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National Safety Congress Transactions

VOL. 13

1959

GLASS and CERAMICS; RUBBER INDUSTRIES



NATIONAL SAFETY COUNCIL
425 NO. MICHIGAN AVENUE • CHICAGO 11, ILLINOIS

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GLASS AND CERAMICS SECTION

PATTERN FOR PROGRESS

By RUSSELL W. FRANK

Safety Director, Ferro Corp., Cleveland, Ohio

Are you interested in reducing costs equivalent to one and one-half per cent of your present labor cost? If so, take a look at your safety and health program.

If this opening does not bring the "hard boiled production executive" to attention, amend it slightly. This represents only the savings in reduced insurance premium for workmen's compensation coverage. Clinch the argument by reminding Mr. Hard Boiled Executive these are conservative estimates.

If the gentleman is still not receptive, point three of your argument will include the hourly cost of direct and indirect losses resulting from accidents.

The following report recognizes the fact that Ohio practices differ from those in other States. However, we think the difference is chiefly one which makes better data available more quickly and provides coverage at a lower cost.

In 1954, the Bureau of Workmen's Compensation and Industrial Commission of Ohio found it necessary to actually adjust insurance rate for workmen's compensation coverage for industry. The proposed upward revision indicated an increased cost to industry. A group of safety engineers in the Cleveland area attempted to analyze the effect and develop a method of control.

The following facts were available to underscore their efforts: The 1954 losses from claims in Ohio totaled \$57,107,000. The metropolitan Cleveland area accounted for \$10,165,000. The proposed rate increase averaged 30 per cent.

Analysis of the claims revealed smaller plants accounted for 80 per cent of the losses and claim frequency. The picture crystallized rapidly. The small plants' claims experience would be reflected in charges paid by large plants, due to the industry wide actuarial evaluation of these matters.

The metropolitan Cleveland area total accident cost, including direct and indirect losses, was very nearly \$80,000,000 per year.

What to do about it? If safety engineering talent were available, and it was not, the small plant could not afford the expense of a full-time man on the staff. The state maintains a fine group of safety advisors to industry, but they could not be expected to concentrate on the problems of our metropolitan area. In addition, we found many industries regarding the state personnel as policemen, which fact suggested they were something less than welcome.

After due deliberation and consideration, the committee proposed a program that would assist production supervisors improve their safety performance.

This program selected four essential points from the activities of a safety supervisor. Educational and training material was provided at the expense of and with the assistance of the Industrial Commission of Ohio, and the "Pattern for Progress," as it was named, came into being.

The Pattern for Progress revolved around four principal functions.

1. Investigation of all injuries with attendant analysis of reports to spot correctable hazards.
2. Safety analysis of all jobs leading to recognition and detection of unsafe habits, practices, and conditions before injuries occur.
3. Periodic inspection of all types including plant tools, facilities, equipment, fire protection equipment, etc.
4. Communication safety guides, posters, and safety committees.

The initial Cleveland group held numerous community meetings for industries' supervisors. The audience received instructions on various aspects of the above points. The program is continuing.

The Industrial Commission each year publishes a handbook for industrial supervisors, using essentially the basic four-point approach. The new annual handbook includes

complete text and material covering a different safety subject for each month. The publication in 1958 was called "Safety Slate for '58." In 1959, it was, "Safety Line for '59."

Work is under way at the present time to provide suitable material for 1960.

Let me cite an example of the acceptance of this program:

One plant had been paying 2.8 per cent of its payroll for workmen's compensation insurance. It now pays 8/10 of 1 per cent.

The State of Ohio has a unique insurance feature which will permit 85 per cent penalty or credit according to experience. The current basic rate for the pottery industry is \$3.25 per \$100 of payroll, or 3¼ per cent

of labor cost. The maximum uprating would be \$6.0125, or slightly better than 6 per cent of labor cost. The maximum credit reduces these costs to .4875 or less than ½ per cent of labor cost.

I have nine divisions operating under this rating plan.

It is the rule in these divisions to expect to spend 10 per cent of the amount saved on insurance premiums to cover costs of the "Pattern for Progress" safety program. This isn't very much, but the results have been so worthwhile we are studying ways to spend twice as much money effectively, without overloading the safety supervisors, who are giving up a part of their time for the safety effort.

SAFETY PROMOTION THROUGH GIMMICKS

By H. V. GARDNER

Director of Safety and Suggestions
Owens-Illinois, Toledo, Ohio

Each year our company selects one month to be "no accident" month. We have used the month of April because a ten-year study showed that we had the most accidents during the month of April.

However, in 1954 we used the month of May and our slogan was "Keep the Flag Flying." Each plant was supplied with a safety flag 6' long, 3' wide, green background with screened-on white letters saying "The Green Cross For Safety—Owens-Illinois—No Accidents." It also had the O-I trademark on it. The flags were double thickness and lettered on each side. They cost approximately \$10 apiece.

The purpose of the flag, primarily, was to have a flag-raising ceremony the first day of the month with the safety committee, the supervisors, the plant manager, the nurse, the doctor and the safety director all taking part in the ceremony. As long as the flag was flying under the American flag, that indicated there were no lost-time accidents. If an accident occurred during the month, the flag was not to be flown for a period of one week.

Three posters were used to launch this program. The first one was a large traffic

"stop and go" light and the red circle at the top simply had the word "no" in it. This went on the board three weeks before the beginning of the contest and stayed up for the first week.

The second poster was the same "stop and go" light again with the word "no" in the red circle and "accidents" in the yellow circle. This again stayed up for a week.

The third poster was the same as the first two posters. This stated "no" in the red circle, "accidents" in the yellow circle, and "in May" in the green circle.

In 1955 our slogan was "Keep It Clean." Three posters were used to promote this idea. The first poster was entitled "Keep It Clean" and showed a hand with a claw cleaning up. The idea here was to tie in good housekeeping and safety together.

The second poster showed the safety record for the months of March and April by means of two calendar months attached together. Red stickers, to show lost-time accidents, were pasted on the calendar the day in which they happened.

The third poster consisted of a large calendar showing the month of April and

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using the same red stickers to show when an accident happened. "Keep It Clean" meant to keep the safety record clean during the month of April.

Individual bars of soap stamped "keep your record clean" were sent to each plant. At the beginning of the month the supervisors gave each person in the plant a bar of soap and at that time talked to his people about working safely during "no accident" month.

In 1956 our slogan was "Be Safe In April." Here again we used the green cross safety flag to launch our safety program and we sent individual buttons entitled "No Accident Month" for the supervisors to give to every employee in the plant at the beginning of the contest.

Our first poster of the teaser type was "Get Ready" and it showed a large safe underneath the "Get Ready" sign.

The second poster was "Be Safe" and was put up the second week before the contest started.

The third poster, of course, was "No Accidents In April—Be Safe And Work Safely" and showed the workers coming out of the safe with safety clothing on such as glasses, helmets, hoods, safety shoes, gloves, etc.

In 1957 our slogan was "Safety Pays Off." This contest was billed as the world's largest poker game. Decks of cards were sent to each plant. On each of the five Mondays in April each person received one playing card, providing his department did not have a lost-time accident the previous week. Thus, each employee could get as many as five cards, but he still could have a winning hand with only four cards.

The poker game was played with both high and low. In order to win the prize for the low poker hand, the person had to have five cards. It was possible to win the high hand with only four cards. Any person having a lost-time accident was automatically out of the contest.

The cards were dealt publicly from a shuffled deck by the supervisor. The safety representative of the department recorded the card each person received and a copy of this record was posted on the bulletin board. In this way it avoided questions later and helped to build up suspense and interest.

The gathering of the people for the drawing of the cards gave the supervisor a chance to say a word about safety. Supervisors were not eligible for this contest.

Since some people did not understand the game of poker, the rules were written up and put on the bulletin board and also explained in the plant paper.

Four posters were used to promote this contest. The first was a teaser poster showing human hands holding the ace, king, queen, jack and four of spades, and underneath it were the words "Play It Safe."

The second poster was entitled "Safety Is A Good Deal" and showed a hand of 13 hearts. Underneath this was labeled "April—No Accident Month."

The third poster was labeled "Don't Gamble With Safety" and showed the person with five cards in one hand and a stack of chips in the other. Underneath that was the caption "April—No Accident Month."

The fourth poster showed three aces and two tens in a hand with the caption "Stand Pat For Safety" and "April—No Accident Month."

The 1958 campaign had the slogan of "Safety Carries You A Long Way." Printed postcards and balloons were sent to each plant to be distributed to each person in the plant. The balloons were filled with helium gas and attached to the printed postcards and were to be released the opening day of the contest. The cards were addressed to the Personnel Department of the plant and carried the name, department and clock number of each person in the plant.

Each person was given a printed card by his supervisor and was asked to sign it and give his clock number and department. At this time the supervisor talked about safety to each person in his department. The cards were then collected and turned over to the safety director. The safety director and the safety committee stamped the plant address on the cards.

When the cards were all signed and addressed, the safety committee inflated the balloons with helium gas and tied a balloon to each card with a 24" long piece of string. Balloons were released the first day of the month.

If no one in a department had a lost-time accident throughout the month, then

the person whose balloon sailed the farthest distance from the plant was eligible for a prize. If a person in a department had a lost-time accident, then none of the people in that department were eligible for a prize. The person whose balloon sailed the farthest distance from the plant was not only eligible for a department prize, but also for the all-plant prize.

Three posters were used to promote this campaign. The first one dealt with a woman standing on a Sputnik reaching for dollars and was entitled "Fly High With Safety During April 'No Accident' Month." This was appropriate inasmuch as it was the beginning of the Sputnik craze in the United States.

The second poster, which went up the second week before the contest, used the theme of "Around The World In 80 Days" and showed people in a balloon looking down on crutches, tape, hospitals, pills, casts, etc. and was entitled "Safety Carries You A Long Way."

The third poster showed a balloon attached to a card. On the balloon there was the slogan "Safety Carries You A Long Way." A person was trying to blow his balloon up into the air so that it would be mailed back and he would win a pot of gold. The bottom half of the poster was captioned "April—No Accident Month."

Large maps of the United States were drawn up and put in the entranceway of the plant and as the cards came back red pins marked the spot from where they were mailed. This created a great deal of interest as people were constantly checking the board to see where the balloons had landed. Some balloons came back as far as 800 and 900 miles. There were many weird stories connected with these balloons. Some of them were shot down from trees. Others fell in boats. Balloons had been mailed back to the plants a year later.

In 1959 our slogan was "Safety Is A Lifesaver." Small packages of Lifesavers were sent to each plant for the supervisors to pass out to his people each Wednesday during the month of April. The small packages of Lifesavers were purchased especially for this campaign. Each package had the caption "Safety Is A Lifesaver—April, of Lifesavers gave the supervisors a chance 1959—Owens-Illinois." The small packages of Lifesavers gave the supervisors a chance

to talk about safety five different times to their people during the five Wednesdays in the month of April. We felt that it was important that the supervisors pass these out instead of having them passed out at the gate. In this way the supervisor had a chance to discuss safety with all of his people.

A large poster, 24 in. x 24 in., showed a lifebuoy in the center. In the center of the lifebuoy there were places to write in the names of the lucky people whose names were drawn each Wednesday in a department that worked a week without a lost-time accident. The names could be drawn only providing the department worked through each week without a lost-time injury. In the event the department did have a lost-time accident during the month, no drawing was made during the week the accident occurred. However, the department was still eligible for a drawing the next week, providing it had no further lost-time accidents. All the names on the lifebuoy were then eligible not only for a department prize, but also an all-plant drawing.

This created interest since everyone was eligible for both prizes until the final name was drawn, providing their department did not have any lost-time accidents.

Three posters were used to promote this campaign. The first one was a teaser type poster and was entitled "Safety Is A Lifesaver" and under that it showed a picture of an ocean with the caption "Sea of Hazards" and a boy grabbing for a lifepreserver which had on it "Safety Pays."

The second poster was captioned "Stay Alert" and showed a young man smelling a spring flower and the lifepreserver becoming a clock indicating springtime and it was entitled "April—No Accident Month." There were also gears indicating the wheels of industry.

The third and final poster, which stayed up throughout the month, was captioned "Spring Is Here" and showed a picture of an injured person on a crutch standing on a boat dock with an outboard motor in a boat ready to go. The lifepreserver stating "Safety Pays" was nearby and under this was the caption "Don't Let An Accident Spoil Your Fun."

We felt that these campaigns, although never perfect, were very helpful in getting

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the proper emphasis on safety from super-
visors, safety committee members, safety
directors and the people themselves. Every
year we did show a considerable drop in

lost-time accidents, and we found that usu-
ally the month before and the month after
showed a reduced number of lost-time ac-
cidents.

INTEREST STIMULATORS FOR SAFETY AT WORKS SEVEN

By JOHN J. LONG

Director of Safety and Plant Protection, Works 7,
Pittsburgh Plate Glass Co., Cumberland, Md.

Attitude and continuing interest are the
most important factors necessary for the
success of a safety program. People are
the most important part of Works Seven's
injury-fire prevention approach. Education,
engineering and enforcement all have their
place in safe production. Interest stimu-
lators assist enthusiasm and get people into
the act.

On March 16, 1959, a plant safety slogan
contest was started at Works No. 7. The
purpose of the contest was to stimulate
thinking about safety, both on and off the
job. The Executive Safety Policy Com-
mittee, which consists of the plant man-
ager, assistant plant manager, department
heads and the safety director, discussed
and formulated the safety slogan contest
plans. The plant manager then explained
the plan as part of an agenda for a meet-
ing that he holds periodically with all em-
ployees of the plant. The following letter
dated March 12, 1959 and signed by the
plant manager was mailed to each employee's
home, explaining the rules governing the
plant safety slogan contest.

"As mentioned to you in our meetings last
week, a plant safety slogan contest will be-
gin on March 16, 1959. The purpose of
this contest is to stimulate thinking about
safety, both on and off the job. The con-
test will operate in the following manner:

"I. Each week a safety slogan will be
posted on the various plant safety bulletin
boards. The week will run from 12:01 a.m.
Monday to 12:00 midnight Sunday.

"II. Each week the name of an employee
will be drawn from a barrel in the Safety
Office. This barrel will contain the names

of all Works No. 7 employees, both salary
and hourly.

"III. The employee whose name is drawn
will be contacted on the job and:

A. If the employee knows the safety
slogan for that current week he will re-
ceive a cash award of \$1. *By knowing the
Safety Slogan for the week, the employee
becomes eligible immediately for further
awards as listed in 1, 2, and 3 below.*
If the employee does not know the safety
slogan for the week, the contest ends at
that point and he is not eligible for the
below listed items for that week.

1. If the employee is wearing safety
shoes—\$1 cash award.

2. If the employee can tell the num-
ber of consecutive days the plant has
completed without a disabling injury as
shown on Works Seven's Safety Board
at the main gate—\$1 cash award.

3. If the employee's safety unit, as
shown on Works Seven's safety board
at the main gate, has not had a dis-
abling injury during the current month
—\$2 cash award.

"A minimum 'jackpot' of \$5 will be avail-
able each week to the employee who answers
all the questions and meets the above re-
quirements. The 'jackpot' will be in addition
to the specific cash awards mentioned
above. An employee will not be eligible for
the 'jackpot' if he fails to qualify on any
of the above items under III. The 'jackpot'
will be increased each week by the amount
that an employee fails to win.

"IV. Simultaneously we will telephone
the employee's home. If a member of the

employee's immediate family such as wife, husband, son or daughter knows the weekly safety slogan, or the number of consecutive days the plant has completed without a disabling injury, they too will receive an award of \$2. In addition, if a member of the family wins the \$2 award, all members of the immediate family will be given National Safety Council automatic pencils. All the \$2 home awards not won will jackpot for the next weekly home winner.

"Names drawn each week will be returned to the barrel immediately, thus making all employees eligible each and every week of the contest.

"Let's improve our safety record for 1959."

We knew ahead of time that to make this plan work required (1) that every employee had confidence in the operation of the program; (2) that all posters with the weekly safety slogan were placed on bulletin boards on schedule; (3) awards were made promptly and fairly; and (4) the program received continual publicity.

Slogans are posted on the large main gate bulletin board and ten safety bulletin boards in various parts of the plant. We do not give out a printed slogan. We expect and urge our employees to memorize the slogan or write it down and take it home to their families. The number of consecutive days is an important section of the main gate bulletin board.

This interest stimulator idea caught on from the beginning and seems to gain interest as the consecutive days of safe production without a disabling injury mounts.

As I go through the plant, workers stop and say, "Are you looking for me? the safety slogan is and I have my safety shoes on"; "Go ahead and call my home, my wife's ready with the slogan" or "My wife gave me hell last week when my name was drawn and I didn't know the safety slogan". The employees also make a habit of writing the slogan and the number of consecutive days on their workbenches or in the area they work.

As soon as the employee whose name has been drawn is contacted, we immediately call his home. Then we broadcast the outcome by a bulletin at the main gate with a large safety slogan contest record display.

PITTSBURGH PLATE GLASS
COMPANY
GREEN CROSS FOR SAFETY
WORKS SEVEN
SAFETY SLOGAN CONTEST
EMPLOYEE CONTACTED _____
AMOUNT WON
BY EMPLOYEE
\$ _____
BY EMPLOYEE'S FAMILY
\$ _____
AMOUNT IN JACKPOT NEXT TIME
FOR EMPLOYEE
\$ _____
FOR EMPLOYEE'S FAMILY
\$ _____

An additional interest stimulator program was started titled "Safety Shoe Month". The impetus for it originated with Works Seven's Executive Safety Policy Committee. The plant manager finalized the program by appointing a committee that consisted of the assistant plant manager, storeroom supervisor and Works Seven's safety director. The following program was placed into operation. First, the following letter and bulletin went to all supervisors.

"TO: All Supervisors

"SUBJECT: Safety Shoe Month—June 1 to July 1, 1959

"To incite additional interest in the wearing of safety shoes, please have the employees in your department complete an individual 'Safety Shoe Month' contact form. Mail the completed forms to the safety department.

"During 'Safety Shoe Month', June 1 to July 1, 1959, two (2) pairs of socks will be given with each pair of safety shoes purchased. A bonus drawing will be made for a 7 transistor radio, with a leather carrying case, when 50 pairs of safety shoes are sold.

"We suggest that you use the 'Safety Shoe Month' information as one of the topics in your departmental safety meetings.

"J. B. White
"Plant Manager"

Safety Shoes—An Ounce Of Safety

An ounce of steel in a safety shoe toecap is worth a thousand pounds of 'regular' shoes when a heavy object falls on your toes.

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Safety shoes are available to every Pitts-
burgh Plate Glass Company employee at
the storeroom. It is important that the em-
ployee is fitted correctly with a pair of
safety shoes. Works Seven's safety shoes
are sold at the manufacturer's cost price.
The employee can pay for them by payroll
deduction.

SALES FEATURES

1. "Sock saver" leather toe lining.
2. Perspiration proof leather innersole.
3. Perma counter non-distorting heel cup.
4. Sole leather inner counter.
5. Seamless backs.
6. Sewed with "dacron" by duPont.
7. Steel shanks.
8. Steel toe box that will take one ton at 18 inches.
9. Leather, neoprene, or cork soles.

Obtain a pair of safety shoes today. You
never know when you might need them.

John J. Long

The Safety Department then made an ac-
curate survey of all employees. The survey
covered (1) who was wearing safety shoes
and (2) the employees who were not wear-
ing safety shoes. They were asked for an
explanation of their reasons. This survey
was made by personal contact with each
employee by the department supervisor.

The cost of the awards promotion is
being assumed by Works Seven. The shoe
manufacturer's representative assisted by
giving suggestions, furnishing additional
styles of safety shoes to our normal stock

room inventory during the "Safety Shoe
Month" campaign. He also spent one full
day at Works Seven. He and the safety
director went into all of the departments
contacting individual employees who had
previously made safety shoe complaints, or
who were not "sold" on safety shoes.

Bulletin boards carry special made bul-
letins related to Works Seven's "Safety
Shoe Month". A large poster is also used
at the main gate in addition to a glass
showcase display of the styles of safety
shoes and awards (transistor radio, socks,
shoe polish).

At Works Seven we have already had
three "golden shoe" winners. Their photo-
graphs and description of the accidents at
Works Seven and of how their feet were
saved by safety shoes were emphasized on
bulletin boards. Also, this was used in the
Topic of the Month bulletin that is fur-
nished by Works Seven's safety director to
each supervisor every month for his de-
partmental safety meeting.

In conclusion, at Works Seven we be-
lieve interest stimulators have their place
in safety. They are not a short-cut or an
easy method to injury-fire prevention. All
of us in safety work know the basic in-
gredients of a successful safety program.

All employees should be thoroughly in-
doctrinated in these basics before you cam-
paign with programs that ask people to
take an active interest in their own per-
sonal safety. Safety is intangible and in-
terest stimulators assist a busy foreman
toward keeping his employees safety con-
scious while on or off the job.

WHAT LINE SUPERVISION THINKS OF SAFETY

By F. M. ACKER

Plant Manager, Textile Fibers Department,
E. I. du Pont de Nemours & Company, Old Hickory, Tennessee

Survival has been man's most ardent oc-
cupation. We can go back to the stone age
and find our forebearers busily engaged in
developing new weapons to protect himself
and family from his adversaries. Down
through the centuries, conditions and meth-
ods may have changed but today we are

basically faced with the same problem of
equipping ourselves with new techniques and
methods to withstand the attack of oppos-
ing forces.

We have represented here a cross section
of men and women from the glass and
ceramics division of industry. Some of you

represent multi-plant organizations much the same as my company, with operating and sales outlets in just about every part of the United States and a few in foreign countries, and employing several thousand employees. Some represent a relatively small organization that has been established for many years and employing just a handful of people.

In the large organization, lines of authority are relatively long and communications from the top to the bottom are probably less accurate than the small organization whose president, general manager, plant superintendent, purchasing agent and general foreman may be composed of one or two individuals.

Top executives in a large organization may not visit all their various operating units over a period of many years and never have an opportunity to know production line workers on a personal basis. Contrast this to the small organization whose owner is president and makes contact with just about everyone on a daily basis and moreover has a good knowledge of the personal lives of his employees and families. The warmth of personal relationships between the top executive of a large organization and the production workers is lacking, as compared to the small enterprise.

These are just a few of the variables we have in our industrial relationships and it might be concluded that the basic ingredients of a good safety organization must also vary according to local environment. This may be partly true of method and approach, but the basic problems are pretty much the same.

For many years our company, which has 78 plants scattered throughout the United States, has tried to determine positively why one of its operating units enjoys an outstandingly good record while another unit is comparatively poor.

Are some of our operations more hazardous than others? Is a plant located in the North or South more accident-prone than those located in the East and West? Is the makeup of a plant's organization with predominately young or old people or male and female a factor? Has the plant with modern, up-to-date equipment an advantage over one whose equipment is obsolete and out of date?

These and many other variables have been thoroughly analyzed and we conclude that such variables are unimportant. Some of our most complicated and difficult chemical operations are among our safest. No particular pattern as to plant location, equipment obsolescence and the age and gender of the work force is indicated, and we have concluded that safety of operation is a matter of *individual responsibility*.

My message, therefore, will be directed to those basic ingredients which encourage individual responsibility, regardless of the size of your company or your organizational responsibility.

It must be apparent to all that the success of our industrial effort today is the sum total of the abilities and skills of many people. The one-man organization is fast disappearing from the American scene. I was prompted to make that statement because the title of my talk—"What Line Supervision Thinks of Safety"—implies that I am expressing the thoughts of many people, and that is exactly what I am about to do.

Our plant organization was asked what, in their opinion, were the main ingredients of an effective safety program. Without hesitation and with unanimity of expression, they said the No. 1 item was "the boss."

So, let's take a look at the "boss." It makes little difference if your boss is president or vice-president, general manager, plant manager, an area superintendent, or if he is some combination of several of these titles. He must be the spark that initially triggers a series of events that filter down through his entire organization if personal safety is to be an important factor in our everyday living. Just as sure as he is the man who sets the pace for those qualities of leadership that result in a successful enterprise, so must he be the "pace setter" that sets the stage for safety of operation.

Not so long ago I was requested to make a talk on industrial safety before a group of supervisors in a plant of one of our well-known industrial institutions. Prior to the meeting the safety supervisor of this plant took me aside and, in a subdued voice, said one of my troubles here is to get the boss to listen to me. He seems to want safety but he doesn't want to take time to discuss safety problems. He cautiously sug-

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gested that I direct some of my remarks to assist him in getting the boss interested.

In my opinion, the person who merely gives lip service to personal safety does as much to retard it as he does to help it. If your place of work is to be a safe place, the boss not only must believe in safety but he must take an active interest and set the example. He must take time to visit the various work areas and be alert to off-stand-ard conditions and see that proper action is taken to overcome them. He must be ever sensitive to the need for finding better and safer ways of doing a job. He must set goals of safety performance that can be met only when every person in the organization understands that safety is his responsibility and is willing to pay the price to obtain it. He must have a contagious enthusiasm that sparks safety interest every minute and every day, both on and off the plant, because safety isn't a part-time job.

Cultivating and building the necessary restraints that promote safe habits require a courageous discipline—and our emotions are not inclined to an off and on procedure. If your boss practices safety solely because he understands it as a part of his official duty, then the scoreboard of your safety effectiveness will show some disappointing results. He must not only believe it as a result of his own emotional being, he must live it and practice it—always. In so doing he will be setting the pace for all who come in contact with him and his satisfaction will be manifest in a feeling of putting a few plusses in the pot of life. So, for your No. 1 item put down the "boss."

For the No. 2 position in creating personal responsibility—"organization." The most safety-minded, conscientious boss in the world can't just say I want a safe plant and get it—there must be an effective organizational structure. He must get results through people, and by this I do not submit that safety can be secured by remote control. His safety organization must reach people in all echelons of responsibility from the boss to the production worker. A creative organization is a participating one, and it will soon be found that the source of some of your most worthwhile safety ideas come via the suggestion box.

While many of our plants employ a safety supervisor to whom we look for safety

guidance and advice, his duties conflict in no way with those of line supervision who have direct responsibility for all activity in their area of influence.

If his ideas on safety conflict with those of the safety supervisor he appeals his case to the "supreme court," which is a central safety committee with each major department represented and chaired by "the boss."

Under the heading of organization comes safety meetings. It has been our experience that meetings, per se, have little meaning unless they offer some sort of personal stimulant to our safety effort. We have seen poor safety performance in areas where meetings were more numerous than areas where performance was good. It isn't so much the number or duration of meetings—it's the subject matter and the way it's presented.

I have seen some meetings where the men conducting them were completely unprepared and the meeting usually ended in a griping session over some matter other than safety. Fortunately these are in the minority as most of our meetings assign specific responsibility to some individual or group wherein a specific problem or program is thoroughly and attractively presented.

A most popular meeting at our plant is known as the "tail gate" meeting. It is usually held at the beginning of each work day and lasts from 5 to 10 minutes. A foreman calls together his group in a quiet corner of the plant and discusses the safety aspects of their various assignments. His remarks may range from some precaution in the use of general equipment or it may have some bearing on a new or particularly hazardous job to be performed that day.

The men themselves freely discuss the safety aspects of their assignments and a team effort is generated that promotes individual responsibility. If through the day unknown conditions arise, work may be stopped until the facts surrounding the situation are known and the safety aspects have been reviewed by all concerned.

The last point to be made under the heading of "organization" is the personalities occupying the various echelons of authority. The best organizational structure in the world can be retarded by one inactive, disinterested, uncooperative individual or one

who performs just well enough to stay on the payroll.

If a supervisor is sloppy with his safety he is probably the same in matters pertaining to quality, cost and employee relations. I don't feel that this subject needs much comment because there are usually two courses of action—first, a frank appraisal and a conscientious effort to get the person to perform in a more effective manner. This failing, he is either removed or you put up with a poor job. Before leaving the subject of "organization," I would like to take a look at the foreman—that all-important link between the boss and the production worker.

All too often I am afraid we overlook the importance of keeping our foremen well equipped with the proper tools to do an effective job. An organization blessed with alert, well respected, intelligent foremen is well on its way to establishing not only good safety performance, but records in quality, cost, productivity and employee relations.

Not so long ago on one of our construction jobs an alert foreman probably prevented a serious accident. On the particular day in question, plans had been made to lift a piece of heavy equipment in place on the roof of a tall building. The work was to be done by using a portable crane with a long boom and extension. In placing this equipment it was necessary to lift the load over operating equipment with very close space limitations—it was a job for a well seasoned, emotionally stable crane operator.

The day before, the foreman picked out his best man (call him Joe) and went over the entire job. They considered all the hazards involved, checked the equipment and made the necessary plans to do the job. The following morning when Joe came to work the foreman noticed he was limping slightly and asked what was wrong. Joe replied that his knee was a little sore because he had twisted it the night before at home in the yard but it was O.K.—it didn't bother him too much.

The foreman, realizing that his bad leg was the one used to brake the load on the crane, didn't want to take a chance and, being anxious not to hurt Joe's feelings, said, "We have decided not to go through with the crane job today and I would like you to do some work in the rigging loft."

This alert foreman did three things in just a few seconds—first, he stopped a job that he wasn't sure could be done safely; second, he handled the situation in such a way that Joe was spared embarrassment, and, third, he gave Joe mostly a sitting down job to rest his knee in hopes that he would be able to do the job tomorrow.

There are many such stories to be told and the point I want to make is the importance of having your foreman check every man every day on coming to work and, in addition, to know his people so well that he can detect emotional irregularities and take corrective action before something happens.

An alert supervisory organization is priceless. If you don't have it, get an effective training program underway immediately.

The No. 3 item on my list is "program." Line supervision feels that an attractive, interesting program, well publicized and presented, wherein a maximum number of people take an active part, is most effective in establishing "personal responsibility." This is a general program for the entire plant and does not take the place of any additional program the individual areas or sections contemplate.

I recall three years ago one of our areas was having 80 per cent of all the injuries. The supervisor in charge decided that something beyond the general plant program was needed and set up a system of daily individual safety contacts and required his supervision to make a one-hour safety inspection every day. The results were catalogued and studied, and before the year was out he had one of the best performance records in the plant. His investigation revealed a general letdown, due mainly to a morale problem that developed over working conditions and was not recognized until an exhaustive search was made.

Regardless of what kind of business we are in, we must have a plan before we can effectively produce. A top flight captain and crew in England must chart a course or file a flight pattern if they expect to arrive in New York or Rome or Tokyo. It's not enough to know that the plane is airworthy, it must be directed by a predetermined plan. This requires forethought and study; the problems of flying have to be understood and compensated for, and as the flight proceeds adjustments must be made to com-

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interpretation of original data. The entire
crew must be ever alert to the needs of the
hour, because only by constant vigilance
and adjustment—a changing of emphasis
from one condition to another—can the flight
be successful.

Planning a successful voyage in personal
safety is a challenging experience because it
deals mostly with the complex problem of
human emotion and behavior. It may be well
to think of the program in terms of train-
ing and, before we embark on a training
program, we must define the needs. I have
seen examples of very effective programs
and others that did not seem to accom-
plish the job.

I purposely did not use the words "good"
and "bad" programs because I am afraid
that what we might call a bad program is
not really that it isn't worth anything—it is
probably one of two things. Either it is out
of place or premature or it is not properly
presented. Something like trying to teach
logarithms before the multiplication tables or
it may be that the instructor isn't capable of
teaching.

We have a situation in our company right
now that illustrates my point. I will discuss
this further under the next heading. We
have been trying to find some effective way
to measure safety effectiveness and eight of
our plants embarked on pretty much the
same general scheme. After one year we
find some plants losing interest in its effec-
tiveness and others claim it's the best safety
tool we have developed for sometime. Every
organization has a certain character; its
needs differ from others; some are old and
experienced; and others young and untrained,
and I believe the needs of a particular group
must be studied and a program planned to
satisfy the need.

An organization that has been exposed to
a well balanced safety effort for sometime
does not need the same ABC fundamental
approach as a group of new recruits with-
out any safety training at all. I feel that
this is an important point to recognize be-
cause very often we hire young people who
are unaccustomed to our industrial methods
and very often they are placed with older
hands without proper indoctrination, includ-
ing personal safety.

Care also needs to be exercised in chang-
ing people from one job to another. Before

a man is left alone on a new job, he should
be acquainted with the safety rules and reg-
ulations and any outstanding hazards that
he may overlook.

I believe, however, there are certain basic
fundamentals that assist any program, re-
gardless of its specific needs, and I would
like to name just a few.

Begin and end the day with a safety
thought. This can be done by having an at-
tractive, well maintained safety sign at the
plant entrance. It may carry a brief safety
thought, or it may show the number of in-
juries or elapsed days since the last report-
able injury. Don't clutter it up with a lot
of words or statistics. If your plant layout
permits, you may have a safety sign at the
main exit that carries a message to encour-
age safety on the highway and at home.

The first few minutes at your desk or in
your work area should carry a safety
thought. Almost before I can say "hello"
and "good morning" to my office force the
safety supervisor appears to give me a safety
audit for the past 24 hours. This includes
injuries on and off the plant and near seri-
ous injuries. What happened—how it hap-
pened—and action taken to prevent recur-
rence. Some plants put this safety audit on
a tape and you can get it by dialing a certain
number.

Selling safety by placing appropriate signs
at well travelled locations or at lunch count-
ers or cafeterias is helpful. A short safety
message on automotive equipment—our com-
pany cars have the words "Drive Carefully"
printed on each side, and all cars are
equipped with safety belts.

Establish a safety theme—Safety is an
all-time job—Safety is our business, not our
sideline—Safety is your responsibility—
Safety is a way of life—these and hundreds
of others can be used effectively on your
letterhead, at the bottom of memo pads, or
they may be printed on small inexpensive
buttons and given to all employees. "Today
I will work safely" buttons have been used
effectively in some of our plants.

Your program should include a safety
audit of all operations—and don't forget the
offices. It's surprising how many unsafe
practices you will find in the central steno-
graphic pool.

The use of proper equipment—safety
shoes, safety glasses, hard hats and many

other types of specialized equipment should be studied. If a plant or area requires certain types of safety equipment, it should be for everybody entering that plant or area—yes, even the boss.

Your program should include the active participation of the mechanic, production worker, and operator, as well as members of supervision. The safety proctor system, when properly established, is most effective. A member of each small crew is designated for one week (this may be varied according to conditions) as the safety proctor of his particular area and is given time each day (and don't make it too short) to look for any hazards or off-standard conditions. Promptness in handling unsafe conditions thus reported will soon build a feeling that safety is not only important but it's "my responsibility."

When you have made progress with on-the-plant safety, you should stress the need for off-the-plant safety. "Safety is an all-time job" or "Take safety home with you" are types of slogans suggested to kick off this important effort. I repeat that proper safety attitudes do not result from an off and on procedure—it's an all-time job. I had a personal experience a few weeks ago that illustrates this point.

I asked one of the boys from the plant labor crew to help me at my home one Saturday morning and, during the course of the day, I asked him to knock the top off a big mound of concrete that had been left there by the construction men. I gave him a heavy steel point and hand hammer to do the job. He hesitated a moment and said, "Boss, I can't do this job because I haven't any eye protection."

That's the kind of safety care and action that pays off. I had a pair of coverall goggles in my back pocket all the time, and I assure you I complimented George most highly on his safety attitude.

Ask your employees to make a habit of checking their homes and automobiles for unsafe conditions or fire hazards. You will find that your employees will respond to these requests in surprisingly large numbers.

General safety rules covering the specific needs of each area should be posted in a well lighted location. Every operator should be "checked out" periodically to see if they are understood. A new man on the job should

be well instructed in the safe operation of equipment in his area.

Your safety program should include a sure-fire reporting system, both up and down the line. Communications in safety work is just as important as monitoring information on the rifle range—you must know where your shots are landing so you can correct your aim. Proper functioning of committees and inspection teams is a must if your program is to produce results.

Much more could be said on program but I want to cover the last item which I feel is most important—"measuring results."

Ask almost anyone in your organization how they measure their safety effectiveness and they probably will say by the number of injuries or the frequency rate. Ask the top man in your state patrol how safe it is to travel on the highways of his state and he will probably recite some statistics about traffic accidents last year and what it looks like this year. How safe were we in our homes last year—27,000 people lost their lives in the United States.

My friends, is this a measure of your safety or your lack of safety? Isn't it a measure of how *unsafe* we are? At least you will have to admit it's a negative safety measurement. This is just measuring what has been—wouldn't it be wonderful if we could be positive in our measurement and see the rapids ahead before we entered into the swirls that toss us about and suck us under?

You men and women of the glass and ceramics industry know that if proper processing conditions are not maintained you end up with a mess of junk on your hands. Do you just start things rolling and keep your fingers crossed until the cycle is complete, and just hope things come out all right? Or do you closely monitor the various conditions of temperature, speeds, flows, additions, time and the many other variables that need adjustment?

Of course, you keep tab on every variation because that's the only way you can come up with a quality product. Your effectiveness is measured by the first-grade yield—not by the heap of junk at the plant dump. That's a measure of how ineffective you were.

Why not measure safety effectiveness by monitoring the things that lead to unsafe

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conditions rather than wait until things get so far out of control that you wind up with a broken leg or arm or maybe the loss of a life.

One year ago last May we, at Old Hickory, embarked on just such a measurement scheme. I might say we were not the first in our company to try it. We more or less borrowed a system that had been tried for a short period in some of our other departments.

You can call it a "safety control program" or a "safety measurement index," or any other name, but it works like this:

The plant is divided into ten major inspection areas. There are five inspections made each week and statistically it is evident that each area under random drawing will be inspected on an average of once every two weeks. The areas to be inspected are drawn by the safety office on Friday morning. This information is not disclosed until shortly before the actual time of inspection.

The inspectors are members of supervision, including the staff and area supervisors or equivalent. The inspectors for the forthcoming week are drawn on Friday afternoon prior to the inspection week. Following the drawing, the inspectors are advised of the day, but not the area, they are scheduled to make the inspection in order that they may reserve free time during that day.

Two inspection times are drawn each day to allow the scheduling of the inspection with a minimum of conflicts to previous commitments by the inspector.

The inspector proceeds, along with a member of the safety department, to the area 5 minutes prior to the time of the inspection and is accompanied on the inspection by the ranking member of supervision. In the event no member of supervision is available, the inspection is made as usual. Inspection time is one hour.

Area supervision is responsible for correcting any items uncovered and making a prompt report of the inspection to the safety department.

Inspectors observe two things:

1. Actions of people, classified as safety rule violations, unsafe practices, or poor safety judgment.

2. Physical plant conditions, such as poor

housekeeping where there is safety involved, equipment hazards such as inadequate guarding, and other physical conditions of the plant which could produce injuries.

Each inspection is given a numerical value as follows: Total items found (acts of people and physical conditions) divided by the number of inspection minutes.

Charts of the areas inspected, showing their *potential injury index*, are posted in the area offices.

In addition, the inspection team makes work cycle checks or parts thereof depending on the job, and sometime during the inspection the staff member of the team contacts at least three employees on some phase of safety.

The employee may be asked what he considers the greatest safety hazards of his job, how many times he is normally contacted on safety matters, or what, in his opinion, would make our safety program more effective. Also, he may be asked certain questions about the program for that particular month. His answers will, in part, be a measure of the effectiveness of our communications (if his supervisor is doing an effective contact job by being understood) and the employee's attitude in general. Prompt action is taken in those cases that appear to need attention.

The safety department member of the inspection team makes sure that all of the inspections are carried out on a comparable basis. This gives more uniformity to our inspections and the variable index figures are not the result of one team being less critical than others. Again, with more experience, this item will become less important.

At the staff meeting each Monday morning, a member of the safety department reviews briefly the results of the inspections for the previous week.

We have had about 18 months of experience now with this type of measurement and it is the consensus of opinion by all that it is the most effective safety tool we have developed in sometime.

The results of our manufacturing effort are a measure of how well we control the processing variables. By the same token, our safety effectiveness requires continuous vigilance and checking the many factors that produce satisfactory performance. Our problem has been and continues to be to properly

identify and measure all the variables that affect safety effectiveness.

We do not consider that the type of safety measurement effort, which I have outlined, is the perfect answer to this problem. On the contrary, it will require much more study and refinement to make it a more effective tool. However, in its present form it is serving a very useful purpose in promoting a greater safety awareness and placing our overall effort on a higher plateau of accomplishment.

My comments thus far have dealt pretty much with the present—what about the future? What about "Safety in the Sixties"—What has been the record in the fifties? During the past 10 years, over 900,000 accidental deaths have occurred in the U.S.A.—146,000 of these were industrial and the remainder, or about 785,000, were non-industrial. Traffic fatalities accounted for over 350,000. A frightening situation to think about.

I believe the foregoing analysis definitely suggests one basic fact—If the sixties are to be safer than the fifties, what we have been doing is not good enough. We must accomplish more—much more. The character of our living is rapidly changing whether it be industrial or social. The present atomic age is ushering in many new areas of activity. Daily we read about almost unbelievable development and discoveries—man is literally reaching for the moon. It seems to me that the challenge of the sixties is to do a little catching up so that the development of character and moral responsibility is more in keeping with our scientific growth.

As individuals and as nations, we must care for the well being of ourselves and our neighbors. I claim no originality for this statement—it is as old as life itself—but its antiquity does not detract from its implied responsibility.

I know of no way to forecast, within any acceptable degree of accuracy, the new problems that the many changes of the next ten years will bring. That the immediate years ahead will be challenging is, I believe, without doubt. We will see a greater competitive awareness, a growing concern for our national solvency, a greater fear of opposing philosophies. Space flight is almost here and travel to other planets is in advanced stages of planning. These and many more will be

our lot as men reach into the tomorrows in their search for the more abundant life.

Unquestionably these concerns, regardless of how major or minor they may be, will usher in new values and force upon us new methods to meet the new conditions. This is just as true in the field of personal safety as it is in labor relations or foreign policy.

The question might well be asked, if we cannot predict with any degree of accuracy what the changes will bring—how can we prepare for it? This is a good question, however, I am convinced that regardless of the complexity of our future problems there is a common denominator of effort that will make our work place, our homes and our communities safer places to live.

Safety cannot be legislated—it must be lived—it must be accepted as a personal responsibility. We can insulate people from all the known hazards, but we can't do their thinking. "As a man thinketh, so is he." So, in keeping with the theme of this Congress, let us get "Safety in the Sixties" by making "Safety a personal responsibility."

A properly directed program at work will carry over and be felt to some degree in the community. However, if we are interested, and we certainly should be, in reducing the number and severity of accidents that happen beyond the boundaries of our work place, this plant safety carryover isn't enough. It must be stimulated by active participation on the part of civic organizations and public officials.

Those of us who really want to contribute something worthwhile to the community effort have an excellent opportunity to do a great public service by approaching the superintendent of schools, the PTA, chamber of commerce, civic clubs, churches, boy scouts, girl scouts, YMCA, chief of police, and many others, and offer our services in planning and effectuating a program that will make our homes and communities safer and happier places to live.

I am going to close by telling a story—incidentally, a true one. There is a small community in the South with a population of about 5,000 people. For the most part the people are employed in a local plant owned and operated by one of our large chemical organizations.

This particular company places a lot of emphasis on personal safety, and about

twelve years ago one of the engineers at this plant reasoned that if our personal safety was good for grownups it must also be good for school children, and he was instrumental in selling to the principal of the local grade school the need for a safety program.

It wasn't long before his enthusiasm spread to the teachers and students and parents, and as a result the children of this school have, during the past five years, been nationally recognized twice as the safest school in our nation. Incidentally, the name of this community is Old Hickory, Tennessee.

NOISE CONTROL — SUCCESSFUL CASE STUDIES

By J. C. RADCLIFFE

Supervisor, Industrial Safety Section, Ford Motor Co., Dearborn, Mich.

During the past ten years the question of noise and its affect on hearing has received increasing emphasis. Noise has been receiving this emphasis because of our increased mechanization and automation of work processes. Parts which previously were toted from place to place manually, now are placed on conveyors which carry them over, under and around to a place where they are dropped or pushed onto a new work loading station. Compressed air is being applied to the problem of moving parts or activating machines, sometimes without concern about the noise produced.

The actual application of power in any form necessitates the use of cams, levers, clutches—so that machines have many moving parts which must contact each other or the part being worked. Every contact can cause noise, and these machines must be constantly maintained in order to eliminate loose parts or poor fits which will create a noise source during operation.

The basic principles of noise control can be classified in the following manner: 1. control of noise at source, 2. segregation of noisy machines or equipment, 3. replacement or change in procedures, 4. preventive maintenance.

Some noise reduction can be accomplished without difficulty by application of these four principles. In some instances machines or areas may be quieted by a single method. Usually, however, multiple sources are present and several methods must be used to secure the desired result. Frequently, the control may be so complex that the services of acoustical consultants are needed to bring about a non-hazardous working environment for employees.

The measurement of noise exposures is best done with instruments that read in decibels—sones—octaves—Humans respond slowly—we need tools.

Ear plugs, muffs or combination of these protective devices are a last means of control. They will provide from 15 to 30 decibels of attenuation primarily in the high octaves. In some instances no other control can be used. If plugs are used, good fitting is paramount to having the men use them. One of the better plugs is a plastic type with a beeswax inner sac which gives lubrication and is pliable so that ear fitting is much better than with other plugs.

These various control techniques, illustrate an area in which the safety engineer can exert his influence. By being familiar with what has been done he can aid his company engineers in putting into effect good in-plant control measures.

One other area where the safety engineer should be alert is in the field of workmen's compensation law. Gradually, many states are beginning to consider the passage of specific legislation for workmen's compensation payments for permanent partial loss of hearing. New York, Missouri and Wisconsin already have such special laws.

In other states, some awards are possible under the existing workmen's compensation laws. Still others have been considering special legislation in their most recent meetings. I believe that the safety engineer in industry must keep abreast of his own state's trends in this matter. Where practical he should make himself heard so that whatever legislation is finally considered is accurate, fair and one within which his company can function satisfactorily.

INDUSTRY ROUNDTABLE DISCUSSIONS

GLASS AND FIBER GLASS DISCUSSION GROUP

WILLIAM H. KOPPERT, Discussion Leader
Safety Supervisor, Owens-Corning Fiberglas Corp., Newark, Ohio

Safety and Outside Contractors—Several members of the discussion group outlined their company's program on this subject. Some do not have the problem in that they put outside contract people on the company payroll thereby automatically rendering them obliged to comply with the company safety rules.

Some companies do not concern themselves with the safety practices of outside contractors, feeling that such is the responsibility of the contractor and his representatives in the plant. Some companies have plant safety rules that apply to the contractor and the company employee, including company safety requirements. This is only in certain circumstances.

All parties have problems with safety education from plant to be a part of policy.

Certainly, in their experience for construction, a help or a hindrance.

Safety Programs—A variety of practices on this subject, but it was clear that all companies have taken steps for protective protection and safety.

Essential elements of the various programs are as follows:

1. Schedule only certain areas of the plant to be seen by visitors.
2. Rope off aisles for large groups, or rope off areas not to be included in plant visits.
3. There was considerable discussion about signed releases. Various states give varying legal credence to signed releases. Even in the states where they are not worth much legally, some plants do require releases to impress safety on the visitor if nothing else.

4. One company represented had so much difficulty with visitors that they were obliged to discontinue all guided tours of casual visitors. This would, of course, not apply to customers, vendors, etc.

5. The minimum age permitted varied somewhat, running between twelve and sixteen.

One company takes great effort to insure that all guides are safety trained.

Some companies supply safety glasses to visitors. Some use the light plastic frame type that is easy to get the glasses back on and return the glasses to the company.

Lockout—There was not much discussion on this subject that involved glass and ceramic. The discussion centered around machines, etc. The companies which the participants discussed, most of which were below the six or seven million dollar annual lockout production.

One of the most vital considerations in the construction industry involves the effective use of equipment as it is in the time that it is put to use.

Safety Committee Members—The discussion on this subject veered into management-union relations on several occasions and proved to be interesting.

Regarding this heading, however, one company stated that the key part of the maintenance of their safety training program was that supervisors were obliged to contact each person once a month for two or three minutes on the subject of safety and report each contact.

Another company, the department safety committee is appointed by the plant manager and they operate on a full-time basis.

More exact on this subject, the matter of return-to-work of disability employees came

up and several participants mentioned that their companies were not in favor of the policy of returning employees to light work pending their complete recovery. Also this sometimes adversely affected their safety record and they felt it was to the best interest of all concerned to wait until the employee is completely recovered and able to perform his regular duties before returning him to work.

Budgetary Control Safety Costs—It was volunteered by one company that each department is charged with a percentage of all safety costs based on the number of members in each department.

The question of whether one plant or multi-plant corporation should be charged at all for accidents and safety was discussed. It was generally agreed that the cost should not be charged real dollar cost.

realistic and further hampers the safety message.

Discipline of Safety Rules—Each participant stated that they do not discipline employees for violations of safety rules, if they were actually hurt as a result of the violation. They felt that the injury alone was sufficient punishment. To this another representative asked, "How can we effectively control accidents without discipline even if the person is hurt?" To this question some agreed; some stated that the supervisor should be disciplined for not seeing that the employee followed safety rules; and some felt that a man who violated safety rules was unjust. Still others felt that discipline on its own could not control accidents and that it was an aid to the right.

Kaiser Aluminum & Chemical Corp.

Safety Provisions for Visitors—The group discussed safety provisions for visitors and outside contractors. It was agreed that guides should be planned. Usually the safety committee lay out planned tour routes through areas that would minimize hazards. It was agreed that the guide, familiar with the plant and its routes, for each group of 8-10 visitors.

Minimum age for visitors should be at least 12 years. It was agreed that teen-age groups usually require special provisions; such as, five visitors per guide since they are very curious and active. Everyone agreed, that personal protective equipment that is required by the workmen in the shop areas, included in the tour, must also be worn by the visitors.

The group then discussed the potential problems encountered, when outside contractors are working in a plant. It was agreed that the key step, is to include in the contract itself the stipulation that contractor personnel must comply with the plant safety regulations.

The majority of the group agreed that

several questions were asked: How serious is the machine hazard at your plant? What do you consider the most serious machine hazard at your plant? What type of accidents and how frequent are they in connection with these machine hazards and what are your control measures?

In general, the group felt that the most effective approach is to guard all moving machine parts that are six foot or less from the floor, either by enclosure or positive isolation. It was particularly noted that elevated work areas must be carefully studied, as maintenance personnel, such as, oilers are frequently exposed if moving machine parts are not guarded. In discussing large drive units, employing overhead belt systems, it was stated that shielding is required to pre-

INDUSTRY ROUNDTABLE DISCUSSIONS

GLASS AND FIBER GLASS DISCUSSION GROUP

WILLIAM H. KOPPERT, Discussion Leader
Safety Supervisor, Owens-Corning Fiberglas Corp., Newark, Ohio

Safety and Outside Contractors—Several members of the discussion group outlined their company's program on this subject. Some do not have the problem in that they put outside contract people on the company payroll thereby automatically rendering them obliged to comply with the company safety rules.

Some companies do not concern themselves with the safety practices of outside contractors, feeling that such things are the problem of the contractor and not the principal. Other representatives included compliances with the plant safety rules as part of the outside contractor and thereby enforce compliance including compliance with protective equipment requirements. Still others require compliance only in certain areas or under certain circumstances that warrant.

All participants agreed that one of the big problems is the borrowing of both plant and safety equipment by contractor members from plant stores. This was felt by some to be a problem that needed a great deal of policing.

Certain states are more strict than others in their enforcement of state safety codes for construction and thus this factor is either a help or a hindrance as the case may be.

Safety Provisions for Plant Visitors—A variety of practices was evident on this subject, but it was clear that most member companies have taken steps to insure the effective protection and safety of visitors.

Essential elements of the various programs are as follows:

1. Schedule only certain areas of the plant to be seen by visitors.
2. Rope off aisles for large groups, or rope off areas not to be included in plant visits.
3. There was considerable discussion about signed releases. Various states give varying legal credence to signed releases. Even in the states where they are not worth much legally, some plants do require releases to impress safety on the visitor if nothing else.

4. One company represented had so much difficulty with visitors that they were obliged to discontinue all guided tours of casual visitors. This would, of course, not apply to customers, vendors, etc.

5. The minimum age permitted varied somewhat, running between twelve and sixteen.

6. One company takes great effort to insure that the guides are safety trained.

7. Several firms supply safety glasses to visitors, usually of the light plastic frame variety. Some expect to get the glasses back and some simply gave the glasses to the visitors.

Machine Hazard Control—There was not a great deal developed on this subject that was at all peculiar to the glass and ceramic industry. The discussion centered around guarding of belts, running machines, etc. The various state codes with which the participants were familiar were discussed, most of them requiring guarding below the six or seven foot level. The various lockout procedures were discussed.

All agreed that one of the most vital controls of machine hazards involves the effective guarding of new equipment as it is installed and prior to the time that it is put into operation.

Training Safety Committee Members—The discussion on this subject veered into the field of management-union relations on safety and proved to be interesting.

Regarding this heading, however, one company stated that the key part of the maintenance of their safety training program was that supervisors were obliged to contact each person once a month for two or three minutes on the subject of safety and report each contact.

Another company, the department safety committee is appointed by the plant manager and they operate on a full-time basis.

More exact on this subject, the matter of return-to-work of disability employees came

up and several participants mentioned that their companies were not in favor of the policy of returning employees to light work pending their complete recovery. Also this sometimes adversely affected their safety record and they felt it was to the best interest of all concerned to wait until the employee is completely recovered and able to perform his regular duties before returning him to work.

Budgetary Control Safety Costs—It was volunteered by one company that each department is charged with a percentage of all safety costs based on the number of members in each department.

The question of whether one plant in a multi-plant corporation should be charged at all for accidents and safety costs arose. It was generally agreed that if the plant is not charged real dollar costs, it is not very

realistic and further hampers the safety message.

Discipline of Safety Rules—Each participant stated that they do not discipline employees for violations of safety rules, if they were actually hurt as a result of the violation. They felt that the injury alone was sufficient punishment. To this another representative asked, "How can we effectively control accidents without discipline even if the person is hurt?" To this question some agreed; some stated that the supervisor should be disciplined for not seeing that the people followed safety rules; and some felt that to penalize an injured man was unjust under any circumstances. Still others felt that the case should be considered on its individual merits and proper discipline could be issued to an injured employee as an aid in the total safety program under the right circumstances.

CERAMIC DISCUSSION GROUP

JOHN S. HALL, Discussion Leader

Kaiser Aluminum & Chemical Corp., Columbiana Refractories Div., Columbiana, Ohio

Safety Provisions for Visiting Groups in Plant: The group discussed provisions for visitors and outside contractors. For visitors, it was agreed that guided tours should be planned. Usually the safety department would lay out planned tour routes through the work areas that would minimize exposure to hazards. It was agreed that there should be a guide, familiar with the plant areas and tour routes, for each group of 8-10 visitors.

Minimum age for visitors should be set at 12 years. It was agreed that teen-age groups usually require special provisions; such as, five visitors per guide since they are very curious and active. Everyone agreed, that personal protective equipment that is required by the workmen in the shop areas, included in the tour, must also be worn by the visitors.

The group then discussed the potential problems encountered, when outside contractors are working in a plant. It was agreed that the key step, is to include in the contract itself the stipulation that contractor personnel must comply with the plant safety regulations.

The majority of the group agreed that

practical control of the safety regulations require that plant line management must report all safety violations promptly, so that the safety or engineering department can follow up immediately to obtain compliance before these sub-standard practices become established.

Machine Hazard Control: Several questions were discussed including how serious is the V-belt exposure in your plant and how do you control it? What do you consider the most serious machine hazard at your plant? What type of accidents and how frequent are they in connection with these machine hazards and what are your control measures?

In general, the group felt that the most effective approach is to guard all moving machine parts that are six foot or less from the floor, either by enclosure or positive isolation. It was particularly noted that elevated work areas must be carefully studied, as maintenance personnel, such as, oilers are frequently exposed if moving machine parts are not guarded. In discussing large drive units, employing overhead belt systems, it was stated that shielding is required to pre-

clude the possibility of a broken belt, dropping or flying out into the work area.

Budgetary Control Safety Cost—Single and Multi-Plant Operations: One of the members of the group described in detail the system used by his company, covering multi-plant operations. The system requires that cost estimates be made for each accident case. These are summarized and shown in

a monthly report, which goes to the responsible operating unit. Each quarter the actual costs are charged against the operating unit's financial account. This method has been found to be very useful as it helps the operating management to fully appreciate the costs of accidents. The group agreed that accident cost reporting is of value and could be a useful part of every safety program.

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RUBBER SECTION

SAFETY COUNSELOR IN A RUBBER PLANT

By EARL E. GOLDSWORTH

Safety Director, The Gates Rubber Co., Denver, Colo.

I feel honored to be here today to talk about Safety at Gates. We are not one of the largest companies—we are sixth in size.

Let's talk about our Safety at Gates. Records from 1911 to 1936 are non-existent but it seems the company knew that it was having too many accidents and something had to be done about it. In 1936 Gates decided it wanted to get more employees into the act, and a group known as the Safety Counselors was formed. Each department or area was to elect a representative for safety matters. Meetings were held as often as necessary. No supervisors were to be elected. The person who was elected had his regular job to do and in addition was interested enough in the program to want to help management do a better job in safety. These elected persons (they are now appointed by the supervisor with the approval of the Safety Department) worked under the direction of the personnel director and their department head until 1942. In 1942 the job of the personnel director was getting larger and larger and so was the safety job, so the company decided it needed someone who could give more time to safety, and a man from the engineering department was given safety as a part-time job.

At this time a safety committee composed of two divisional superintendents, two shift foremen, the personnel director and safety director was also formed to assist and advise the safety department. The company frequency rate was 21.59 in 1942 and went to 22.41 in 1943. It was then decided that the safety engineer's job should be full time. More responsibility was placed on the safety counselors and through the efforts of the full-time safety engineer, the counselors and supervisory personnel, our frequency rate declined. At the end of 1958 our rate was 2.59, with the rubber industry rate being 2.81. Our rate at the end of September this year was 0.00. We have improved quite a bit,

and we feel the counselor group has been a leading factor in lowering this rate.

I have told you previously that the counselors were originally elected but are now appointed, and when these persons come in to the safety department, we give them a counselor's booklet and go over it with them, explaining the job. These people are not forced to accept the job as a safety counselor, however very few ever refuse it. They are appointed by the supervisor with the approval of the safety department.

The term of office is 12 months. These counselors are expected to attend 12 monthly meetings before their term is up. They can be removed by the safety department or their department head during this time, if we do not feel they are doing the job expected of them. If a counselor misses a meeting, he is expected to make it up. If the counselor misses three consecutive meetings without a good legitimate excuse, he is ordinarily removed.

Our safety counselor meetings are held on the first Tuesday and the following Wednesday of each month in the company clubrooms or our roof garden, and counselors are urged to read their notices each time to be sure of the meeting place. We hold a separate meeting for each shift: graveyard being from 6:00 to 7:00 A.M.; swing shift, from 10:00 to 11:00 P.M.; and day shift, 2:00 to 3:00 P.M., on both Tuesday and Wednesday. Some of the duties of a safety counselor are to attend the monthly meeting and they are allowed time and are paid for it. They are allowed time to attend to safety matters in their area if arranged between their supervisor and themselves.

If a counselor is unable to attend the meeting the foreman is asked to send a substitute so that his area will be represented, and our attendance is almost 100%. We want the supervisors to be represented in these meetings too, and we always have

one member of the safety committee and one divisional superintendent attend.

We have safety record boards in each department and more than one in some of the bigger departments and it is one of the jobs of the day shift counselor to keep this board in good shape. He is to keep the posters up and any other information that is supposed to go on this board.

Each department has its own small first aid kit which the counselor is to keep supplied with materials, getting them from our hospital.

Counselors watch for all types of unsafe equipment such as trucks, skids, ladders or hoists; they either tag them with a bad-order tag, or inform the supervisor.

We furnish badges and each counselor is expected to wear his badge while on duty. Some of these people wear them away from work and we have no objections to this.

Whenever an accident occurs it is the direct responsibility of the supervisor to make a full and careful investigation with a report to the safety department. We are quite often able to prevent accidents by recognizing and eliminating causes. We expect the counselors to assist the foreman in these investigations. The counselors are right there doing the job and quite often are more familiar with the details than anyone. We also expect them to make suggestions for the correction of conditions to prevent a recurrence.

All of us know that unsafe acts on the part of an individual cause many accidents. We asked our counselors to watch for careless persons, and to either talk to them or have the foreman talk to them. If the counselors are unable to get action from their supervisors on unsafe conditions or unsafe acts, they bring these things to the attention of the safety department.

When counselors find an unsafe act or an unsafe condition, we ask them to write it down, make a record of the date, and to whom they talked about it. We feel that this will prevent any misunderstandings later. We urge them to make contact with the individual or foreman immediately and not wait until the situation is past and the occurrence is forgotten.

As we know it takes time to correct some of the unsafe conditions that a counselor might turn in to his foreman, we ask them

to check back on these with the foreman, always being sure to give the foreman enough time to have been able to get the job done.

Suggestions of a general nature which are not necessarily safety are sometimes brought up at the meetings and we attempt to iron out these and make any corrections necessary.

We ask our counselors to advise us if they will be unable to attend the monthly meetings or if they change departments or shifts. If they change departments or shifts they are no longer counselors and their names go into an inactive file and they remain there until we are able to reappoint them in another department and allow them to continue their term.

There are many other things not mentioned that the counselors do, and we stress in all of our meetings that unsafe acts are the number one thing they should always watch for and of course not do these things themselves.

Part of the training we give our counselors includes tips on the things they can talk about to other employees. Here are a few that we give them:

1. Open the conversation with a comment to which you know the employee will agree.
2. Have a definite safety subject to talk about.
3. Point out some of the unsafe acts that are done in your department and how they can be corrected.
4. Let the employee talk if he wants to, and you listen.
5. If you don't know the answer, don't guess. Find out and then tell the employee.
6. If you leave the employee with a question in his mind, go back and answer it as soon as possible.
7. Get all unsafe conditions fixed as soon as possible and keep the employees advised of your progress.

We also give the counselor an outline that he can use in talking to an employee if he can't think of something to say. This outline includes such things as the following:

1. He tells the employee what a counselor is and what he does.
2. He identifies his badge.

3. He explains the procedure to follow if a person receives an injury, such as: reporting it on the same shift to his foreman; location of the first aid kit; telling him to be sure to have cuts and small scratches cared for; telling him where the hospital and first aid rooms are located.
4. On machines he points out the special hazards.
5. On tools such as scissors and knives he tells the employee not to carry them point up in pocket; to use a sheath; and to use proper tools.
6. He just talks about general safety. Some of the things he can talk about are: the company policy, department records, goggles and respirators; smoking, running, and horse-play; elevators, trucks; and many, many other things.

We also expect our counselors to know what to do in case someone is injured, such as: where the location of the stretchers are, how to open them, how to place the patient on it, how to cover them up, and the transport route to the hospital. We have our own hospital with seven full-time doctors and four full-time dentists. We also have twenty part-time specialists on our staff. Our health plan includes the families of our employees. This means we are caring for some 20,000 people with various health and accident problems.

In one of our monthly meetings during the year we have a fire prevention discussion. At this time we talk about house-keeping, the causes of fires, where our extinguishers are located, the kind to be used, how to use them, and what to do with them after use.

After a counselor has completed his term of twelve meetings, he is eligible for what is known as a counselor Club. It is one of the most exclusive clubs here at Gates because to be eligible for membership you must have completed a term as a safety counselor. This club elects its own officers, committees, and sponsors many worth-while

activities. Dinner meetings are held once a month. It is an honor to be a member of this club.

Also at the completion of their term, we give them a pencil in appreciation of their service as a counselor.

On the back of the booklet we have what we call a safety check list. We make many uses of this list, such as going out in the plant asking a person if they know what number 7 or number 5 or any other number might be. Sometimes prizes are awarded if they know the answer. Foreman and supervisors also use it to promote safety.

You may wonder how many of these counselors we have. Our day shift which includes the Tuesday and Wednesday groups, has approximately 75; swing has 45; graveyard has about 35.

Our safety program includes many other things in addition to these counselors and we have tried all kinds of ideas to prevent accidents and make the workers safety conscious, concentrate on their work. We find it is seldom that an accident occurs through lack of knowledge; it is caused by employees not thinking about what they are doing when they are doing it. We furnish all types of safety equipment. We have our own safety shoe store. Each year we set up some goals that we try to achieve. This year we want to beat a plant record of 48-days straight run without lost time. We want to get a two-month period during the year without any lost time in it. We also want to achieve a frequency rate of 2.0 or better for this year.

We believe "safety is a fact." I once heard someone say "not production and safety, but production with safety." I believe this can and will be done if we keep working at it in every industry in the land. Finally, we who are safety people and who believe in the principles of safety must lend ourselves and our knowledge to our communities to help prevent the terrific toll of off-the-job accidents that we now have. Let's all work for more and better safety in this coming year.

DERMATOSES AS RELATED TO THE RUBBER INDUSTRY

By R. A. MANNING

Manager, Safety Department, The Goodyear Tire & Rubber Company, Akron, Ohio

Dermatoses are abnormalities or inflammations of the skin and we will concern ourselves only with those occupational in origin. When one realizes that from 65-70 per cent of all occupational diseases reported in the United States are dermatoses and that about 50 per cent of compensation money expended is for this one problem, amounting to over \$100,000,000 annually, it is a portion of the work environment that must be controlled. In the rubber industry, dermatitis must represent approximately \$1,500,000 annually as it is estimated that 1½ per cent of all dermatoses occurs in our industry.

Surveys conducted in industry show that at any one time, approximately 1 per cent of the plant population will have a dermatoses. We estimate in our plant that 0.8 per cent of our plant population will be affected and that about 0.3 per cent will be a compensable case averaging \$146 per case. This average is about one-half of the national average as our figures do not reflect the cost of a plant hospital with full-time physicians that handle the vast majority of our cases, except when a dermatologist is required.

There are certain predisposing causes of dermatitis, including:

1. Age; in that younger workers new on the job will frequently develop a problem within the first month of employment. Then a "hardening" effect takes place if dealing with a primary irritant and little trouble is experienced thereafter. It sometimes happens that an allergic type response will develop in some workers after many years of successfully working with materials.

2. Allergy; is always a factor when dealing with industrial materials and particularly in the last few years as many of the newer materials seem particularly prone to cause sensitization.

3. Perspiration; can act as both a diluting agent and also as a wetting or solubilizing agent thereby allowing greater, more intimate skin contact.

4. Existing skin disease; appears to make workers more susceptible to dermatitis be-

cause the integrity of the skin has already broken down and allows for more easier access by an potential irritant.

5. Race; has less bearing than originally supposed, however, different types of skins can be important. In general, blondes react more adversely to actinic rays than do brunettes, dry skins react more adversely to volatile solvents than do moist skins, etc.

6. Season of the year; has an effect because in the summer when less clothing is worn and more skin surfaces are exposed, coupled with additional perspiration, most dermatitis is seen. In addition, outside activity may influence or aggravate existing skin conditions more readily in the spring and summer as our climate then allows us to engage in yard work, painting projects and gardening of all kinds. However, winter can also generate problems in that many employees are not as amenable to taking showers following a work shift due to the cold weather and customary personal hygiene breaks down.

7. Sex; is a factor in the overall problem as women tend to maintain a higher level of personal cleanliness than men and also usually report minor skin disorders much more quickly than the male employee, so that many cases of dermatitis do not develop into a problem of any consequence.

8. Personal hygiene; is probably the greatest factor in this overall problem. Poor housekeeping in the work environment exposes the worker to large quantities of material and uncleanness in the worker not only does the same, but allows prolonged, intimate contact of materials with the skin of the employee.

The actual causes of dermatitis may be classified as:

1. Chemical and can be further subdivided into primary skin irritants and sensitizers. A primary irritant affects the skin at the site of contact if it is permitted to remain in contact for a sufficient period of time at adequate concentration. It has a direct chemical or physical action on the

skin either combining with the skin or taking some essential ingredient from it. Some examples are acids, alkalies and most of the organic solvents. Sensitizers usually exhibit no observable manifestation on the initial exposure, but within a so-called "incubation" period of five days to two weeks subsequent exposure can result in a definite and often pronounced case of dermatitis. Of course certain materials, some of the amines, are both primary irritants and sensitizers.

2. Biological agents; such as fungi and parasites must also be listed as potential skin irritants, but in the rubber industry they present little exposure potential from an occupational standpoint.

3. Mechanical; causes consisting of pressure, friction, cuts and abrasions etc., all of which can become sites of secondary infection and/or allow skin diseases present on other parts of the body to relocate.

4. Physical; agents such as heat, cold, and radiation may also contribute to the dermatoses by generating perspiration, breaking the integrity of the skin or by energy absorption that produces demonstrable skin changes.

Prevention of dermatoses follows well established principles in the field of safety and industrial hygiene engineering. The first point to attack this problem, as with most, is in the pre-placement examination. Care must be exercised to place the employee in an environment that his particular physical condition will contribute to successful employment. Secondly, ventilation for removal of potential irritants from the work environment and maintenance of good housekeeping can do much to alleviating this expensive and vexing problem. Third, the employee has as much or more at stake in this situation as the employer and the majority of dermatoses

could be eliminated or reduced in severity by good personal hygiene on the part of the employee. Frequent bathing, change of clothing at reasonable intervals, adequate attention to personally maintain the highest standard of housekeeping at his personal work station and exercising a common-sense approach in personal habits all can make a significant contribution towards reducing the incidence in the work population.

Protective clothing or ointments are other approaches that it may be necessary to utilize to control your problems in this field. A note of caution on protective ointments or creams; to be effective they must be properly chosen for the exposure involved and properly used. If not, they can often cause more dermatitis than they prevent by sealing contactants next to the skin and actually holding them in contact with the skin.

In closing, I would like to summarize and point out that dermatoses is a major occupational problem in American industry and a recent survey conducted by the National Safety Council revealed that 1.2 per cent of the injuries in the rubber industry were attributable to this problem of dermatitis.

To avoid the problem, avoid the exposure. Maintain good housekeeping through ventilation and personal effort, maintain good personal hygiene by providing adequate washing facilities and encourage their use (waterless hand cleaners can be placed right at work stations if necessary) and educate the employees as to why certain measures are being taken and get their active support and participation in your preventive program.

Employee and employer alike can materially benefit financially and health-wise from a sound and adequate program of dermatoses prevention.

YOUR SAFETY LINE FOR '59

By WAYNE L. CHRISTENSEN

Supervisor, Field Force, Ohio Division of Safety & Hygiene,
Columbus, Ohio

If you are employed in industry in the State of Ohio, the odds are better than one in four that you are being exposed to the educational safety approach of "Your Safety

Line for '59." Our orders from industry for material to conduct the program indicate that it is presently being used by 1,965 companies which employ in excess of 884,608

people. Use of the monthly posters only by other companies carries our monthly theme into more than 11,000 Ohio plants.

This safety program is truly a product of Ohio industry. It was created originally by a group of industrial safety people in northeastern Ohio, most of whom are members of the *Northern Ohio Chapter of the American Society of Safety Engineers*, for the purpose of promoting industrial safety in the greater Cleveland area. It was designed to bring some of the safety techniques being used effectively by the larger industries into use in the smaller industries.

The Industrial Commission of Ohio and its Division of Safety and Hygiene became aware of the program and, recognizing its potential value, arranged to develop and publish it in exchange for permission to use it on a statewide basis. This, then, is a brief outline of the back-ground information. It is well to move on to a discussion of the program itself.

The basic principles of the program are 1 A recognition by responsible management of the need for such a program, 2 A determination of the steps necessary to make the program effective under the conditions in which it is to operate, 3 The establishment of the inspection system and control required to assure that the program is continued in full force and effect, and 4 The creation of a system of communication which will guarantee that everyone who is concerned with the program knows what his responsibilities are and why he must meet them.

It would be appropriate to compare the initiation or installation of this program to the founding of a new business organization. You must first establish the business. You must then determine the method by which the product is to be produced. Next you must establish a system of inspection or quality control which will assure that you are consistently producing a product of salable quality. Finally, you must sell the product.

We will attempt to convince you that the program meets all of these requirements. This is "Your Safety Line for '59." The manual was designed for use by the person in charge of the safety program for the entire plant. It contains a complete listing of the monthly safety themes for the entire year. In addition, it provides a complete

breakdown of the steps necessary for the foreman or supervisor to prepare his presentation of the material dealing with each monthly theme. This can be done in either of two ways. It can be used as the basis for a personal contact between the supervisor and his men individually. It is equally adaptable as an outline for a more formal group or departmental safety meeting.

In addition to this material dealing with the monthly themes, it contains information on the objectives of a safety program, managements' responsibility, methods of developing a safety organization, the importance of proper employee placement, the effect of a good employee-training program on safety performance and the value of encouraging employees to carry their safe habits into their off-the-job activities.

The two earlier editions of this manual deal with such other subjects as proper record keeping to provide information regarding hazardous conditions or operations, the value of careful accident investigation, the importance of a carefully planned inspection system, and a step-by-step outline of a job safety analysis.

You can see that over the three-year period this program has presented and explained nearly every safety technique known to industrial safety men.

You will notice that these suggestions on the use of the various techniques are presented only to the person in charge of the program. We believe that on this skeleton each plant can build the type of program which it feels is most desirable for its particular needs. It can be as simple, as practical, or as elaborate as each management wants it to be.

The second piece of material provided in this program is the Supervisor's Discussion Guide. While it is sufficiently different in appearance from the manual that there is no difficulty in distinguishing between them, it bears enough resemblance to assure that it will be recognized as a part of the program.

It contains a brief statement dealing with the importance of the role played by the supervisor in a safety program. It also presents the same outline for the development of the various monthly themes as was contained in the manual. Each company can obtain enough of these to issue one to each foreman or supervisor.

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These two pieces make up the material provided for use by management and its representatives in developing their program and preparing to present it to the employees. Their importance in the program cannot be stressed too heavily.

The other materials provided are designed as aids to assist in getting the monthly message to the employee.

Probably the most impressive of these is the monthly safety streamer. It is designed to provide the quick impact type of message. Each month it presents the theme in colorful Day-glo ink against a contrasting background. Kleen-stik has been applied to each end of the streamer to provide a quick, easily displayed safety reminder. Some plants display them on machines, on wall space in frequented areas, or on mobile equipment.

Possibly less impressive but equally effective is the monthly safety poster. Designed primarily for bulletin board use, it is intended to serve as a constant reminder throughout the month of the importance of the monthly theme to each individual job. Careful use of the multiple illustration technique helps to deliver a personal message to each employee.

Both of these items are available in the quantities necessary to make the monthly safety theme an obvious part of the safety communication system.

There are two types of safety material connected with "Pattern for Progress" which are designed for direct distribution to the employee.

The calendar card is designed to be carried in the wallet of each employee and is available in sufficient numbers to permit its being issued to each employee of a company using the program at the beginning of the year. It carries a twelve-month calendar on one side and a complete listing of the safety themes for each month of the year on the reverse side.

The monthly employee booklet, which is many times referred to as a payroll insert, takes some interesting or unusual fact and ties it in with the theme of the month in colorful fashion. While this type of booklet can be used as a payroll insert where pay envelopes are used, we believe they achieve their greatest value when handed to each employee at the time of a personal safety contact or in connection with the monthly meeting where such meetings are held.

An attempt has been made to present the information contained in these booklets in such interesting and attractive style that the employees will want to carry them home with them and share them with their families. They are available in quantities which make this possible.

Much of what has been said to this point is not new to many of you. The heavy concentrations of rubber industry in Akron and other areas of Ohio insure that many of you are using all or major portions of this program. For example, to mention only one company, it can be stated that "Pattern for Progress" is a major portion of the world-wide program of Firestone Tire and Rubber company. Other major rubber companies also follow the program and use its material in company and employee publications. We encourage all Ohio industries to use or adapt the various parts of the program to meet their individual needs.

The question has been asked, "How is it possible for a state agency to provide such a program to the industries of that state without any charge for it?" The answer is simply this. The Division of Safety and Hygiene is not a state agency in the usual sense of the word. We operate, under the conditions established by a constitutional amendment in Ohio, on a sum set aside from the employers' contributions to the Workman's Compensation Fund. This amount is not to exceed one per cent of such contribution. Actually, therefore, all employers are sharing the cost of the program. Those who do not use it are allowing a portion of their money to be spent in the interest of others.

We are trying by means of "Pattern for Progress" to achieve these results.

(1) We are attempting to show management not just its responsibility for the safety of its employees but also the advantages which a carefully developed accident prevention program creates. Reduced costs, improved morale, and better public relations are among these.

(2) We are attempting to provide for the foreman or supervisor, who has been recognized as the "key" man in safety, some of the aids or tools which will enable him to fill that important role with maximum efficiency.

(3) We are attempting to convince the employee, who many times is inclined to con-

sider safety as a company program with no particular meaning to him, that there is something in it for him.

We are convinced that, when each of these elements is recognized and given its proper attention, the frequency and severity of industrial injuries will be greatly reduced.

When management assumes its rightful role as the leader in creating and maintaining conditions favorable to safety—a climate in which safety can grow and develop, when supervision provides the instruction and training and the constant reminders necessary to make safe operations possible, and when the employees recognize that they simply cannot afford to get hurt—on or off the job; we will be moving toward an injury-free experience such as has not yet been known.

Some one has said that we do not so much need to be taught as to be reminded. Reports indicate that a majority of injuries are caused, at least partially, by conditions which had previously been recognized as hazardous. This must not be accepted as an indication that training is unnecessary. We simply can not afford to assume that the employee knows the hazards of his work.

We must work diligently to eliminate the known hazards from an operation. This can best be accomplished by means of the job safety analysis. Once the job has been made as safe as sound engineering methods can make it, we need to train the employee in proper job behavior and to remind him of proper procedure when deviation from the accepted methods are observed.

We have been dealing with the past and present. What does the future of "Pattern for Progress" hold? We are going to continue all of those features of the program which experience had indicated to be good and effective. Minor changes will be made to give a little variety or a little more appeal to some of the material. The monthly themes will be continued. Those selected for 1960 are as follows:

- January —Think Twice—Don't Fall Once
Subject—Falls
- February —Safety's in Your Hands
Subject—Material Handling
- March —Lock Out or Tag Machinery
Before Repairing
Subject—Lock Out or Tag Systems

- April —Keeping Neat Can't Be Beat
Subject—Good Housekeeping
- May —Use the Right Tool Properly
Subject—Hand Tools
- June —When Away Make Safety Pay
Subject—Vacation Safety
- July —Check Hazards—Work Safely
Subject—Check Hazards and
Then Work Safely
- August —Be Alert—Don't Get Hurt
Subject—Obey Safety Rules
- September—Foresight or No Sight
Subject—Sight Conservation
- October —Fire Feeds on Careless Deeds
Subject—Fire Prevention
- November—Think Safe—Plan Safe—Be
Safe
Subject—Safety—A Thinking
Man's Protection
- December —Safety Spells Merry Christmas
Subject—Safety is a Personal
Responsibility

All of these subjects deal with conditions which our records indicate as common causes of injury to Ohio industrial employees.

Many of the smaller industries for whom this program was originally developed have said to us, "It's a fine program but we have no one in our organization who is able to direct it for us."

To meet this condition, we are developing as part of "Pattern for Progress" 1960 model, a basic safety manual for Ohio industry. This will be a permanent type of publication—not one designed for annual revision. It will contain all of the accident prevention techniques which have been set forth in our annual programs of the past three years, together with much that is new. It will be so clearly presented and effectively illustrated that it can be used easily by people without previous safety experience.

Then, for those companies who feel the need for a safety training program, we will offer, using this new manual as the text book, a course in safety for supervisors in which all of these methods will be taught, explained and demonstrated. It is planned to offer this program for use by the selected company representatives during working hours on the plant premises or as an evening training program for representatives of numerous area industries. This latter type

course will be conducted at a centrally located place and be open to all who care to attend.

This, then, is our first step toward "Safety in the 60's." The volume, bearing that name, published by the National Safety Council, which was recommended reading for all who present papers at this Congress, opens Chapter 2 with this quotation: "The health of the people is really the foundation upon which all their happiness and all their powers as a State depend." Benjamin Disraeli, one of England's great prime ministers, made this statement in 1877. It is no less true today.

We believe the greatest gains in industrial accident prevention in the sixties will be

made through engineering and education. When we have engineered maximum safety into an operation, when we have completely instructed and continuously reminded our employees concerning safe procedures, when we have convinced everyone concerned that safety is good business, we will find that we are preventing injuries which, at present, are described as unavoidable.

We can do a better job in the field of accident prevention. We must raise our sights toward higher goals as experience proves that the goals previously set are too easily attainable. "Leisure can destroy us—unless we use it to release new and vital powers, in ourselves and others."

SAFETY PROBLEMS IN PLANT MAINTENANCE

By RICHARD T. WISE

Manager, Maintenance Service, B. F. Goodrich Footwear & Flooring Co., Watertown, Mass.

Believe it or not, there is probably no other group in the plant any happier than maintenance people when plant equipment is running properly. They like to see the equipment operating smoothly, being used properly, and turning out the product. When repairs are required, they would like to do the job easily, quickly, and safely. Maintenance people have the normal dislike for working against a time limit, working under pressure and with others looking over their shoulders.

Maintenance work has its own hazards, working conditions, methods, and procedures. The installation and repair of equipment, maintenance of plant buildings and grounds, working with electricity, steam, liquids under pressure, compressed air, etc. expose maintenance men to a similar yet continually changing pattern of hazards and working conditions.

The overall plant safety program should be supplemented by separate safety activity originating with maintenance management and supervision. This activity should direct intensive effort toward two major problem areas:

1. The hazards involved in maintenance work.

2. The development and maintaining of a high level of safety awareness among maintenance personnel.

These two areas are also basic problems in any safety program. They are particularly important in maintenance operations because of the nature of the work performed and the characteristics of the employees. Let's review how these problems apply to maintenance personnel.

1. *Maintenance Operations Are Hazardous—*

There are few occupations in industry as hazardous as the usual maintenance operation. Maintenance men are continually using hand tools or power tools, working in, around, on top of and under machinery. They work above ground on ladders, platforms, roofs, and staging; they work below ground in trenches, pits or tunnels. They use chains, wires, machines, drills, brushes, tools and wrenches of numerous types and sizes. The hazards are many and change with the job being performed. Each craft—the electrician, millwright, pipefitter, machinist, etc.—has its own particular dangers. Even the janitor is exposed to hazards in cleaning work.

The greatest hazard of the electrician is naturally electricity itself, but surprisingly

few electricians are hurt from this source. Far more are hurt in falls from ladders than from shock. We have had two demonstrations of this in our plant in recent years. A former electrician is now doing maintenance clerical work as a result of a fall from a ladder several years ago. The back injury he received prevents him from performing electrician's duties. He is quite unhappy because his present pay rate is less than that of an electrician.

In April of this year an electrician stood on a portable platform to remove a 1 HP motor from a storage shelf. He fell from the platform eight feet to the floor and fractured a shoulder bone. He has since recovered and returned to work.

The carpenters' greatest hazards are the power tools available for woodworking. These tools are wonderful aids for improved quality and quantity of work performed, but must be treated carefully. How many carpenters have you seen who are missing a finger joint or two? Here is a trade where injuries do occur in the area where we would expect, the fingers and hands.

Pipefitters are exposed to burns from hot pipes, steam, and hot water. They handle piping for compressed air, water to 2500 p.s.i., and various other liquid materials. Theirs are the usual hazards of working in close quarters, of lifting, of pulling on wrenches from a cramped or strained position. Yet our Pipe Shop's lost time injuries of recent years have resulted from falls. One man slipped on an oily spot on the floor; the second stepped through a Celotex ceiling of a warming oven.

Go through each of the crafts, and you will find numerous hazards that are part of the work of the millwrights, tinsmiths, machinists, oilers, etc. Go through the minor injury reports and you'll find numerous cuts, nicks, bruises, scraped skin, foreign bodies in skin resulting from working with tools and machinery. Janitors and matrons, in spite of wearing gloves, receive cut or jabbed fingers and hands from sharp objects thrown into waste paper containers. Wet floors being mopped, floors being waxed, and lifting of rubbish cans are daily hazards for these employees.

So often it seems that injuries occur that are not directly connected with the hazards of maintenance employees' jobs. From ex-

perience and instructions, the men seem very much aware of the dangers of their particular trade. Apparently they relax during the preparatory and cleanup phases of the job, or when going to and from various plant areas. This is when injuries often occur.

Can a man get hurt walking in the plant area? He certainly can! We had a lost-time accident in June when a janitor was walking to his regular job assignment at the rubbish disposal platform. His feet became entangled in a piece of baling wire on the road, he fell and fractured a rib.

In August a production employee walked between two small flat-bed trailers parked parallel to each other. A third trailer, parked at right angles to the first two, blocked the three-foot passageway between the two trailers. The employee did not see the third trailer, fell over it and fractured his arm.

So much for hazards in maintenance operations; there are plenty of them. Let's consider the second problem.

2. Maintaining a High Degree of Safety Awareness—

I find it not too difficult to develop an initial awareness of job hazards and the use of safe methods among maintenance personnel. I feel that maintenance men are a step above the normal factory worker in basic intelligence, independence, and ability to find solutions to problems. Craftsmen already recognize many of the danger spots in their jobs, and are receptive to efforts made to reemphasize these hazards and point out new ones.

The difficult task is to maintain, to a high degree, the safety attitude and the awareness of job hazards that has been developed. This requires continual, persistent effort until the new attitude and higher level of awareness becomes a habit with each man. Many an old-time craftsman has performed a particular repair job in a certain way for a number of years, and nothing has happened. Now we tell him his method is unsafe. If he is independent enough (and maintenance men can be quite independent), stubborn enough (we all have our share of men with this characteristic), or the selling job is not good enough (we may "goof," too), he will continue with the old method. Some day either he or his buddy will be caught; a near miss or a serious injury will result. Then he'll be convinced.

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Tied in with this development of a safety awareness is a basic characteristic of men. Men are showoffs; many men are would-be supermen. The National Safety Council has statistics to show that seven out of ten persons who die in accidents are males. Thirty years ago the average white female lived three years longer than the average white male; today she can expect to outlive her man by more than six years. The male is the one who normally tackles the more hazardous job, who will be less careful, who will drive himself a little harder, who will take a little more of a chance at both work and at play in order to accomplish whatever he sets out to do. Call it aggressiveness, drive, showoff tendency or whatever you will; it is a characteristic of men that makes a safety awareness program more difficult.

These then are the two major problems facing a safety program for maintenance personnel: (1) Hazards of the trades, and (2) maintaining a safety awareness. We have a three-part program at work on these problems. We feel that this program is in a similar position as the undertaker, who wired a man and informed him of the death of his mother-in-law. The undertaker asked if the deceased should be cremated, embalmed, or just buried. After a short time he received the following answer, "Do all three. Don't take any chances."

In our three-part program, we do all three. We don't take any chances. This program consists of:

Part 1—Safety Letter—Every 6-8 weeks I prepare a letter for distribution to each member of the mechanical shops and sanitation department. The subject matter is *always* some phase of employee safety. One letter may call attention to unsafe acts or conditions that appear on the minor injury reports; another may outline some phase of tool safety; another letter may recognize an excellent record in one or more shops; another letter may emphasize off-the-job safety. This last subject is particularly applicable at Christmas time and during the summer vacation months. The letters have caused both favorable and unfavorable comment. They perform two important functions:

a. They direct attention to some phase of safety that pertained to each employee, his department, and fellow worker.

b. They help indicate to each employee the interest of supervision and management in safety of employees, both on and off the job.

I have no way of knowing the effectiveness of these letters as they are a part of our overall program. At the Akron plant, the letters were mailed directly to the home of each employee in the maintenance organization. This enabled the employee's family to become aware of the safety program and perhaps exert an influence on the employee.

At the Watertown plant, the supervisors distribute the letters to the employees. This seems to work satisfactorily. One supervisor, however, did say that he handled some of the letters twice—once when he passed them out and the second time when he picked them up off the floor.

Several of our shop supervisors supplement these letters with their own bulletin board posters. They watch newspapers and magazines for pictures of industrial accidents. When a suitable picture is found, the supervisor decides on the poster wording, and we prepare a safety poster using the picture as the central point. One electric shop poster caused considerable comment among all shop personnel, even though it pertained to an injury on a high voltage electric power line.

Part 2—Supervisors' Safety Meeting—Safety meetings of 45 minutes duration are held once a month for maintenance supervisors and foremen. A meeting program is built around a review of minor injury reports, lost-time injuries, if any occurred, and discussion of specific hazards in maintenance operations. From time to time, one of the supervisors is asked to prepare a short presentation on a subject of his own choosing and to lead the discussion. This requires him to do some study on a phase of maintenance safety, and provides him with practice in leading a discussion. Safety films and supervisory training type films are sometimes used as part of the meeting program. Occasionally representatives of equipment suppliers instruct the group in the proper and safe use of the maintenance shop tools and equipment. We devoted part of one meeting to a "brainstorming session" on certain plant safety hazards. Each meeting has two objectives: To obtain maximum par-

ticipation of supervisors and foremen, and to provide them with information on a specific subject that they can use in their daily contact with their men.

Part 3—Personal Safety Contacts— Each supervisor and foreman has instructions to contact two of his men daily on some aspect of safety. Observation of the man's handling of tools, work method being followed, proper use of protective equipment as goggles, shoes, masks, gloves, etc., provide subject matter for a safety contact.

Knowledge of the man's off-the-job interest such as boating or camping, provides an opportunity to mention safety points along these lines. The supervisors encourage the men to think about and look for better methods or better tools to do certain repair jobs. This is always a good subject for a safety contact. A better method or better tool will usually enable the man to do the job safer, easier, and faster.

The most effective part of any safety program is frequent personal contact of each employee by his supervision. The key to any successful safety program is the interest and efforts of first-line supervision. These are the beliefs that we follow. This means that the supervisor himself must sincerely believe in safety. This means that the supervisor must set the *example* by his own actions. This means that the supervisor must provide *enthusiasm* for safety. Only then can he put the message across to his men. My job and your job is to be sure that we sincerely believe in safety, that we set a good example by our actions, and that we have our own frequent personal contacts with the men we supervise. Safety contacts, safety selling and safety emphasis must be an unbroken chain between all levels of management, supervision and employees.

This is our three-part program for maintenance personnel. It supplements plant-wide safety activity. This type of program is not new or startling, but persistent and continual effort will make it effective. The equipment side of safety, such as proper tools, guards, protective equipment, etc., are important and are given considerable attention by the supervisors and foremen. Major emphasis, however, is placed on the development and maintenance of a safety attitude, of positive thinking toward safety hazards, of a safety awareness among supervisors, foremen and

employees. This is the more difficult yet the more rewarding task.

The dollar cost of injuries receives its share of attention in the supervisors' monthly meeting and occasionally in a safety letter sent to all maintenance employees. This cost is translated into dollars of sales that our company salesmen must obtain to cover the injury cost, perhaps in terms of new equipment for the maintenance shops that the injury cost represents, or into any other terms that we feel make an impression on the employees.

Does this type of program work? Yes, it does. Several years ago at the Akron plant my group of 160 maintenance employees had five lost-time and 87 minor injuries between January and middle September. One pipe-fitter died from internal injuries ten days after his accident. This same group, after the program outlined above was started, went 14 months before the next lost-time injury occurred. At the Watertown plant this program was begun in early 1958 for 315 maintenance employees. Comparing the year 1958 with 1957, minor injuries dropped 21 per cent from 348 to 277; lost-time injuries dropped 50 per cent, from 6 to 3, while manhours worked dropped 13 per cent.

In 1959 to date, manhours worked have decreased 3 per cent, minor injuries decreased 6 per cent, and lost-time injuries have held even with 1958. This year's performance is simply holding onto the gains achieved in 1958. Something new must now be added to the program to increase the level of safety awareness that exists among maintenance personnel.

"Accidents are caused—they don't just happen" is certainly true in today's machine age. "Accidents can be prevented" also was never truer than it is today. Many outstanding safety records demonstrate the truth of these statements. Any safety effort, large or small, requires an investment of persistence, originality, work and perspiration. The return on this investment is substantial in a reduction of suffering, pain and probable disability, in keeping experienced people on the job, in less out-of-pocket injury and compensation cost, in improved morale and efficiency of employees. You, your supervision, your employees and your company benefit from such safety effort. Where can you obtain a better return on your investment?

RADIOACTIVE PROBLEMS IN THE RUBBER INDUSTRY

By JOHN G. WOOD

Chief Application Engineer, Tracerlab, Inc., Waltham, Mass.

The use of radioactivity in industrial plants is increasing at a steady rate. Various reports issued by the AEC indicate industrial savings to date in the order of hundreds of millions of dollars. Management, in some cases pressured into it by their competition, is looking at these figures and wondering what use to make of this new tool.

Industry's attitude toward isotopes has changed greatly in the last few years despite the fact that many people, when they think of radioactivity, hear a loud explosion and see a huge mushroom-like cloud coming out of the horizon. Great progress has been made in allaying the fears of those wanting to use this new tool but there are still many obstacles which have to be overcome.

The plant safety man who in the past may have been concerned only with high voltages, combustible solvents, toxic chemicals, etc., now finds that he must have a new set of answers for the AEC, the Department of Labor and Industries, the Public Health Department, the fire department, the police department, insurance company and various transportation agencies. This hasn't hindered progress; on the contrary, in some ways it has helped to promote a greater understanding of the hazards involved in the use of radioisotopes.

Many people find it reassuring to know that so many different groups are concerned with their problems; and each in its own way, because of its own particular experience can make its contributions and recommendations to their program. Never in the technical history of mankind has such a tremendous body of knowledge regarding safety techniques been developed in such a short period of time. A look at the safety record of the industry will show that you can count the number of serious accidents on the fingers of one hand. When we think of the unhappy fate that befell many of the early experimenters who did not realize the dangers in working with this new phenomenon, it is apparent that we have come a long way since the discovery of x-ray some sixty years ago.

There are generally three types of radioactive materials available—alpha, beta and gamma. Each by virtue of its own physical characteristics is useful in its own particular way. Alpha rays are very large particles, comparatively speaking, and are very highly ionizing. This particular characteristic makes alpha particle radiation very useful in deionizing air, i.e., to remove static charge in unwanted areas.

Beta emitting isotopes might be used for a variety of reasons. In many cases they might do the same job as alpha materials but they are much easier to measure and are not generally as hazardous. While alpha ray materials are not very penetrating, beta rays are moderately capable of passing through only thin materials. Gamma rays, also measured very easily, are extremely penetrating and are most useful industrially for that very reason.

Special emphasis must be placed on the use of radioactive tracers. In many of our industrial plants the first instance of radioisotope use is in the case of a particular tracer study—an evaluation—which in many instances leads to the use of the radioactive tracer as an aid in production and quality control. Usually by the use of very simple experiments and inexpensive equipment, industry has been able to increase its knowledge of chemical and physical processes resulting in better products and more efficient production.

The two important characteristics of radioactive tracers are:

1. They exhibit the same chemical and physical behavior as their non-radiochemical counterpart, and are available in the form of a liquid, solid or gas. They, therefore, can be added to a system without disrupting the chemical or physical balance.
2. They are easily detectable through layers of solid materials and therefore their presence can be determined without actually being seen.

The tracer technique is one in which radioactivity is introduced into a system, courses through it, and finally gets detected

at some critical moment or period; generally, because of the extreme sensitivity of our detection instruments, extremely small quantities are required. The amount of radioactivity in a luminous dial watch is sufficient in many cases.

In order to procure radioisotopes in excess of the typical quantities listed below, the intended user must first obtain a license from the AEC. The form which must be used is entitled "AEC 313" and requests the answers to several questions which will indicate to the license reviewer the amount of experience and training of the user, the safety equipment available, and adequacy of the proposed safety program.

When this license is approved a form "AEC 374" is issued whose identifying number must then accompany all purchase orders to suppliers of radioactive materials.

Newly revised licensing procedures will soon permit purchase of certain types of measuring and quality control devices without a license. In this case the supplier of the device must furnish the AEC with complete manufacturing drawings and details of all safety features.

Distribution procedures and the maximum amounts of radioactive material that can be procured from a supplier without a specific license are all clearly listed in the Code of Federal Regulations, Title 10—Atomic Energy, Part 30, entitled "Licensing of By-product Material," commonly referred to as 10 CFR 30. A partial list of the quantities of radioactive material and the forms in which they can be purchased without obtaining a license from the AEC is listed below:

Element	Half Life	AEC Exempt Quantity (μc)	
		Soln.	Sealed Source
Antimony-125	2.7 years	1	10
Calcium-45	163 days	10	10
Carbon-14	5568 years	50	50
Cesium-137	30 years	1	10
Chlorine-36	3.08x10 ⁵ years	1	10
Cobalt-60	5.27 years	1	10
Iodine-131	8.08 days	10	10
Nickel-63	85 years	1	10
Promethium-147	2.6 years	10	10
Ruthenium-106	1.0 years	1	10
Strontium-90	25 years	0.1	1
Sulfur-35	87.1 days	50	50
Thallium-204	4.0 years	50	50
Tritium (H ³)	12.5 years	250	250

Another section of the Federal Regulations, 10 CFR 20, is specifically devoted to safety considerations and is entitled "Standards for Protection Against Radiation." This is often supplemented by state codes which are generally patterned after the federal regulations. There is also available a wide variety of safety booklets issued by the National Committee on Radiation Protection and Measurements which is sponsored by the National Bureau of Standards, working through its eleven subcommittees. These booklets are indispensable guides to those engaged in the use of radioactive materials and are available by purchase from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Some of the titles of these handbooks are:

1. Safe Design & Use of Industrial Beta-Ray Sources;
2. X-Ray Protection;
3. Permissible Dose from External Sources of Ionizing Radiation;
4. Radioactive Waste Disposal in the Ocean;
5. Radiological Monitoring Methods and Instruments;
6. Safe Handling of Radioactive Isotopes;
7. Protection Against Radiations from Radium, Cobalt-60 and Cesium-137; and
8. National Committee on Radiation Protection & Measurements.

It is a commonly accepted fact that the two hazards we face in working with radioactive materials are the internal and external hazards. The internal hazard is that which is created by airborne radioactive material in the form of fine dust or powders and vapors which may potentially be ingested or inhaled. This hazard can be a serious one when the radioactive material has a strong affinity for a particular organ in the body and becomes totally lodged in the organ.

The National Committee on Radiation Protection & Measurements has established certain maximum airborne contamination levels as well as maximum concentrations in water which are permissible to humans. These are clearly listed in both the state and federal regulations. All industrial laboratories must evaluate the possibility of this type of exposure to their personnel and provide, if necessary, the proper safeguards, such as properly designed and ventilated exhaust systems, protective clothing including coats, shoe and head covers, and proper respirators. All operations must be evaluated and the question asked "What, if any, is the overall possible internal hazard to the indi-

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vidual, both under the normal operating con-
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Permissible limits for external exposure have also been established by the National Committee on Radiation Protection and Measurements. It is apparent that alpha and beta emitting material offer no great problem from the standpoint of the external hazard. However, working with gamma isotopes in the larger amounts usually requires consid-
eration of such factors as the amount of activity, shielding, distance and working time. Since the distance factor is so important in reducing whole body dose, some very simple devices have been designed which permit the operator to accomplish certain jobs three feet away from the source of radiation.

The latest trend in the considerations on maximum permissible whole body exposure, including blood-forming organs or gonads, favors the acceptance of the 5(N-18) formula. It states that the maximum permissible accumulated dosage in roentgens (which is a term denoting biological dose and is easily measurable) to the individual at any age is equal to five times the difference between his age and 18.

It has been recommended that except for establishing administrative procedures the present permissible weekly tolerance, which is .3 R per week, be dropped but that the current 13 week permissible maximum which is 3 roentgens be retained, and that the yearly increment should not exceed 12 roentgens. Therefore, while the total accumulated dosage at any age would be fixed, the yearly increment could be exceeded in the event that such a person had some reserve to fall back on.

These new regulations in effect reduce the currently acceptable rate of exposure and make it therefore mandatory that good records be kept of radiation dosages on a yearly basis, and that such records always be available for reference and furnished to an individual if transferring to another radiation installation.

There are a variety of devices which are used to measure a radiation dose to the individual. Perhaps the most sensitive and complete is the film badge. Its main element is a film which darkens in ratio to the radiation exposure. With the newly lowered radiation limits, it was necessary to increase the sensitivity previously available by this technique.

Tracerlab had developed a new badge called the Twin-Film which consists of a plastic holder and two separate films. One of these films is exchanged and evaluated every week and is indicative of any large weekly fluctuations. The other film remains in the holder for a 13 week period, at which time it is returned for processing and is interpreted as the total dose received in a 13 week period.

All photographic emulsions have a threshold dose below which exposure cannot be detected accurately and the magnitude of this dose is dependent on the film used, method of development and interpretation, but in general, varies from 20-50 mr. It is therefore obvious that even though the 13 weekly films indicate no detectable dosage, at the end of the 13 weeks the wearer may have had 13 x 50 or 650 mr of exposure for the quarter. On this basis if a badge was worn for 13 weeks and showed no detectable exposure, and since our lower limit of detection is 20 mr, then we can accurately state that the wearer was not exposed to more than 20/13 or 1.6 mr/week.

Consider conventional film badge services, then, that state that their lower limits of detection for gamma rays is 50 mr. Thus, if an employee were exposed to 40 mr/week for 50 weeks, then his yearly exposure could have been undetected but could have actually been 2,000 mr.

The film badge has the unique advantage of indicating radiation exposures in the form of a permanent record. A review of the legal aspects of film service indicate that the mere subscription to a service may not be sufficient protection. In the event of litigation, the film processor's experience and technical competence may be points of issue; his methods must include the use of a densitometer and control films exposed to various types of radiation. The actual films themselves (not just the report) must be available as evidence and identification of the film as the one actually worn by the subscriber must be positive.

Twin-Film Service has been designed to meet all known requirements of federal and state legislation regarding exposure records. All films and film reports are kept by Tracerlab and in the event of litigation, Tracerlab can provide expert and impartial "Third Party" testimony on the accuracy of its method and the results declared.

There are also available to those using radioactive materials a large variety of both geiger tube and ionization chamber type instruments. The design of this equipment has been improving steadily and many reliable instruments are available commercially. Care should be taken in the selection of the proper type of instrument and operating instructions must be carefully studied because of the energy characteristics of the various types of radiation. One instrument may be 40 per cent efficient in the detection of one type of particle, but only 1 per cent efficient in detecting another. Some of these instruments are discussed below.

Many industrial plants today are beginning to use radioisotopes—but the approach is a very cautious one—perhaps like the youngster tasting a new food. Today's engineers and scientists, always looking for the new approach, invariably come around to considering the use of radioisotopes. At first a few microcuries will do, but soon many millicuries are better. According to the federal and state regulations, the plant responsibility for the safe use of these materials must be assigned to someone and this is usually the plant safety man or perhaps someone in industrial hygiene.

A trained health physicist is not essential in the greatest majority of cases and sufficient education and training can be accumulated in a short time. Training courses are available at the Oak Ridge Institute of Nuclear Studies and can also be obtained at several industrial firms and universities. A variety of literature has been published and typical safety programs applying to specific radioisotope applications may be available.

One of the very first problems in many cases is to assure management that everything is under control and that no one will get hurt. Certain of the personnel in the area will need special reassurance regarding the actual or imagined hazards. We can usually predict what the questions will be and the answers might be as follows: "No, you won't become radioactive"—or "There isn't enough to make you sterile"—or, "There's nothing wrong, that's natural cosmic background"—or "No, it can't explode."

In a typical limited use industrial application the following items should be considered in organizing a good safety program.

An isotopes committee should be formed

whose function it is to review all current and planned uses of radioactive materials. It should be composed of supervisory personnel and at least one individual who would be familiar with the overall company program.

A health physics committee should be composed of supervisory personnel from all the departments using radioactive materials. The head of this committee should be a member of the isotopes committee described above. The function of this group is to set up all plant radiation safety procedures and also to directly supervise the program as it applies to their own departments. It would also have the specific function of carrying out a radiation indoctrination program on a personal basis.

Pre-employment, annual, and termination physicals are recommended for all personnel coming into contact with radiation. Such information is highly valuable since it can possibly uncover those individuals who have some fears and anxieties concerning their work as well as those who might currently be suffering from some deficiency which might under some circumstances at a later date be attributable to radiation damage. For this same reason, periodic blood counts are recommended.

All radiation surveys which are taken both on a routine basis as part of the program or as a result of certain requirements listed in 10 CFR 20 should be maintained in a permanent file. Some thought should be given to the proper type of form and should include such information as: Name of person making survey, date, instrument type and sensitivity and methods used.

A very important part of the program is to maintain a complete inventory of all radioactive materials in the plant. An accounting system should therefore be devised which will immediately indicate the amount and type of radioactive material purchased, being used, stored and disposed of.

In the event that any material is delivered to any company licenses to dispose of radioactive materials, a record should be kept of the quantities as well as a brief description of the material.

All aspects of the radiation safety program specifically as it applies to actual personnel handling procedures should be a matter of company record. Such records have a tendency to be too limited in content and leave

too much room for individual discretion. A typical set of instructions should include such items as:

1. Discussion of potential radiation hazards
2. Proper use and calibration of survey and personnel monitoring equipment
3. Detailed description of handling procedures for all operations
4. Safe storage of radioactive material when not in use
5. What to do in the event of an accident

Finally, and perhaps the most important aspect of any safety program is "What do you do in the event of an accident?" Accidents are bound to happen and many of us may be familiar with several that have already taken place. Such accidents could result from:

1. Spillage of liquids or powders containing radioactivity
2. Power or mechanical failure in the laboratory exhaust system
3. Evaporation of uncovered radioactive liquids
4. Radioactive powders made airborne by gusts of air
5. Chemical explosion
6. Breaks in vacuum equipment
7. Accidental volatilization of radiochemicals
8. Mechanical damage causing rupture and resulting in leakage from sealed sources, particularly radiography, clinical or beta gauge sources
9. Fires which consume radioactive materials and result in the release of radioactive gases or particles

If the proper steps are taken following an accident, a certain situation can be analogous to the dropping of a bottle of acid on the floor. If improperly handled, loss of property, materials and production time, as well as certain degrees of hysteria, can result. Such hysteria may not only be present in the plant itself but could extend to the outside community.

Experience has indicated that the overall loss suffered is a function of the period

elapsed between the time the incident took place and the time it was discovered and, most important of all, the nature of the initial corrective steps taken. An improperly devised plan of action can only serve to aggravate the situation and unfortunately a few of these instances are now a matter of record.

If I had to prepare a list of general procedures to be followed in the event of the unusual accident, it would read as follows:

1. Evacuate the general area—shut off all ventilation—close all windows and doors and seal the room if possible. This should help to isolate the area affected and prevent the further spread of radioactive contamination.

2. Monitor all personnel for contamination and secure medical aid. Several tests are available to help us determine the amount of material that may have been inhaled and in some cases some corrective action can be initiated.

3. If serious enough, notify the nearest AEC office as required by law. They will generally visit the site and help in evaluating the overall hazard as well as planning remedial action.

4. Do not attempt to re-enter the affected area—but contact a firm which is experienced and equipped to handle such a situation.

A radiation emergency kit has been developed which should be a standard item in radiation labs. It is shown below and is intended to include all items which might be needed should an emergency arise.

Each particular use of radioisotopes is unique in some way and in this brief summary I have only been able to deal with generalities. Any industrial hygienist or plant safety man having some minimum amount of training, the proper instrumentation, a well developed educational and safety program can adequately manage most industrial radiation problems. Any worker in a plant, so directed, need not fear radioactive materials any more than he does working on a lathe or plugging an electrical cord into a wall socket.

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