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Publication Plan

THE TRANSACTIONS of the Twenty Annual Safety Con-gress National Safety Council 1934 are published in two volumes The first containing the General Sessions the Special Subject Sessions and the Industrial Section Sessions is presented herewith It is sup-plemented by a smaller volume containing the sessions of the Street
and Highway Traffic Section the Child Education Section and Home Safety ; The large volume is being sent automatically to the Industrial mem-bers of the Council the smaller volume is sent automatically to mem-bers who are believed to be chiefly interested in those sessions It may also be secured on request by other Council members â

For the benefit of many members who have found it advantageous
to distribute copies of these TRANSACTIONS to supervisors fore-men and others among their personnel who may keep them for contin-
uous reference the following quantity prices are quoted 1 to 10 copies of the large volume 1.50 each 11 copies and over 1.25 each Copies of the smaller volume .50 each

THE PLAN OF PUBLICATION is the same as that followed for

the last three years It is a condensed record The papers of cach session or division of the Congress have been assembled edited with care and discernment to eliminate extraneous matter and abbreviate

the less essential portions and the concise remainder is presented for study and reference Although not complete in the sense that every word is reproduced it is an interesting and valuable record which em-phasizes the memorable parts of each paper or address The original manuscripts are on file in the Council Library available for additional
reference as desired

Although the National Safety Council endeavors to eliminate from discussion at its conventions matters which are not pertinent to its purposes or which are contrary to its policies the Council cannot ac cept responsibility for the views expressed either in the papers pre-
sented or the discussions thereon

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Dust in Industry

FRIDAY AFTERNOON SESSION .

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October 5 1934

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â session devoted to a discussion of Dust in Industry was called to order by

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Dr. E. Meiter Director Industrial Hygiene Laboratory Employers Mutual Lia-
bility Insurance Co. Milwaukee who presided Dr. Meiter briefly welcomed the delegates and then introduced the first speaker

The

Types of Dust That Cause Occupational Diseases

By LEROY U. GARDNER M.D.

Director Saranac Laboratory for the Study of Tuberculosis of the Edward L.
Trudeau Foundation Saranac Lake N. Y

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The speaker said in part Experience has demonstrated that the lung tissues can tolerate very large amounts of most kinds of foreign dust particles without serious nterierence with function The lung may be intensely pigmented by colored dusts with no evidence that respiration is impaired But dusts composed in whole or in part of silica have been shown to be dangerous because they stimulate the growth of the connective tissues of the lungs and bring about the formation of scar

This

destroys the normal elasticity of the organ which is necessary tissue This for respiration and it thickens the delicate membranes so that a free interchange ot gassess gassess impeded Fortunately these results only follow the prolonged inhalation of very large quantities of silica
Experiments have demonstrated that the injection of silica into the tissues of the cells where the substance lodges and excites an inflammation
Fealing takes place a very dense and characteristic kind of scar tissue forms
siliceous dusts produce no inflammation and very little scar It has been
such changes do not follow the injection of silica unless the particles
ne three microns or less in diameter and unless enough of them localize
With larger particies the rate of reaction is so slow that little change within year As a general rule the finer the particles the more rapid the response The reaction to fine silica begins within four or five hours and for a period of years
silica is combined with bases in the form of silicates it rarely produces
and progressive changes The silicate of magnesium asbestos does
teamation of tissue in experimental animals and in the human lung
chimed

other silicates are not generally recognized as irritating Recently it has

chimed that a hydrated silicate of aluminum and potassium called sericite responsible for most of the cases of silicosis This silicate a transformed feldspar
associated with quartz and it has been identified in the lungs of persons suf-

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fering from silicosis However at least two types of sericite have failed to extite significant changes when injected into animals Experiments with this substance are still in progress Kaolin an alumino of potash has also produced quite characteristic changes in the lungs of rabbits But our present knowledge does not permit us assume that silicates as a class will produce serious tissue damage Most observers now believe that uncombined silica or quartz is poisonous to the tissues because it is stowly dissolved in the fluids of the body Certainly the majority of the experimental observations suggest a chemical injury but it is dim cult to understand how enough of such an insoluble substance as quartz could be dissolved within eight hours to produce a well marked acute inflammation : solubility were the only factor one should discover a more active response after the injection of the more readily soluble silicates but such is not the case For merly it was held that silica produced its effect mechanically The hard sharp quartz particles were believed to abraid the lung surfaces and excite the forma tion of scar tissue as a manifestation of healing This theory is no longer tenable for when animals are injected with other hard sharp particles like diamond carbe rundum or aluminum oxide there is no inflammation and practically no formation of scar tissue Ultimately it may be shown that the irritation of silica is due to some unrecognized property possibly related to its atomic structure

. :

When quartz particles are inhaled they produce threz specific effects which are not excited by any other type of dust yet studied They alter the behavior of pulmonary phagocytes they stimulate the formation of circumscribed nodules of scar tissue and they subsequently increase the susceptibility of the lung to infection espe-cially tuberculous infection

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Phagocytes that ingest too many quartz particles are killed by this irritating substance As the cells die they liberate their burden and several new phagocytes come out to take it up again By a repetition of this process enough phagocytes accumulate so that many of them ingest only a few particles Luder such
stances the stimulus is not strong enough to kill but merely accelerates the motility of the cells They naturally tend to leave the air spaces enter the lymphatic vesi sels and accumulate in the lymph nodes This process becomes more ranid under the influence of the irritating silica and very considerable members of particles are consequently localized in the nodes
After six or eight years the quartz in the nodes has caused a marked over-growth of the fibrous elements in these structures Ultimately the reaction develops to such an extent that the node is entirely replaced by a mass of coarse glassy tissue fibres often several times as large as the original node

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is choked and effective removal of subsequently inhaled dust is gradually
Dust now accumulates around the lymph vessels and sheets of
in this location

These preliminary changes do not constitute the disease
only the lymphatic system The respiratory tissues are not
In good storo ray films these preliminary changes may be visualized as a
ening and beading of the shadows cast by the blood vessels together with a widen-
ing of the shadow of the root of the lung The blood vessels are thickened because
the most important lymphatic vessels course through their walls The beading
due to the minute nodules of silicotic scar tissue in the lymph nodes within

lung The root shadow is widened because of the silicotic reaction in the lynigh nodes in this location
If still more dust is inhaled it can no longer be effectively carried off through

the lymph vessels The phagocytes now carry it into the walls the air space
Often the cells grow themselves in nodules hut sometimes they are scattered
these locations the silica again stimulates the formation of scar tissue The rest
is a general thickening of the septa between the spaces and elation through
the functional rtica the lung This change seriously interferes with

fuzeti

as interchange lose ga- cannot take place through the thickened walls of the
and the tissues lose their normal elasticity Less involved air
walls stretch producing producing the condition known as emphysema
patible with efective effective respiration
With the formation of silicotic modules in the fatctioning 7

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Dust in Fuinistry 25

disease silicosis is said to begin On the ray film such nodules cast clear cut und shadows they increase in mumber and size they biot out the formerly

accentuated

Alds linear shadows of the blood vessels In a well marked case both lung may be thickly seeded with hundreds of such sharply derned rumdies nodular Alds

nd the film appears black

The condition of silicosis is a progressive une and it continues to develop after
a man has left his dusty occupation Serious results only follow however when he
leaves with many nodules in the lung tissue itself As such nodules increase in size they replace important functional elements Obviously the continued growth ot only a few nodules situated in the lymphatic system could have little effect other than to increase the obstruction already present
The serious part of silicosis is its frequent complication by tuberculosis This may arise from reactivation of a existant latent infection or it may result from
a new infection from without The danger of infection increases with the amount
a silicosis present The course of the infection in the silicatic is usually chronic
and it often fails produce characteristic symptoms for months or years after its
criset Many times it is accidentally discovered in routine ray examination of
groups groups of active workmen However evidences of disability are much more marked in silicotic individuals with infection than in those with uncomplicated disease Occa sionally tuberculosis may run a very acute course in the silicotic subject but this is also true in other persoONS The cause of the susceptibility of the silicotic lung to tuberculosis is not perfectly understood but it would seem that the action of the silica on the tissues creates a medium favorable for the growth of the bacteria The tubercle bacilli multiply and a slowly progressive tissue reaction ensues but

the usual clinical symptoms of tuberculosis are often held in abeyance for a long time because the chances for absorption of poisonous products of infection are mini-
mazed by the obstructed lymphatic system It is also possible that some of these prisons may be absorbed on the silica particles as Cummins has suggested Ulti-mately the infection gains the upper hand symptoms develop and death from tuber-

culosis ensucs ,

The only other type of dust which

in

generalige recognized as a cause of severe
pulmonary injury alunos a magnesium generalige magnesium This substance is brous in character and is more readily solubie than quartz Apparently the protective per respiratory mechanisms seem inadequate to prevent the inhalation of many such fibres and even quite long ones may penetrate into the finer bronchial tubes These structures have irregularities in their walls which seem to hold the fibrous

dusts In this location the asbestos particles are surrounded and ingested by phago-

cytes
cially

The cells do not seem to be particularly irritated for they are not espe-numerous nor do they migrate rapidly into clumps as in the case ci phago
ytes dealing with quartz Apparently most of them carry their burden of asbestos ragments directly into the walls of the tubes in which they c The mildly irri-ing dust sets up a proliferation of the connective tissue cells in the walls result-ing in collar thickening of the tubes Contraction of the new connective tissue narrows or closes the tube and thereby chuts off the ingress of air to the more Peripheral air spaces These spaces then collapse a condition known as atelectasis This in itself is a cause of fibrosis or scarring of lung tissue The result is a ˆ–brosis of numerous relatively small areas in the lung due to the collar constricting ˆ –ibrosis about many small terminal bronchial tubes The lymphatic system seems to little part in disposing of asbestos dust and very insignificant amounts of this
Cust are found in the lymph nodes
Not a few cases of asbestosis die of tuberculosis or bronchopneumonia but the prevalence of the former infection is probably much less common than in silicosis Surveys of large groups of asbestos workers fail to reveal such a high incidence of
tuberculosis as found in similar studies on silica workers

The inhalation of unusual amounts of siliceous dusts apparently fails to pro-dure significant alterations in the hung It is of course possible that injurious ones ultimately be discovered but none are recognized today The siliceous micles enter the lung and are ingested by phagocytes as in the case of quartz
The cells are not stimulated to move very rapidly and as a consequence many of then remain within the air spaces for a long time Some particularly those con-

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sitadows Where there is emphysema oiten at the bases no markings are visible -

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taining relatively few particles make their way into the mulate in the lymph nodes In lymphatic system and 17- sufficient concentration or perhaps because they are

mixed with small amounts of
inflammation But this reaction

silica they set up a low grade progressive chronic results only in a little thickening in the lymp nodes and about the lymphatic vessels The lung tissue may be black from coal or red from iron but there variously pigme

feres with function The

is no formation of scar tissue that susceptibility to tuberculosis of the person with suer page

mentation is not increased but it is
unduly prevalent in coal apparently quite definite that presiona tion of cement The
miners and that chronic bronchitis results from the innala ray films of men

nothing at all or a more

working in siliceous dusts shows citter
the blood vessels

or less marked accentuation of the linear shadows cast This of course is due to the chronic inflammatory changes alot
the lymphatic trunks in walls of blood vessels : The effects of mixtures of free silica and siliceous materials are less ciently defined and should receive more serious attention It would seem unwise to assume

as has been done in the
diluents and that

past that the siliceous substances serve only as only the quartz component of a dust is of significance Experi mental and clinical data are accumulating which dusts may materially suggest that at least some ode modify the action of quartz both in its capacity to produce nodular fibrosis in the lungs and to increase the example animals susceptibility to tuberculosis Fir inhaling heavy concentrations of a mixture of silica and hematite dust for eight hours a

equal parts of =

shown not even the day over a period of 14 months bare

pure quartz dust inhaled

slightest
for

indication of nodule formation in the lung wheras only two hours a day produces definite nodulation
H also seems to be true that animals inhaling such a mixture are much less susceptible to tuberculosis than those

miner some lungs show

exposed to pure quartz In the case of the human definite silicotic nodulation others only a and many no nodules very few nodules at all All exhibit cellular connective tissue heavy deposits of iron particles with reaction When these chemical analysis of the findings can be correlated

which these miners have

lung tissues and the approximate amount of rock work performed some silica and the fibrous nodule relationship between the exposure : formation may be established Tuberculosis in these iron miners is apparently less prevalent and much less severe than in men exposed
exposed to pure silica What has been said of iron miners is also workers and coal miners probably true of founum It is generally accepted that men in the latter occupatie have less tuberculosis than the average for the they have the infection but age period Cummins believes that it is so atypical and benign in its manifestation manifestaion that it escapes diagnosis

containing

Mention

large

should
amounts

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of

be made of mixed dusts like certain slates and free silica in combination with silicates Experimental these substances behave atypically and do not produce nodular fibrosis unless there is complicating infection The same may also be true in human tionably such dusts are beings Unques

dispose to tuberculosis

capable of producing typical silicotic nodules and they are

From

exposed

From a theoretical

more intensive study to standpoint they should receive clarify our views on the whole subject At the present it appears that the action of their quartz component is modified and partially tralized by the other substances which they contain

Using Exhaust Systems and Respiratory Equipment To Protect Workers Exposed to Dust
By STUART W. GURNEY and DAVID S. BEYER

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Liberty Mutual Insurance Company Boston
elimination

The speaker
in their

said in part A number of our states have had references to dus labor laws for a good many many years but no state has as

thoroughly

provide that

thoroughly enforced these laws The codes Ave states which we investigate grinding Luting and

two of the states

polishing wheels should be exhausted althougy

exempt from these provisions whÆ» PROBAV˜°NG˜°L exhausted althougy 2

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Dust Industry 27

This seems advised since a study of wet and dry grinding in Connecticut by
Winsor and Greenburg has shown that the application of water does not by any
Heans eliminate the dust hazard

give

It may be remarked that with everything else equal a high static suction will higher velocity at the point of origin of the dust fume or gas than a low
this alone is not a measure of the effectiveness of any exhaust system Wisconsin has adopted the principle of specifying a limit to the number of dust particle of respirable size per cubic foot of air After all this is what we are primarily interested in to keep the dust contamination down to a point where it
will no be harmful : a

These variations and conflicting provisions in state codes merely reflect the gen eral lack of authoritative standards It is accordingly fortunate that definite steps are now being taken by the American Standards Association to develop the proper basis icr such codes There are two committees working on this problem the Ventilation Code Committee sponsored by the American Society of Heating & Ven-tilating Engineers and the Exhaust Code Committee sponsored by the Inter-cational Association of Industrial Accident Boards and Commissions It is also arranged to appoint committees to take up five specific subjects Abrasive cleaning chromium plating granite cutting rock drilling and spray coating If addition a Committee on Fundamental Principles of Design and Operation and Maintenance of Exhaust Systems will be appointed
The two most important considerations in an effective exhaust system are
1. Velocity of air flow 2. Arrangement of the inlets from the standpoint of near-ness to the dust source shape etc.
Many an installation that is otherwise all right fails to remove the dust success-mily mirely because there is not enough air being drawn through the system In a series of tests that were conducted under actual working conditions by Theodore F. Hatch Department of Industrial Hygiene Harvard School of Public Health a machine used in dressing stone was employed and it was noted that with an air flow through the hood of 230 cubic feet per minute there were over one hundred million just particles in the surrounding air When the air how was increased to a little over 250 cubic feet per minute the dust concentration had dropped to forty million a marked improvement As the air flow was further increased the drop dest concentration was relatively slower and it took a volume of about 380 cubic

feet per minute to bring the dust concentration down to ten or fifteen million particles per cubic foot which was considered reasonably safe for this type of dust
It is accordingly possible sometimes to take an installation that is not satis-factory and if the remainder of the system is well designed by merely speeding up the tower of adding a larger enc to bring about the desired results
Another very important consideration is to get the inlets of the exhaust system 25 close as possible to the source of the dust The drop in efficiency as we get further way from the inlet is really surprising to one who has not studied the prin ciples involved It should be remembered that if we have the open end of an ex-haust pine or air duct in operation the air tends to flow in from all sides even from behind the opening As we move away from the end of the pipe the velocity
rapidiy so that even at a distance of five inches from the hood the
velocity may be less than 10 per cent of that right at the hood inlet This is the most important consideration to keep in mind and one which is frequently lost sight of in designing exhaust systems It is not uncommon to see an exhaust inlet a few inches in diameter with which the person making the installation hoped to draw dust from a distance of several feet but the air flow even a foot or two away from the cotrance to the inlet may be negligible

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Still another important consideration having to do with the design of the inlet is the addition ofˆ ofˆ flange The efect of this flange is to cut down the air that would flow in from behind the opening thus drawing it nearly all from the front Thus the efficiency of the system is substantially increased and the scope of the ex-haust extended appreciably without increasing the power consumption or otherwise adding to the expense of keeping up the system

air There are also other considerations of perhaps lesser importance For example air cannot be iled from a distance by merely directing an exhaust pipe toward the point in question but it can be rushed or blown directionally for a consider

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able distance This principle may be used advantageously in directing the du toward the opening of the exhaust inlet and thus getting the desired results wit 2 lower exhaust velocity and power consumption than would be required if suc¯£i alone were depended upon This principle has been applied effectively in drillir material containing asbestos where the exhaust inlet is placed at one side of th drill and a small air jet at the opposite side of the drill blowing across the tabl

turns the particles that would fly out from this side and directs them back in the exhaust system It is also being applied to foundry shake work

Other considerations in designing exhaust systems include the elimination (

unnecessary bends or curves the provision of clean doors and the proper cor struction of joints Where there is a general ventilating installation and one or mor exhaust systems care must be taken to see that they do not conflict with each othe After an exhaust system has been installed it should be tested by taking actu dust counts to see that the dust is really being cut down to the desired point an such counts should be taken at intervals after the installation has been made t

see that it is still functioning property

,

The fact that the dust particles that cause the trouble are so small that the are invisible under ordinary conditions less than 10 microns or 2500th of a

iuch in diameter often makes it hard to convince the practical plant manager tha there is any dust present it also makes it impossible to tell without the use of spe cial instruments whether the completed exhaust system is actually removing th

dust an

It might seem like an insult to one’s intelligence to say that after an exhaus system has once been installed it should be maintained in good operating condition However the numerous cases que encounters in the plants where this obvious neces sity is not carried out indicates that it is really one of the major considerations in

connection with the elimination of dust or fumes Cases are not unknown where the blower has in some manner become reversed so that the air is being eleme and diffusing the dust rather than drawing it in other instances where

em

ciency of the system has been lowered or its value nullified by clogging 5. connection or wearing out of the piping etc. are all too comma

One concern of which the writers have knowledge has a U tube permanently installed in one of its main exhaust systems so that the foreman te safety man can

tell at a glance whether there are any changes that would indicate a break in

the system All such installations should have regular inspections by same cimper tent person as a routine part of their upkeep ,
It will be sumcient here to discuss respiratory equipment very briefly The
simplest form of this equipment is the filter respirator Such respirators
definite value ir temporary use such as sweeping up cleaning
materials etc but they require careful fitting and constant supervision supervision
they are being properly used

It is our opinion after watching the sincere efforts in a number of plans to enforce the use of these respirators that it is rather impracticable to require them

to be used on time operation One notices the men under these surreptitiously pushing the respirator aside and gasping in free air
of water Certainly if they are to be used any considerable length
quent rest periods should be allowed where the men can get out
for a few minutes refreshment

There are also the large fed helmets with which most of
used for sandblasting sandblasting etc. which have been carried to high state of
for the purposes to which they are adapted
We believe

type of apparatus
helmet namely
leaves the rest
offers considerable
hose could be
practicable to
pure air supjdy
that is impos

that much more use could be made advantageously midway between the fiter respirator

ied respirator which covers the nose
exposed With a light hose attachment
of movement and if air outlets were
one cutlet to another it

considerable area They afford the
weight and without the restricti
fiter respirator

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Dust in industry 29

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The Medical Supervision of Workers Exposed to Dust

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By W. J. McCONNELL M.D.
A Sit;

Assistar Medical Director Metropolitan Life Insurance Co. New York City

The speaker said in part
ace with the physical and chemical natures of each individual substance Certain dusts are soluble or slightly soluble in the body fluids and their harmful effects are proportional to the toxicity of the compounds formed Lead mercury and arsenic
are examples of poisonous dust Other dusts exert their harmful effects locally
ont and mucous membranes and through irritation to the respiratory passages Carmic acid and alkalies are examples Attention recently has been called to the preably harmful effect of dusts arising from active ores A fourth group

of cists which are insoluble or very difficultly soluble in the body fluids may initiate
É armful pathological lung conditions These may be subdivided into fibrosis ;
and ˜brosis producing dusts The organic dusts mainly the vegetable fibers such â
as moctor jute hemp etc. are fibrosis producing dusts The fibrosis producing
dnsts are limited so far as we have evidence to a few of the inorganic mineral
f such as free silica crystalline silicon quartz and certain combined silicates
Of the brosis producing dusts those having a high percentage of free silica arc
admited y the most important because exposure over a period of years to such
distˆ¡ distinctly predisposes the individual to tuberculosis
ce The effectiveness of dust control measures in preventing diseases produced by
z duses can be determined only by careful physical examination of the workers s50
exposed under the guidance of competent medical supervision The benefits which

acume to the employer and employee alike as a result of the physical examination
of 2 applicants for employment as well as periodical examination of those already engaged would indicate very careful consideration by industry of a program for

comul of sickness Such a procedure protects the employer from engaging an
ap˜can already physically or mentally impaired who later may claim disability or a condition either not associated with employment or contracted during a pre-was employment The applicant’s physical and mental condition is established and by seeping record of his subsequent illnesses and accidents the question of re-sponsibility for injuries and sickness need never arise
The applicant is protected from engaging in work for which he is physically DH adapted which if undertaken might easily bring about serious impairment of his bealth For example an applicant with an arrested tuberculosis who seeks in a certain dusty occupation if allowed to engage in such work might readily Convert an inactive tuberculosis into an active one thereby endangering life or at east seriously impairing the applicant’s future efficiency and earning capacity Whereas the saine applicant if assigned to a position that involves no such ex-pose might be expected to continue for years as a useful and productive work-
Tear. The examination of applicants for employment likewise protects those that
are already employed from the risks of communicable diseases such as tuberculosis
and various acute respiratory and other infections being introduced into their midst
by a new applicant

Many of the younger individuals who seek employment have never before re-
ee ved a thorough physical examination and consequently are unaware of the de-
fers from which they suffer As a result of physical examinations many defects

The harmiuiness of dusts rite varies widely in accord-

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x are located which may be removed or

corrected before they have caused irreparable

z damage thereby increasing the efficiency of the worker and often averting definite
â a. and finally chronic diseases Furthermore incipient tuberculosis unsuspected dis-
ae. cases of the heart kidneys and a host of other diseases of a similar nature are
& discovered and the applicant referred for proper medical care and treatment which

n

otherwise might have been postponed postponed til too late
Of even more importance than the initial physical examination of applicants is
the periodic examination and care of tid employees by industry Such a pro-

cure

serves to check the efficiency of preventive measures designed to prevent serpational diseases It offers the most effective way of controlling the health of

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many

large groups
other conditions

of workers
that

by discovering early not only occupational diseases ton
go undiscovered until the worker is comes disabled If the acutely ill er te various
cone infected

contagious conditions go unrecognized others tx thereby causing serious economic loss as well as health of a group of endangering the individuals

The information obtained from
visor the opportunity to make certain

physical
that

examinations affords the medical spe
out of which employees are engaged in suitable with they are
posure to harmful

getting maximum results to correct the effects of undue et- environmental conditions and tional hazards As a

generally to lessen all o

value of periodic

public health measure it is impossible to estimate examinations in
The set of a

establishing interest in sickness prevention
proper program˜– for medical control of workers depends upon the exposed to casa number of
A series of articles

employees involved and individual plant conditiona under the title of The Medical Hart E. Fisher Department Manual br
prehensive account

appearing
of the organization

in current numbers
and

of Industrial Medicine gives c
1. The operation of a medical department
ical personnel

establishment
who have

of

qualified

a medical
in the

department
field of

with adequate facilities and m

analysis of all operations in the

industrial medicine A process
should list all possible health

plant should be made and the medical superviser
logical effects If

hazards and familiarize himself with their physic
harmful effects of new

necessary
substances

he should conduct research studies to determine x
is known In cooneration

introduced into plant processes about which linie with other departments he should of the hazards and devise investigate the exte measures of
2. The routine control . examination of all applicants for should include a detailed history of the applicant’s

employment The proc
classified under a diseases of

previous illnesses and accid

respiratory diseases d

childhood b general infectious diseases venereal diseases and e accidents and defects A detailed resulting physizi history of previous occupations engaged in is A mere statement of the type of very import industry in which the slight value if applicant was engaged tas any The exact duties performed in each noted and information occupation should te ascertained as to the probable length of ous substances After exposure to hazi- the history has been taken and a tion photograph for identi

examining

purposes

room

if
where

part of routine is made the applicant should be directed to he is instructed to remove his clothing for ination This physical e examination should be made as complete as is considered to determine the applicant’s necessary physical condition

cases

If the

auf ray

applicant
picture

has
of

been
the

or will be exposed to dusts which induce lung s
part of the examination

chest is an importat puss puss which indice
may be referred to an experienced the value of this roentgenelegis_
the experience of

method
the
of diagnosis depends upon the type of pictures taken reader who interprets them The

may need additional examining physician iâ:
snutum and the urine

information obtained by laboratory analyses of the 1 These aids to

able when desirable

diagnosis should he provided or made ava

3. The rating and placement of applicants In
department the applicant should be

cooperation with the pers
past
rated and placed not only on his training z˜« experiences but also on his

ring from time to time The

physical and mental abilities to fill vacancies oc- record of his

be the confidential physical and mental examination shrekt property of the medical department Periodical physical examinations The frequency of periodical examinations necessarily must defend upon individual

such examinations as
circumstances according to the nee˜ determined by the
examinations are made for

supervising physician Where the first time the given ample employees of long standing

auces that
explanation of the benefits of such examinations be their jobs are secure

5. Provision for the disabled Employees who develop disabilities course of employment shcard he assigned to

with occupations which or aggravate the disability

process
superviser

will not

or they should he provided for in other ways

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the manufacturer It is not enough to say in a code that certain hazards must 7 be permitted the code must specify the actual type of

hazard safety device to eliminate the

Specifications for
engineers or safety directors
safety devices should be set up by competent and experie These specifications should be as it is possible There is largely uniform so =

tensile strength in a

no reason why one state should require 55,000 pounds window cleaning device and another state should require 62000 pounds tensile strength If 55,000 pounds tensile in strength is safe for a man’s sae

equipment

one state
should

it should

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safe for a man’s life in all states Manufacturers of safery that the states adopt a uniform standard in ment .

safety -

Safety devices in the shop have an almost incalculable visual value to emploress The

ing and

very sight of guards brings to their minds the thought of the employer’s back- willingness to
see any proof of

prevent accidents wherever possible The employer can
money spent by his
oral safety employer when it is expended merely for directions meetings of committees or

presence of the engineers but there is a visi¯¾ie Again there

employer’s
is an

interest shown in every safeguard used in a shop added gain in the mental reaction of the guarded employee in well

if we work

shop
or

To illustrate we are prone to be careless in our personal has frequent a

throwing a

carelessly kept workroom or office We do not mind cigaret butt or a paper on the floor of a hesitate twice dirty room or office but we before doing so on a floor of a I believe that in a

scrupulously clean and well roim
a safe worker is

well guarded shop the moral and mental stimulant to become greatly accentuated due to guarding and that we can workers to react expez te by conducting themselves as safe There are workmen plenty of instances where proof can be obtained as to the valse II

within

safety devices
our own

in
state

accident
in

prevention A short time ago a project was comple the nature of road building lasting only a few weeks and yet during that time thirty pairs of

Had these goggles worn by the workmen were broken
would have

goggles
had

not been worn there is no question but that thirty pers

eye injuries
At the Greater New

resulting probably in the loss of eyes to some of th
lated

York Safety Congress held last winter statistics were da- to the effect that the loss of an eye entailed a 12.000 In the monetary loss of approximate instance I speak of the wearing of thirty pairs of sured a possible goggica

money saving of some 432,000 In the olden days the operator of a mill expected accidents just as surely as te expected breakdowns in his machinery The situation is different now however an accident in a mill means an

somebody’s

investigation as to its cause a rigid inquiry
the

carelessness and in most cases a punishment for the man in charte operation because of the accident All we need to do to size up the value safety devices is to imagine what

devices industry would be like today if all our and safe practices were abolished and former manufacturing plants returned to careless state of years ago

Protecting the Feet and Legs Hands and Arms Face and Head of Industrial Workers

By H. R. BIXLER

Industrial Relations and Employment Department Union Carbide Company Company New York City
The speaker said in part In recent publication of the Industrial Commissie of Ohio under the
analysis
heading The Destructive Big Six I find the following of occupational injuries in Ohio in 1933 shows that a large

centage of the total of all mishaps mishaps in industry are directly traceable to six causes The most prolific source source of injuries to industrial workers is that of objects This cause is charged with for 26 per cent of the total injury claims for six causes for the year 1933. Next in

accident machinery machinery ST:

with 24

Safety Equipment 87

per cent Falis of persons while fourth in order of
x lead in severity Stepping upon or striking against
directly er cent and the operation of industrial motor vehicles
not directly related to our subject is sixth with 8 per cent In sum
Tap Tap the 1933 totals these six causes it is iound that they were accountable
sep Tap 73 per cent of al injury claims fied for over 44 per cent of all fatalities See approximately 80 per cent of all permanent disability cases and were charged approximately a time loss of over 1 per cent of the total for all causes

One of the major considerations considerations in the design of protective clothing for special
us in addition to the mechanical features of such clothing and equipment is that
@ the materials with which they are made A specialist in the design of safety
are offers the following comments :

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Primarily three types of material are used in the manufacture of safety ap-nami. These are leather asbestos and fireproof duck Duck of this kind should reciy be called fame Flame duck when exposed to flame or fire
eves at high temperatures will not ignite There will however be a process of
axation which will everally consume the cotton in the duck Fireproof duck is the cheaper of the three substances ordinarily used and is suitable where the Sazard encountered does not require impervious protection Asbestos the second mer is also commonly used in the manufacture of protective clothing Many people think that asbestos is a heat insulator while actually it is a heat conductor Agestos can be compared in this relation to any other mineral and while it will not

amine heat as readily as metal it certainly will conduct some heat Such equip-
mer. herefore should have some heat insulation as for example a cotton lining
in in asbestos glove Astestos of course is absolutely fireproof The third material commonly used in the maniacture of protective clothing is leather which for most y apparel is horserite or cowhide Leather can be either grain or split Icaber The grain leather is comparable to the tough outer layer of skin while toe split leather can be compared to the bottom layer of skin In tanning leather Rm ecessary to use of While there must be a certain amount of oil in the femier the buyer of preterive apparel must be careful that there is not too much ou in it since such leather when used near hot operations deteriorates rapidly
Ea the estimation of specialist leather is the best article for round wear

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and hard usage He believes for example that a leather legging should out-

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wear at least three fireproof duck leggings and from two and a half to three asiesto leggings This same comparison applies to leather gloves He recommends csr cather for all general purposes except those where its weight will defeat is garoose by tiring the mer or making him too hot while working
Many types of specially designed protective clothing are made of rubber or of
a composition of some one material with rubber Such equipment is usually de-sed for protection in connection with operations involving hazards because of
- \ 3eRa. ames and vapors work in wet areas and those operations involving the
E i n e Eine of liquids

Special

Special rubber protective clothing and equipment has been ´§
deme for clectrical hazards and include rubber gloves boots overshoes sleeves
: C. hats and line cover z material such as blankets line hose insulator hoods
<7 and protectors
Feit is used in some

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pes of protective clothing as a protection against heat
where the use of clothing made from fireproof duck asbestos or leather is not de-

sirable One industrial secern having electric furnace operations uses paper- TL? pressed felt to make protective jackets and trousers for its furnace operators

because of its protective Natures comfort of the wearer and The relatively low cost material is pure we felt and offers good protection from radiated heat on
acct of its low conductivity while it will burn it will do so very
slowly and without flame :

Referring to the first two sections of our subject without details two attempting to go
material requirements and mechanical design let us
say that protective clothing for the feet and legs of industrial workers would in-
Core shoes toe guards pats leggings knee pads thigh guards and aprons for :
Doperations Doperations In proteining the hands and arms safety gloves hand pads mit- . In firger cots arm protectors sleeves jackets and the like are commonly used
In addition for complete body protection are found protective suits consisting of

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jackets and pants or complete jumper suits Protective ointments are also used for the skin in operations involving acids fumes and vapors

The third division of our subject for protecting the face and head of industrial workers one which is receiving increasing attention because of the hazards in- volving the eyes and respiratory organs While eye protection has long been a

part of industrial accident prevention work the necessity for the use of goggies is not fully recognized since we learn from the National Safety Council that there were 300,000 industrial injuries to the eyes in the United States last year each re-sulting in at least one day of disability Of this number 70.000 were compensable

cases which means seven days or more of lost time for which the average cost was 375 and 125 additional for medical cost In 2,000 cases there was com-
plete loss of vision in one eye while 75 persons lost the vision of both eyes The total estimated loss of 3,600.000 days per year from work was attended with a total cost in time lost compensation and medical bills of approximately fifty millions of dollars

Perhaps the most authoritative source of valuable information for safety engi neers at this time concerning the protection of face and head of industrial workers is the head and eye safety code which is now being revised under the supervision supervision of the American Standards Association The title of this code is being

to the American changed Standard Safety Code for Protection to Heads Eyes and Respira-

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tory Organs A study of the code’s revisions even in its present tentative form will be of great value in the individual’s consideration of our subject and in its final form when published will be of inestimable value
Of special interest are the following requirements for respirators and gas masks
as proposed in the revised code .

Requirements for Respirators and Gas Masks

The respirator gas mask with mechanical filter or hose mask is permissible
The respirator shall be so designed and constructed that when it is worn in
its proper position it will permit only air which has passed through the filter

to enter the mouth or nostrils of the wearer The material used for the body of the respirator shall be such as to combine mechanical strength and lightness of

weight The respirator shall be comfortable to wear and shall not impede free action by the wearer The facial contact edge of the respirator body shall not irritate the skin of the wearer and shall not allow leakage of unfiltered air If . rubber is used the rubber compound shall be free from jead and mineral
If used in work sulphates requiring goggles the respirator when in place on the weare
shall permit the use of various types of goggles without impairing the effectiveness of either the goggles or the respirator or the goggles may be permanently attached to the respirator An automatic exhalation valve is optional
The gas mask is permissible for limited exposure For higher concentrations and for longer exposures to any gas a hose mask or a hood with positive air
supply may be used

The hose mask shall be of such design and construction as to completely protect the respiratory organs of the wearer from toxic gas and dust and make a tight fit when in its proper position on the wearer

.

Canister type gas masks shall be of such design and construction as to protect the eyes and respiratory organs of the wearer from acid and organic vapors am-

monia carbon monoxide dusts smokes and mists either singly or in combination where the oxygen content of the surrounding atmosphere is not less than 16 per

cent In places where only irritant gases such as carbon monoxide are present the eyes need not be covered Gas masks shall be of such design as to insure a
tight fit when in proper position on the wearer Cartridge masks shal meet all requirements for the canister type except as to canister connecting tube
and body harness
Among the devices designed
dusts by far the most impretant
dusty operations such as
injure the face the helmet

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the protection of the indivirical worker against
positive pressure respirator In particulari
and metal grinding where the particles may

respirator is prefer Aldate per Ange of

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Safety Equipment 89

me 12 No it is essential that the apparatus |. provided with an adequate air
drawn from a pure dust source Sime authorities recommend as
x cubic feet per minute while others are of the opinion that respirators
on modern principles are efficient when
of air per minute The source of air
ry frequently made of taking the air directly
providing the air intake to compressors

with

ne just particles Sometimes the air of
and there may be a possibility of carbou menoxide
y burned in a reciprocating piston compressor compressor The air under these :. is unsuited for use in the respirator it becomes necessary to install small rotary compressor blower supplied from a clean source of air This

are

used with but one or two

supply is equially important The
directly from a compressed air fine
with a filter capable of removing
compressed air line is wet and
menoxide poisoning menoxide due to oil being

Respirators should be selected for their comfort to the wearer and for their
; ´' efficiency The manufacturer should be required to submit a laboratory
t of the efficiency of his device for the purpose selected Although respirators homd never be regarded as substitutes for local exhaust ventilation they provide a practicable means of protection for workmen engaged in dusty operations carried cicly cicly occasionally or for short periods of time The positive air pressure type of regulator unfortunately cannot be worn by workers engaged in operations requiring
an to move about tinhampered by air hose The only available protection
worker under these conditions is to wear a respirator with a filtering
of fibre or tissue Only those types which have been demonstrated to
sess the necessary filtering medium to give sumcient protection against fine
should be selected

The importance of the use of the positive pressure respirator in dusty work on is illustrated by the results of an analysis conducted by Dr. Leonard Grammburg and Charles Pierce of the Laboratory of Hygiene at Yale University â a #nection with the study of the subject of Ventilation and Its Relation to the roof roof Dust Gases and Fumes They found that air drawn from a cabinet amining 61 millions of dust particles per cubic foot retained four and half
um particles per cubic foot when drawn through a respirator two million
cies were drawn through helmet and respirator tenths of one million of is particles per cubic foot were drawn through helmet with positive air pressure but tenths of one million were drawn through a respirator and helmet pustive air pressure This demonstrates conclusively that a respirator alone imitations in effectiveness when used in heavy concentrations The reason for
lack of satisfaction arises from the fact that the fit of the respirator to the face
ide ide by soit rubber which even though the

best

available is not air tight when
heyeater heyeater is working Where dust exists which cannot be otherwise controlled pal protection can be obtained through the use of respirators however if pramcable a positive pressure helmet system ould be installed since it gives
a complete protection

Safe Protective Equipment as Related to Accident Prevention

By R. B. ROAPER

Safety Engineer Humble Oil & Refining Company Houston Texas

The speaker said in part I am convinced that a combination of education and equipment is essential for accident preverin work The use of protective
ment cannot prevent all accidents nor can the training of employees prevent
accidents No matter how proficient employees may become in the performance
;

, they must not lose sight of the fact that certain hazards and conditions
e protective equipment
be used it is necessary to study

experience in each class of work If it is found that men engaged in certain of work are prone to receive injuries to certain parts of the body even in

In order to determine just what equipment must

method is applicabic particularly to plants not equipped with compressed air

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TWENTY ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL

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Accident Prevention Equipment

Manufacturers Section

Officers 1933-34

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* Chairman W. Millard Industrial Gloves Corporation Danville Ill ´¥

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Pulmosan Safety Equipment Corporation Brooklyn N. Y.
Gallaway American Optical Company Southbridge Mass
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BUSINESS SESSION

September 30 1934
The annual x
annual business meeting of the Accident

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turers Section was called to order after a pleasant * Buell W. Nutt Safety Equipment Service ports Company Cleveland who presided Re- were heard from the General Chairman and the Chairmen of Standing Com- mittees on activities during the past year The report of the Nominating Committee was then called for and new officers for the Section were nominated and elected follows :

cag Chairman Irwin W. Millard ville Ill

Chairman George Shull Pittsburgh Pa President Safety First Supply Brady Bldg

George Shull , President Safety First Supply Co. Brady Bldg

Secretary William Wahlert Pulmosan St. Brooklyn 1 Safety
75 Treasure L E. Dickson President Standard Safety Equipment Co
East Wacker Drive Chicago Hi Executive Executive Committee Larne - J.T.
Ryan Pres Mine Safety Appliances Co 201 N. Braddock Pitts- burgh Pa
F. R. Davis President Davis Emergen New York City

Prevention Equipment Manufac
pleasant dinner by General Chairman

Secretary Industrial Gloves Corporation Dan-

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R. T. Solensten V.Pres Elliott Service Company 242 W. 55th St. New York City
B. W. Nutt President Saiety Equipment Service Company 1228 St.

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Accident Prevention Equipment
Manufacturers

Who Made Exhibits at the Twenty Annual Safety Congress
and Exposition Statler and Cleveland Hotels
Cleveland Ohio October 1-5 1934

American France & Foamite Industries Inc. Elmira New York
Fire protection equipment

American Optical Company Southbridge Massachusetts

Industrial eye protection service

Bendix Products Corporation South Bend Indiana
Automotive testing equipment
Robert A. Bernhard Rochester New York

Saf applicator bottles for antiseptics

Binney & Smith Company New York City Emulsified carbon black for concrete pavements
Bishinger Manufacturing Company Pittsburgh Pennsylvania Oxygen equipment products
Bradley Washfountain Company Milwaukee Wisconsin
Group washing equipment
Brown Shoe Company St. Louis Missouri
Safety Toe Shoes
R. H. Buhrke Company Chicago Illinois
Safety beits straps buckets and tool guards
E. D. Bullard Company San Francisco California
Safety equipment for mines and industry

Burroughs Wellcome & Company U. S. A. Inc. New York City First aid and medical equipment
Godfrey L. Cabot Inc Boston Massachusetts

Emulsified carbon black for concrete pavements
Chicago Eye Shield Company Chicago Illinois
Head and eye protection equipment -
H. Childs & Company Inc. Pittsburgh Pennsylvania
Safety footwear
Cunningham Aircraft Corporation Rochester New York Sand blast helmet and suit

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Davis Emergency Equipment Company Inc New
First aid gas masks and safety equipment

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Accident Pretention Equipment Manufacturers Section

fro Eagle Signal Corporation Moline Illinois

Traffic signal equipment and industrial timing equipment Elliott Service Company New York City
Elimination of waste promotion of efficiency and safety
Evans Products Company Detroit Michigan
Railroad grade crossing and barrier and traffic signals The Stewart Corporation Cleveland Ohio
Soaps disinfectants and cleaners for planned sanitation Davidson Motor Company Milwaukee Wisconsin Special police motorcycles and equipment
Huster Auto Equipment Company Inc. New York City Fleet specialties rubber mirrors stop and lights
Hynson Westcott & Dunning Inc. Baltimore Maryland

Mercurochrome and Thantis lozenges

Industrial Industrial Commission of Ohio Columbus Ohio
Accident record charts and graphs educational safety literature International Shoe Company St. Louis Missouri
Safety shoes

Junkin Safety Appliance Company Louisville Kentucky
Safety guards for punch presses
Walter Kidde & Company Inc. New York City
Permanently piped fire systems and portable extinguishers Leigh Safety Shoe Company Allentown Pennsylvania
Safety shoes and boots
Lima Cord Sole & Heel Company
q Non soles and heels for icewear

Liquid Carbonic Corporation Chicago
Fumigant for infestation centr

Mazwhyte Company Kenosha Wisconsin

Wire rope and braided slings
Martindale Electric Company Cleveland Ohio
Protective masks safety roadway signals

Metropolitan Life Insurance Company , New York City
Insurance industrial group etc.

Mine Safety Appliance Company Pittsburgh Pennsylvania

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Lima Ohio

icewear

Chicago Illinois

Mine and industrial safety equipment

National Automatic Safety Sigma Company Chicago Illinois
Safety flash signal for rear ci trucks
Innois
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industry and construction
Company Pittsburgh Pennsylvania
equipment

Company Cleveland Ohio ~

National Safety Council Chicago
Foster Library Research and
The Patent Scaffolding Company
Ladders and scaffolds for industry

Portable Lamp & Equipment Company
Electric mine lamps and safety
The Positive Safety Manufacturing

| Power press safety devices

Illinois

benzn storage etc. tank ¯¿ittings

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152 Twenty Annual Safety Congress Safery

Pyrene Manufacturing Company Newark New Jersey
Hand fire extinguishers and systems

Reece Wooden Sole Shoe Company Inc. Columbus Nebraska Wooden sole safety footwear

The Safety Clothing Company Cleveland Ohio
Safety clothing and equipment

The Safety Equipment Service Company Cleveland Ohio Goggles safety clothing and other safety equipment

Safety First Shoe Company Holliston Massachusetts Safety shoes

Safety Signal Devices Inc Chicago Illinois
Safety light for cars trucks and buses

The Service Recorder Company Cleveland Ohio
The Servis Recorder for trucks and buses

Shepherd Safety Shoe Corporation Chicago Illinois Safety shoes .

The Sight Light Corporation New York City Instruments for measuring light in industries etc.

Standard Safety Equipment Company Chicago Illinois Dust protective equipment and general safety devices

Stonehouse Signs Inc. Denever Colorado
Metal accident prevention signs

The Surety Rubber Company Carrollton Ohio
Rubber safety equipment for linemen and industry

Weaver Manufacturing Company Springfield Ill Automotive testing equipment

West Disinfecting Company Long Island City New York Disinfectants insecticides and sanitary supplies

Willson Products Inc Reading Pennsylvania
Eye head and respiratory protective devices

Mfg Corporation Brooklyn New York
Fire extinguishers and equipment

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: October 2 1934

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activities presented a brief review during the past year
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The opening

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The Economics of Accident Prevention Marine Cargo
By W. HEINRICH

Assistant Superintendent Engineering and Inspection Division
Insurance Co. Hartford Conn
The speaker said in part

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TUESDAY MORNING SESSION

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TUESDAY MORNING SESSION

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Marine Section 235

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Report of the Nominating Committee

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Chairman in Charge of Publicity M. Tode Consulting Marine Engineer New York N.
Chairman for the Pacific Coast O. Wull General Petroleum Corp. of Calif Terminal Island Calif

Secretary S. Hunter The Atlantic Refining Co. Philadelphia Pa
News Letter Editor Blackstone United States P. & L. Agency Inc. San Francisco Calif

Engineering Committee Chairman York N.
Membership Committee Chairman C. Holden Jr. United State P. & 1 Agency New York N. Chairman
Program Committee Chairman E. Ames Lykes Ripley Steam-ship Co New Orleans La
Statistics Committee Benjamin H. Self

pany New York N. Y.

Chairman C. Edwards Consulting Engineer New

Travelers Insurance Com-

Chairman C. Gregory Waterfront Employers Stevedoring Committee
Union San Francisco Calli

Members at Large-

W. P. Eiggs Navy Department Safety Engineer Washington D. C.
C. F. Blackton Erie Railroad Co. Jersey City N. J.
Frank H. Cogan Delaware Lackawanna and Western
Hoboken N. J.

F. P. Foisic Shipping Federation of the State of Washington Seattle Wash J. M. Griser Alabama Dry Dock & Shipbuilding Co. Mobile Ala
Wm Groundwater Union Oil Co. of Calif Los Angeles Calii

Henry J. Heidorn Standard Shipping Company New York Y.
Willard F. Jones Gulf Refining Co. New York N.
W. P. Kain Marine Surveyor New York N. Y
T. F. Kavanagh Grace Lines Inc. New York N. Y.
R. K. Kelly Tide Water Oil Co. New York X.
Stewart Lee Jr. New York Shipbuilding Co. Camden X. J.
J. L. Luckenbach American Bureau of Shipping New York Y.
Daniel J. Murphy Murphy Cook & Co. Philadelphia Pa
Carl E. Petersen Newport News S. B. & D. D. Company Newport News Va Byron O. Pickard Pacific American Steamship Assn San Francisco Calif
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H. W. Proom Black Diamond Lines New York N.
J. K. Robison Sinclair Navigation Co New York N.
J. C. Roblis Standard Oil Company of Calif San Francisco Calif
Arthur R. Savage Peninsular & Occidental Steantship Co. Port Tampa
H. L. Seward Yale University New Haven Conn
A. J. Smith Marine Office of America New York X.
J. H. Tomb Capt USN Rtd New York State Merchant Marine Academy
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THIRD ANNUAL SAFETY CONGRESS
NATIONAL SAPETY COUNCIL

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Secretary and Notes Letter Editor BERQUIST The Youngstown Sheet and Tube Company East Chicago Ind
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Bethelehem Pa

Health Committee Chairman R. C. ENGEL The Corrigan McKinney Steel Company Cleveland Ohio
Membership Commitice Chairman A. CuAFFIN Continental Steel Corp Ko-
komo Ind

Poster Committee Chairman D. SPEHT Keystone Steel & Wire Co. Peoria
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Pragram Committee Chairman M. ALLEX The American Rolling Mill Co
Middletown Ohio

Publicity Committee Chairman M. LyTLE The Newton Steel Company New-
ton Falls O.
Statistics Committee Chairman E.

burgh Pa
Slides and Safety Kinks Committee Chairman A. OARTEL Carnegic Steel Com pany Pittsburgh Pa
Foundry Committee Chairman G.
pany Columbus Ohio
Railway Car Builders Committee Chairman J.
facturing Corporation Pullman Chicago Ill
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J. A. COLTRIX National Radiator Corporation Johnstown Pa
H. M. CROGHAN Inland Steel Company East Chicago Ind
A. Davis Illinois Steel Company Chicago Ill
Jons P. Ets Illinois Steel Company Joliet Ill
E. A. ELLs Wheeling Steel Corp. Wheeling W. Va
W. T. FILMER The Youngstown Sheet and Tube Co Youngs A. C. Grason Spang Chaliant & Company Inc Pittsburgh

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A. Jarvis The Chase Companies
A. LAUERMAN Republic Steel

T. H. McKENNEY Illinois Steel Company N. MEDALIE Interlake Iron Corp. Chicago W. E. MegraW H.

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Louisville Ky

J. K. STAFFORD Mississippi Valley

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Waterbury Conn

Corporation South Chicago Chicago
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H. Robertson Company Pittsburgh Pa

Louisville Car Wheel and Railway Supply Company
Structural Steel Co Decatur Ill

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MONDAY AFTERNOON SESSION

October 1 1934

The opening session of the Metals Section was called to order by General Clair- man E. F. Blank Jones & Laughlin Steel Corporation Pittsburgh Pa who presided Chairman Blank introduced Mr. Donald D. Gillies President Corrigan McKinney Steel Co Cleveland who made a brief address of welcome on behalf of the Con- vention City General Chairman Blank then presented ties of the Metals Section giving in some chairman of standing detail committees whose work fur Chairman Blank then introduced the first speaker

presented a brief Resumˆ' of the Year’s Activi-
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Practical Safety from an Operating
By G. D. TRANTER

General Superintendent Middletown Division The American Rolling Mill Ca.

Middletown Ohio

Standpoint

The speaker said in part If we seek the same methods used for operating control piant safety record For example safety rules must be manner as regarded in the same

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TWENTY ANNUAL SAFETY CONGRESS NATIONAL SAFETY COUNCIL

Mining Section

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Tenn

Chairman in Charge of Membership Coal FRANK B. DUNDAR Pick-ands Mather & Co. Mather Pa

Chairman in Charge of Membership Metal Mines- W. ALT Calumet & Hecla Consolidated Copper Co. Calumet Mich

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Washington D.
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W. H. COMINE National Lead Co. St. Francois Mo.
M. F. FAIRLIE The Mining Corporation of Canada Ltd. Toronto Ont Can-
ada

C. W. Grans Harwick Coal and Coke Co. Pittsburgh Pa
H. C. HENRIE Phelps Dodge Corp. Bisbee Ariz
THOMAS E. LIGHTFOOT Koppers Coal Co Pittsburgh Pa
Lee Loxc Clinchfield Coal Corp. Dante Va
George MartINSON Pickands Mather & Co. Hibbing Minn D. D. MOFFATT Utah Copper Co Salt Lake City Utah
M. W. PRICE Highland Coal Co Jeddo Pa
L. T. Sicka St. Joseph Lead Co Bonne Terre Mo.
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Mining Section 281

It is also to be realized that a safety program or method that is suitable for one company or location may not be desirable for another company For example in our two New York state mines which have the same regulations regarding safety hats shoes goggles etc. and where the primary rule is also enforce that cach and every man is responsible for his own safety and for the safety of his fellow worker great emphasis is placed on housekeeping or cleanliness about the mines and mills Each department of the two divisions has a metal sign ruled in three columns one being for the month of the year while the other two are for the house-keeping rating and time accidents If the conditions are good a gold star is placed on the sign if only fair a green star is awarded while for poor cleanliness a red star is given A gold star counts ten a green five and no score is given for ref These scores are posted monthly on the bulletin board and the basis of com-parison between the two mines is thereby made possible If a score is not perfect or at a reasonably high figure the department which is negligent receives consider able adverse publicity If there are no time accidents a gold star is placed
in the accident column

The results of our New York safety program are reflected by the achievement of operating 162.912 hours with only one time accident which incapacitated a worker for two days and this record resulted in the 1932 award of the Sentinels of Safety Trophy

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THURSDAY MORNING SESSION

October 4 1934

The Dust Problem in Mining Operations
By D. E. CUMMINGS

Assistant Director The Saranac Laboratory for the Study of Tuberculosis Michigamme Michigan

The speaker said in part Refuge can no longer be taken under
ignorance that the prolonged inhalation of dust may lead to serious disease for the medical technical and lay press is filled with accounts describing the dangers associated with breathing certain dusty atmospheres What then should be the proper course to pursue in meeting this problem and dealing with it in a satisfactory
nanner

Both industrial and laboratory studies prove that only certain dusts are danger-G’s when inhaied and that quartz or other forms of pure crystalline silica are most dangerous constituting a specific tissue poison Where men are exposed to a suff-cient quantity of very fine pure crystalline silica dust only a true hazard always cars The dusts of silica in combination with other elements generally give rise pulmonary reactions which differ in many respects from those caused by pure sca and which vary rather widely among themselves in their harmfulness As a class and with the notable exception of asbestos silicates are less dangerous than pure crystalline silica Not only are certain dusts apparently incapable of producing a specific harmful reaction when inhaled by themselves but when asso-cated with silica favorably modify the usual response to this dangerous dust The efective size range of particles causing disease is now regarded as three microns and smaller while the qualities of hardness and sharpness are no longer regarded as of significance The term pueumonokoniosis is intended to describe the changes arising out of the prolonged inhalation of any dust harmful or otherwise and does not necessarily imply the presence of disability or a predisposition to pulmonary injections The term silicosis reiers specifically to the disease which results from
the prolonged inhalation of harmful silica dust and is characterized by a

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Mining Section 281

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Every effort should be made to prevent silicotics from contracting infection

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which will later prove disabling and to protect those who have pulmonary inf tions from being dangerously exposed to harmful dusts In order to determine whic

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workmen in a hazardous industry have silicosis or pulmonary infections all ep-ployees should have a thorough physical examination including the taking of =

complete occupational history and satisfactory stereoscopic roentgenograms of the

chest .

Since the rate at which silicosis develops depends upon individual susceptibility and the degree of exposure it follows that these factors should be determined & accurately as possible Individual susceptibility to a dust hazard can be estimate fairly accurately from a single examination and can be defined quite exactly in repeating these examinations at regular intervals The degree of exposure for ca individual should be evaluated by determining the length of service and the cos centration size distribution and composition of the dust suspended in each working place during each operation The method generally used to enumerate das particles is that accepted as standard practice by the U. S. P. H. S. with the addi tion of dark field illumination as suggested by Fehnel and Cummings Size dis tribution studies can be made by any of the several satisfactory techniques The co-position of the dust can be studied by the usual quantitative analysis supplemented by petrographic and rational chemical analysis to determine the amounts of fre
and combined silica and the other minerals

A medical and technical survey should be supplemented by an analysis of the mortality records in and about the locality under study and by the information obtained from carefully performed mortem examinations on employees wh have been exposed in the industry and who have died from any cause If these p cedures for recognizing and defining a hazard are carried out under the supervisio of an organization competent to deal with the many complex and confusing aspect of the problem the investigation will be worth while regardless of the condition which are discovered Where the findings of such a study fail to disclose a sig nificant hazard both the employer and employees will gain the protection whi¯¾ this knowledge affords and if a health hazard is discovered the original invesuges tion will serve as a guide to the program which should be inaugurated to ove come the dangers disclosed .

The most severe dust hazards in mines or in plants can be reduced as succes fully as were accidents by the Safety First program and the chief requisite 1 success lies in establishing adequate control procedures The physical condition or all the employees must be determined at regular intervals and weil interprete roentgenograms provide a most satisfactory control procedure Men applying in work should not be hired until they have passed a thorough physical examination including chest roentgenogranis Reliable records should be established to show the exact time place and duration of employment for each person working in hazardous positions Policies of employment should be worked out for each mine or plair based upon an accurate knowledge of the condition of each employee si that all of the workmen may be protected from contracting occupational disabilities Occupations should be selected which are compatible with the physical condition the employee Care should be taken to protect the silicotic from infection or case of infection from harmful exposure to silica or the normal individual itun contracting either silicosis or pulmonary infections
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Mining Section 283

Shortly after the inauguration of a program designed to control a known dust hazard it will become evident that marked improvements can be effected without incurring an impractical expenditure Personnel problems will arise due to the reluctance of labor to accept new procedures and in the end these problems must be dealt with by educating workmen to recognize the necessity for introducing meth-ods to control dust hazards The question of what men should be told regarding ~ Their physical examinations should follow the practice adopted by any reputable physician in dealing with individual cases As industry becomes more familiar with titis problem it will discover the serious need for further research
Since silicosis is a true occupational disease disability resulting from or at-tributable to it should be compensable in the same manter as other injuries sus-rained as the result of employment Only the intelligent cooperation of industry will bring about the formulation of reasonable occupational disease legislation and its
fair administration :

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Silicosis from the Operators Standpoint

By G. C. BATEMAN

Secretary Ontario Mining Association Toronto Ont Canada

The speaker said in part It is important to know what causes silicosis but unless a knowledge of the cause leads to a cure it is not nearly as important from the operators viewpoint as the knowledge of how to reduce the incidence With all the research work that has been going on throughout the world for many years we still do not know the cause and we still have no cure but we have learned a lot about how to reduce the incidence

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The silicosis provisions of the Ontario Mines Act and the Compensation Act were passed in 1926. These provided for the examination of all men employed in positions in mines where they were exposed to silica dust for all such workers to be the holders of medical certificates certifying as to freedom from tuberculosis the respiratory organs and also for compensation to men affected by silicosis This legislation was introduced as a result of a survey in Northern Ontario mining camps which indicated that silicosis had made alarming progress among the miners There being no reason at that time to question the results of this sur vey the operators agreed to do all that was asked of them and cooperated fully with the Government in the steps considered necessary to meet the situation
When this legislation was first introduced in Ontario we were advised that men with a merierate degree of silicosis while not physically disabled were better of the injustry and that they should be paid a lump sum which would assist
them in rehabilitating themselves in some other occupation
We were further arivised that if we took active steps to clean up the

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With the passage of time it also became apparent that the removal of the men from underground employment in the carly stages of silicosis did not have the results anticipated The payment of a lump sum award did not in most cases serve the end expected As a general rule this money was expended for other things and the men made little effort to rehabilitate themselves A certain number of men classiˆ–ed as silicotic continued in their underground employment and we found practically no difference in the rate of progression in those who continued as com pared with those who were taken out of the mines Some of this may have been

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It should of course be understood that during this time active efforts were made by the mines to improve ventilation and to allay dust Without this the above statement would not hold true Steps were also taken by the mines to pro-vide that men in the early stages of silicosis were placed where the comlitions underground were most favorable
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Mining Section $

to know how to reduce the incidence than to know the cause
preventive measures are as follows

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1 Improvement in fundamental working conditions in the matter of ventila-
tion and allaying dust

2. A rigid initial examination to keep out of the industry those men whose

physical condition would indicate a type most susceptible to silicosis and tuberculosis 3. Control of tuberculosis not only among employees but also among those with whom they come in contact

It goes without saying that it silicosis is caused by the inhalation of dust the removal of dust will remove the cause This means ventilation and lots of it and where possible the wetting down of dusty places In mining operations the chief | source of dust is believed to be from blasting therefore the time interval before

men return to a blasted face is important

Ventilation and water will remove the visible dust from the air but it is not the visible dust that causes the damage It is the dust that ranges between one- half and five microns that is dangerous and so difficult to remove and the quan- tity in the air can only be determined by some method of sampling

We would consider it a mistake to have either the type of sampling apparatus
or the permissible dust count defined by law This may be all right on the Rand
in South Africa where conditions are more or less standard but it is not advisable
in the United States or Canada where conditions vary so greatly For one thing
we do not know what constitutes harmful dust and there is no standard practice for
the treatment of dust sample slides The untreated slide of a sample taken near

a carbide lamp in an otherwise dust atmosphere would show an apparent very high dust count Dust sampling however should be a part of the regular routine
using the type of apparatus best suited to the particular conditions and this will show whether the atmosphere is good fair or poor
Next to ventilation and the laying of dust the most important measure is to

carefully select the type of men to he allowed to work in the industry This re- quires a rigid initial examination which should include a complete physical examina-

tion and ray By this means men with the type of chest which would indicate

their susceptibility to tuberculosis and silicosis can be eliminated The complete physical examination should also have a heneficial effect on the accident rate
Uncomplicated silicosis is not a big problem but silicosis and tuberculosis com-hined represent a very real problem The measures for the control of tuberculosis

are well known Particular care should be taken that men with tuberculosis be withdrawn from the industry and given proner care and treatment Places where

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Some Aspects of the Silicosis Problem

By DR H. H. MOORE and DR M. J. KELLY

Medical Staff Hollinger Consolidated Gold Mines Ltd.
Timmins Ontario Canada

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oficial certificate good for twelve months stating that he is free from disease of
respiratory organs This certificate must be renewed at each annual examina-
In the meantime an amendment to the Workmen’s Compensation Act pro-
for the appointment of medical cers working under the supervision

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Mining Section $

to know how to reduce the incidence than to know the cause
preventive measures are as follows

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1 Improvement in fundamental working conditions in the matter of ventila-
tion and allaying dust

2. A rigid initial examination to keep out of the industry those men whose

physical condition would indicate a type most susceptible to silicosis and tuberculosis 3. Control of tuberculosis not only among employees but also among those with whom they come in contact

It goes without saying that it silicosis is caused by the inhalation of dust the removal of dust will remove the cause This means ventilation and lots of it and where possible the wetting down of dusty places In mining operations the chief | source of dust is believed to be from blasting therefore the time interval before

men return to a blasted face is important

Ventilation and water will remove the visible dust from the air but it is not the visible dust that causes the damage It is the dust that ranges between one- half and five microns that is dangerous and so difficult to remove and the quan- tity in the air can only be determined by some method of sampling

We would consider it a mistake to have either the type of sampling apparatus
or the permissible dust count defined by law This may be all right on the Rand
in South Africa where conditions are more or less standard but it is not advisable
in the United States or Canada where conditions vary so greatly For one thing
we do not know what constitutes harmful dust and there is no standard practice for
the treatment of dust sample slides The untreated slide of a sample taken near

a carbide lamp in an otherwise dust atmosphere would show an apparent very high dust count Dust sampling however should be a part of the regular routine
using the type of apparatus best suited to the particular conditions and this will show whether the atmosphere is good fair or poor
Next to ventilation and the laying of dust the most important measure is to

carefully select the type of men to he allowed to work in the industry This re- quires a rigid initial examination which should include a complete physical examina-

tion and ray By this means men with the type of chest which would indicate

their susceptibility to tuberculosis and silicosis can be eliminated The complete physical examination should also have a heneficial effect on the accident rate
Uncomplicated silicosis is not a big problem but silicosis and tuberculosis com-hined represent a very real problem The measures for the control of tuberculosis

are well known Particular care should be taken that men with tuberculosis be withdrawn from the industry and given proner care and treatment Places where

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the employees live should also be supervised to see that they are not exposed to tuberazlar tuberazlar contacts

Some Aspects of the Silicosis Problem

By DR H. H. MOORE and DR M. J. KELLY

Medical Staff Hollinger Consolidated Gold Mines Ltd.
Timmins Ontario Canada

speaker said in part In 1923 the Ontario Mining Act was amended to

physical examination on empisement and yearly thereafter or twice yearly indicated of all underground men be employed the workman must hold an

oficial certificate good for twelve months stating that he is free from disease of
respiratory organs This certificate must be renewed at each annual examina-
In the meantime an amendment to the Workmen’s Compensation Act pro-
for the appointment of medical cers working under the supervision

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Commensation Deard to conduct these examinations Cases of silicosis arising at examinations are scimmitted to Workmen’s Compensation Brand
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The act in its present form was pased which had become involved by the be
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since been lost sight of or who were carrying on at work
disability

From the workman’s point of view the new act is a great step forward allows a man to continue at his usual duties underground as long as he is able work without any serious degree of discomfort Previously a workman was vised to quit underground work when a certain stage of fibrosis had been reached regardless of his ability to carry on and sacrificed his rights to compensation

continued to work

In the ray examination of the chests of the 2007 meu employed at the Hollinger mines during 1933 determinations are graded as follows Normal is a chest show-ing little or no fibrosis where the condition of the lung is better than the average

for the age M. F. or More Fibrosis is a chest which is normally found the average adult at the age of the miner under consideration M. F. .. More Fibrosia

Plus is a chest showing slightly more fibrosis than normal for the particular age M. F. P. P. or More Fibrosis Plus Plus is a chest showing considerably more fibrosis than normal and is a silicotic stage Silicotics are that group which show a great deal of fibrosis and taking into consideration the mining history and consequent exposure to silica are thus termed Admittedly disability may not be present This last group ranges from the early silicotics with a minimum

disability to the late complicated or secondary cases with marked disability

tuberculosis It must be added that a large number of men at the commencement
of employment at the Hollinger and without previous mining experience or contact

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Mining Section 287

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It would seem therefore that on the whole the situation is showing consider-able improvement from this viewpoint During 1933 no case progressed from the silicotic to the silicotic stage In the years up to 1933 120 men had been rated silicotic and the total cost to the Hollinger involved a sum of 915.950 which figure includes the progressive and contingent funds set aside to cover future costs and possible future clainis
Two objects have been kept in mind during the many years of study of the dust problem at the Hollinger Mine
1. The collection of complete data regarding the nature of air breathed by workmen in different occupations its chemical composition temperature humidity
dust content and rate of flow .

2. Working tests of all practical methods of improving the condition of such
air .

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In searching to adapt a method for the determination of air dustiness it was realized that no instrument has been devised which would measure the dust con-

tent of the air with scientific precision Furthermore it was felt that the principal object of making determinations was to ascertain if the dust count of the air was undesirably high and if such a condition was found to devise a method of reducing
it Hence for practical purposes the instrument which possesses a high efficiency
in the range of desirable concentrations and gives a quick indication of dangerous quantities of dust is most desirable The circular Konimeter invented by Sir Robert
Kotze and introduced to the Miners Phthisis Prevention Committee of South

Africa in 1916 has therefore been used in the Porcupine District for the past eight years
A summary of our investigations along this line may be given as follows
1. About 900 of the underground force are engaged in work which will pro-
duce dangerous dust if measures of control are not applied
2. Of this number a little over 400 are engaged in shoveling broken ore into
cars and the average dust exposure does not exceed 300 particles if the muck piles are kept thoroughly wet and blasting carefully restricted
3. The remaining 500 men are engaged in drilling and blasting operations and
are subjected to severe potential hazard Men engaged in stopes who do not have
to return to the working faces have an average exposure of about 1200 particles while using the ordinary type drills It is felt that the use of the dustless type of drifter will reduce the concentration of dust to somewhere near 300 particies
4. The men engaged in development drifts are exposed to the same concentra-
tions of dust namely 1200 particles Where possible two development drifts are worked simultaneously by the one crew so that the men do not have to go back through dense dust after blasting the cut There are only a few exceptions to this rule and witen necessary to go back to load the remaining holes the men are provided with the special respirator
5. The high dust concentrations in the vicinity of stopers we hope to deal
with by the use of compressed air masks Also the practice of driving adjacent raises simultaneously has reduced the hazard after blasting
With the constant improvement and maintenance of general health conditions kept always to the fore as most desirable and necessary in aiding in the solution
of the
silcosi silicosis problem the men at the Hullinger Mine are cared for under a
contract medical system The incilities and service at mine office and hospital are most complete and efficient and in combination with the annual or annual check made by the medical staff of the Compensation Board health of the workers is under constant supervision supervision
Men report with

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Officers 1933-34

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H. V. OWENS Eastern Ruck Products Inc Utica N.
Jons PRINCE Stewart Sand and Material (Kansas City Mo.
L. WORTHEN The Conecticut Quarries Q. Inc. New Haven Conn Ae

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October 3 1934 |

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350 Twenty Annual Safety Congress Safety Council

The Dust Hazards in Industry
By DR R. R. SAYERS

Medical Officer in Charge Office of Industrial Hygiene and Sanitation United States Public Health Service Washington D. C.

The speaker said in part Realizing the importance of the dust problem in industry the United States Public Health Service in cooperation with the Bureau

of Mines began its first study of the health of workers in dusty trades in 1914 in the mines of Joplin Missouri and later in 1923 the Public Health Service

inaugurated a series of dust studies These later studies were all conducted in the same manner in order to permit as detailed a comparison as possible between the different investigations
Briefly these methods of study may be divided as follows 1 examination to

determine the general physical condition of the workers under observation 2 special physical examination to determine the prevalence of specific diseases of the respiratory system and the lung pathology resulting from exposure to the particular dust hazard 3 record of the nature and severity of the disabling illnesses 4 analysis and detailed study of the occupational environment 5 occupational mortality statistics relating to the specific dust and 6 autopsies

The first six intensive investigations carried out by the Service dealt with the

health of workers exposed to dusts in a cement plant granite cutting industry anthracite and bituminous coal mining silverware manufacturing plant cotton cloth

manufacturing and in municipal street sweeping Brief studies were later conducted in certain slate granite marble and tale quarries while more recently a rather extensive study of the health of anthracite coal miners was completed
These six dust studies showed that the workers in the granite cutting plants who were exposed to the highest dust concentrations were found to suffer from an

excess of pulmonary tuberculosis after 15 years or more of exposure and developed silicosis 2 to 10 years In the group exposed to a lesser amount of dust
silicosis developed only after prolonged exposure with no excess of tuberculosis It was found that a close relationship existed between the degree of dust exposure
and the extent and severity of the pulmonary damage Anthracite coal miners
suffered from dyspnoca and other signs of pneumoconiosis and experienced a high rate of respiratory sickness in addition an excessive mortality from influenza-pneumonia and possibly tuberculosis was found Bituminous coal miners experi-enced a generalized fibrosis of the lungs and an excess mortality from influenza

and pneumonia pneumonia Cement workers showed some signs of early pneumoconiosis with diseases of the upper respiratory tract On the other hand workers
cloth and silverware manufacturing plants and municipal street sweepers
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the general industrial population
Drilling For five years the United States Bureau of Mines studied lead

and zinc miners in the State District Oklahoma The ore here is high in free
silica Of the 7.722 men examined a group of 1,647 or 21.3 per cent was definitely

diagnosed as having silicosis not including those diagnosed as having tuberculosis All the men diagnosed as having stage silicosis had worked an average of

13 years but those men starting in the mines after +) years of age worked an average i only 8 years
The work of rock drilling in subway and tunnel construction in New York

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City is in some respects similar to that of some of activities in the hard rock
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National Safety Council This investigation indicated that judged by the mature of the dust and degree of the exposure a real hazard exists in this occupation This study also brought out the fact that it is possible to conduct sandblasting with safety provided properly designed and well maintained equipment is used Diatomaceous Silica Workers Workers Most of the data on silicosis have been gathered from studies made both in industry and experimentally on dusts containing free silica in the form of quartz Such studies have been made in the granite industry pottery trades hard rock drilling etc. There are other free silica minerals in existence that are not crystalline in nature but of an amorphous composition I´„ Santa Barbara County California there exists the largest and purest diatomaceous silica denosit in the world This substance consists of about 85 per cent free silica Recently an examination was made of 108 workers selected among those employed less than I year 1 to 2 years 2 to 5 years and more than 5 years All of the workers were Mexican laborers and the examinations consisted of ray determinations social and medical histories and clinical examinations of the chests

Dust determinations were also made but these were not reported The outstanding feature revealed by the examination was the splendid physical condition of the men Eighty per cent of the workers were reported in excellent physical condition It was found that 60 men showed signs of early pneumoconiosis 15 were in the moderately advanced stage and 6 in the advanced stage This latter finding was among workers with a history of exposure of more than 5 years
Dust Hazard in the Granite Quarry Industry It is a common belief that granite quarrying is not so dangerous an industry as granite cutting in enclosed shedis quarry work is done outdoors and lience may not be attended with very much dust exposure However certain quarry operations require the use of preumatic tools which are usually associated with the formation of considerable quantities of dust It was thought that a study made in a representative granite quarry might cast some light on our problem Accordingly a study of a clinico-radiographic nature of 53 quarriers was made and occupational dust exposures were also obtained The dust determinations show that nearly 38 per cent of the workers drillers were exposed to many times the amount of dust considered safe at the

present time Drillers were the only persons showing pathologic lung changes Half of these workers with an exposure of 5 to 19 years had silicosis and 4 of the 5 men with more than 20 years of such trade life showed this condition study suggests quarry drillers may experience as high a death rate
from pulmonary tuberculosis as do pneumatic workers in granite cutting sheds Efect of inhaled Marble Dust The pulmonary fibrotic changes due to the inhalation of marble dust appear to be slight in comparison with those caused by stone dust containing a high percentage of silica in the form of quartz A recent study made by us among marble workers showed that although marble dust when inhaled in concentrations averaging about 25 million particles per cubic foot of air produced a mild bilateral linear fibrosis in a certain number of the 80 men examined no serious lung changes were noted and there was no disability due to
dust even after many years of exposure more than 40 years in some cases
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Dust Hazard in ibrasive Industry Artificial abrasives are widely used in industry and for this reason the effect of the inhalation of dusts produced in the manufacture or preparation of these products is of great importance In 1925 1920 and again in 1931. Dr. Clark of the Norton Company at Worcester Mass made investigations of workers exposed to aluminium oxide and silicon carbide dust produced in the manufacture of grinding wheels which showed that during a period of 13 years there were proportionately twice as many cases of pulmonary tuber-culosis among those working in the abrasive dust departments as in departments where no abrasive dust occurred In 1931. Kessier of New Jersey reported the occurrence of over 100 cases of alleged silicosis in the abrasive powder industry
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The tale was a hydrous tremulite with magnesium silicate being 45 per cent talc and 43 per cent tremulite with no quartz present The results of the study seemed to indicate a relationship between the amount of caN inhaled and the effect of this dust on the lungs of workers
Statistical Studies Recently Lanza and Vane estimated that there are stre 500,000 workers engaged in the mining quarrying and manufacturing andussies

in this country in which an exposure to silica dust to a harmful degree is o> tailed Their analysis of mortality experience of twelve life insurance companies for the period 1915-1926 showed that the actual mortality from respiratory rim culosis among the silica exposed persons was about three times that of a silica dust group If one considers their data for certain occupations in om mines and granite and sandstone quarries occupations known to be exposed high concentrations of hazardous dusts then the comnarison is more striking she the actual deaths among these workers was found to be ten times that of the ˛–- pected deaths More detailed statistics on occupational mortality as reported by the Registrar of England and Wales 1921-1923 and sunumarized by Brit show the high rate of 1.886 per 100.000 for tin and copper miners while the rate for all occupied and retired males was only 150. Other occupations with s
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Quarry Section 353

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In certain cases such as in the sandblasting of large castings in sandblast rooms

the practical safeguard to the worker is to provide him with a mask or helmet of the positive air pressure type In the sandblast investigation previously men-tioned it was found that when from 5 to 6 cubic feet of practically dust air per minute are supplied to the helmet the worker receives ideal protection How-ever one must always bear in mind that the ultimate criterion of protection should be the dust determination of the air within the heimet during blasting and not the quantity of the air supply itseli
In most dusty processes however the most effective means of dust elimination are by the use of properly designed exhaust ventilation systems Since in many instances it is difficult costly and at times an unnecessary procedure to remove all the dust in the vicinity of a worker we need first to determine the minimmu amount of a certain dust which the worker can apparently tolerate with immunity Such information can be made available by the type of studies carried out by the Public Health Service For example in the granite study already referred to it dust at the breathing level of about 10 million particles per cubic foot 35 per cent
free silica

Studies of dust removal devices used in granite cutting plants at the time this work was conducted showed that a linear velocity of 1.500 feet per minute as measured by an anemometer at the face of the removal hood would keep the dust at the breathing level to an amount less than 10 million particles per cubic foot A word should be said concerning personal respiratory protection agamst dusts It has already been shown that in the use of positive pressure respiratory devices in sandblasting it is important to have a designed device supplied with about

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cubic feet of dust air per minute to give full protection to the worker With reference to respirators of the filter type there is still much to be accomplished in the design of an efficient and comfortable mask for continuous usa Of great value are standard methods for the testing of the efficiency of respiratory pro-tection devices Drinker advocates testing a device against the particular dust which the respirator is to encounter these tests to be made both in the laboratory and under actual industrial conditions He further suggested that some impartial agency should conduct such tests and certify the devices for industrial use the work being done on a cost basis The U. S. Bureau of Mines has prepared such
a schedule for testing and approving respirators
I wish to stress the importance of good housekeeping in the effort to combat the dust hazard Good housekeeping should not only imply the removal of accumu-lated dust about a workroom but should also embrace eficient maintenance of dust removal devices and respiratory protective equipment Systematic inspection of all dust suppression equipment should be an axiomatic principle in every dusty industry rather than the casual attention witch it now receives in many instances

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Report of the Nominating Committee
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In most dusty processes however the most effective means of dust elimination are by the use of properly designed exhaust ventilation systems Since in many instances it is difficult costly and at times an unnecessary procedure to remove all the dust in the vicinity of a worker we need first to determine the minimmu amount of a certain dust which the worker can apparently tolerate with immunity Such information can be made available by the type of studies carried out by the Public Health Service For example in the granite study already referred to it dust at the breathing level of about 10 million particles per cubic foot 35 per cent
free silica

Studies of dust removal devices used in granite cutting plants at the time this work was conducted showed that a linear velocity of 1.500 feet per minute as measured by an anemometer at the face of the removal hood would keep the dust at the breathing level to an amount less than 10 million particles per cubic foot A word should be said concerning personal respiratory protection agamst dusts It has already been shown that in the use of positive pressure respiratory devices in sandblasting it is important to have a designed device supplied with about

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cubic feet of dust air per minute to give full protection to the worker With reference to respirators of the filter type there is still much to be accomplished in the design of an efficient and comfortable mask for continuous usa Of great value are standard methods for the testing of the efficiency of respiratory pro-tection devices Drinker advocates testing a device against the particular dust which the respirator is to encounter these tests to be made both in the laboratory and under actual industrial conditions He further suggested that some impartial agency should conduct such tests and certify the devices for industrial use the work being done on a cost basis The U. S. Bureau of Mines has prepared such
a schedule for testing and approving respirators
I wish to stress the importance of good housekeeping in the effort to combat the dust hazard Good housekeeping should not only imply the removal of accumu-lated dust about a workroom but should also embrace eficient maintenance of dust removal devices and respiratory protective equipment Systematic inspection of all dust suppression equipment should be an axiomatic principle in every dusty industry rather than the casual attention witch it now receives in many instances

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Report of the Nominating Committee
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M. Graves The General Crushed Stone Co Easton Pa
A. L. Worthen The Connecticut Quarries Co. Inc. New Haven Conn

The Foreman’s Duties and Responsibilities in Preventing

Accidents

By GLENN GARDINER

Forstmann Woolen Company Passaic New Jersey

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The speaker
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said in part Ou my first jub in the clay it of a brick works disastrous cave which so injured one of my fellow workers that he was totally disabled for life The accident was so plainly the fault of the foreman in charge that he was discharged for his carelessness That accident made an indelible impression upon my mind and let me understand as nothing else could what the responsibility of the foreman is in accident prevention

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The foreman who is responsible for getting out the work is also responsible the control of those conditions He immediately surrounding the worker on his job has an unexcelled opportunity to observe his workers and their habits If he is

a competent foreman he can detect those working habits which may result in acci- dents He should come to know his workers so well that he will understand when worries and outside problems are taxing their minds and powers of concentration He may not be in a position always to do much about the side problems but he can at least govern conditions on the job The foreman is the one who is most likely to set up conditias on the job which
cause job anxieties for the worker He can do much to ease ease the worker’s mind by keeping him informed about conditions which affect his men and the steadiness of employment He can help to reduce the fatigue his men experience and in so doing directly influence accidents which are related to fatigue Every intelligent foreman realizes the importance of the safety functions and that safety should be put upon the same plane of importance as the other duties his job includes
If the worker is indifferent to safety it is usually merely a reflection of the foreman’s attitude On the other hand if the foreman will stand for but safe nothing working habits the worker will proceed very rapidly to develop saie working habits Of course I recognize that certain workers have an attitude of recklesseness and bravado about them which makes them slightly contemptuous of the dangers of the job But it is up to the foreman to puncture this attitude and bring such workers down to earth A recent study of a company employing 6.600 workers ie cated that 48 out of the 6,600 had had 10 per cent of all the time accidents ie the entire organiza- tion The accident frequency among among these 48 men was fifty times as great as that ´«.

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The record also indicated that those men having the largest
accidents were also the same men having the amber
Thus minor accidents are of real significance to BB

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