependence on telephone contact and frequent oral communications are logical choices, as are those where the individual works on a somewhat independent basis and where written instructions are feasible. However, for those with some hearing capability, advancements in telephone technology have provided an

amazing number of devices such as adjustable amplifiers, adapters, bone conduction receivers, and signals to assist those with hearing difficulties. One fellow employee who is a deaf interpreter can provide a communications link to the deaf employee that might satisfy the necessity for instructions. Deaf employees are particularly adaptable to high noise areas if allowances are made for the type of moving equipment which normally alerts the employee by sound. Lights and signals, such as those used on fork trucks, are usually potential substitutes for warning bells and sound alarms to alert the employee to moving equipment. In many cases, the deaf have become better than average file clerks, checkers, and inspectors because they are able to concentrate so well, unaffected by noise and other distractions. Many deaf persons have won praise for their performance in industry as linotype, tabulator, and keypunch operators.

Blind workers, with their sense of touch often extremely highly developed to compensate for the lack of sight, have made superior assemblers, inspectors, sorters, and counters of small parts in such vital industries as electronics, aircraft, and missile production. The key to the safe placement of blind employees is to find jobs where little or no mobility is required. One example of accommodation within my own company involved an employee within our transportation department who has suffered an increasing loss of vision as a result of diabetes. The employee successfully works as a rate clerk, quoting shipping rates to inquiring personnel throughout the company with the aid of a magnifying screen. His office is located on the first floor of the building and is readily accessible. With the aid of the magnifying device, he successfully performs his job in spite of the fact that he is legally blind.

Our experience indicates that employees with vision in only one eye can function adequately without accommodation in most work situations.

However, where a universal eye protection program may not be in effect, requiring positive eye protection for the employee with vision in only one eye is advisable. Recent workers' compensation rulings have held an employer responsible for a claim of total blindness in cases where vision had been already lost in one eye prior to employment.

In our glass plants we must be more cautious than most employers when considering placement of handicapped individuals who are dependent upon artificial means of support because of the frequent presence of broken glass or cullet on the floors of our shops. For an individual using a cane or similar support device, placing the support device on a floor which has cullet particles creates an effect somewhat similar to working on ice.

I can think of several examples within my own company where employees without one or more limbs have functioned effectively with little or no accommodation, such as a Lehr unloader with an artificial leg who unloaded heavy windshields with no difficulty. Another case involved a double amputee with braces on both legs. He was assigned to a mold shop job making aluminum dies for aircraft patterns and filing those down to tolerances. The sum total of the accommodations provided to this employee who was without the use of legs was to (1) provide him with a stool, (2) permit him to use an elevator which was restricted for other employees, and (3) provide a preferential parking space to facilitate access to the work station.

Another employee with only one arm was effectively placed as a guard on the plant protection force. The only accommodation required involved lowering the position of the Detex station keys on his patrol. This enabled the handicapped employee to reach the keys while holding the detex clock between his legs.

Our basic approach to the effective placement of epileptics has been to work closely with the physician and employee to ensure that proper medication is being

taken so that the condition is under control and to restrict them from jobs involving climbing. One such case involved an electrician who was having seizures at such frequency as to present a clear and imminent danger to himself and others. We encouraged him through personal counseling to bid on a clerk's job opening to which he had sufficient seniority to transfer. The clerk's job involved working at a desk in a shop where other employees would always be around. It was necessary in this case to involve his wife in the counseling to persuade both of them that the job reassignment was in the best interests of all concerned.

The mentally handicapped present a special challenge. The orientation of both supervision and co-workers as to the condition of the mentally handicapped employee and what actions they might expect from him is particularly important. If fellow employees are alerted to the possibility of sudden, unexplained bizarre conduct on the part of the mentally handicapped employee, they can better react to situations which might occur and which would otherwise be disruptive. Again, communication with the employee's wife or family is most desirable.

If I could summarize our experience to date in employing the handicapped, I'd say that there were two things which we did not do: (1) we never patronized them, but rather tried to treat them as individuals; and (2) we never created jobs specially for them and their handicap. Our experience has also shown us that in many cases it is necessary to protect the individual handicapped worker against himself. By this I mean that there is a tendency for some handicapped individuals to try to over-excel. Individuals with a recognizable limitation, such as a missing limb, loss of sight, etc., tend to accept their limitations and grow accustomed to functioning within those limitations. On the other hand, employees who return to work following heat attacks, cerebral hemorrhages, and

the like, tend to adopt a philosophy of false security and may consider themselves as good as new and able to do everything they did before the traumatic incident.

When we speak of affirmative action for the handicapped, whether within the context of regulations or otherwise, it is important to keep in mind that we are talking about "qualified" handicapped people, and the word "qualified" should be underscored in your mind. If an applicant or employee simply cannot perform the jobs which are available to him there is no inherent problem involving the requirements of affirmative action. Regulations notwithstanding, there are some jobs which some people simply cannot perform. Unfortunately, a number of persistent myths have long militated against the hiring of the handicapped. Three of the most frequently heard myths are:

1. That handicapped workers are more likely to have accidents than other employees.
2. That an employer's workmen's compensation insurance rates will rise if he hires handicapped workers.
3. That his insurance company "won't let him" hire handicapped persons.

All of these myths are false. U. S. Department of Labor surveys have shown that "impaired persons" have fewer disabling injuries than the average worker exposed to the same work hazards. They have about the same number of minor injuries as other workers. When placed in suitable jobs, they are for all practical purposes no longer handicapped. And since they are not inherently "unsafe," the handicapped cannot adversely affect workmen's compensation rates. These rates are based solely on the relative hazards of a company's operations and on the company's accident experience.

As to insurance companies' positions on such hiring, the very fact that insurers

are among the leaders in the rehabilitation and placement of impaired workers refutes the idea that they oppose hiring the handicapped. In fact, you may find that an aggressive handicapped placement program will save you many dollars in accident and sickness insurance costs.

Properly-liability insurers have repeatedly pointed out the good work records of most handicapped workers. Absenteeism among them is no greater—and is often less—than among non-handicapped workers, and their overall turnover rate is about the same as for other employees. When placed in jobs they can handle, handicapped workers as a group produce at slightly higher rates than unimpaired workers on the same jobs. Too often, however, the practice has been to consider partially disabled workers capable of only the unskilled, routine type of work. This attitude can be more crippling to the employee than the physical injury.

Be assured that workmen's compensation insurers do not penalize an employer for hiring disabled persons. Properly selected and placed, persons with handicaps make excellent employees. Their safety records are at least as good as those of other employees, often better. Our experience at PPG confirms these contentions concerning the productivity, safety records, and dependability of properly placed handicapped workers. We have had no above-average experience in regards to workmen's compensation claims or accident frequency among our handicapped employees.

In conclusion, I believe a positive approach on the part of employers is necessary. Instead of looking at a handicapped worker or applicant with tunnel vision directed at what he cannot do, take a look at the positive aspects of the handicapped person's abilities in terms of what he can do. In the final analysis, the basic question becomes: "Can the man do the job properly and safely?"

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Respectfully,

Robert J. Marecek
Manager, Library

