

COMMENT ON THE UNDERWRITING OF COMPENSATION FOR SILICOSIS

BY

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When particles of sand smaller than $1/2500$ of an inch in diameter have been inhaled by human beings in quantities too large to be ejected, or to be absorbed by the body's mechanical or chemical safeguards, the inevitable consequence is silicosis. The generally accepted theory of the action of the sand particles is that silica reacting with alkalies in the body forms silica hydrosol. This substance coagulates fluids of the lung tissue to such a degree that osmotic action cannot take place. Cells of the lung tissue starve. This action is continuous and ultimately results in total impairment of the lungs. During the process the sufferer's susceptibility to pneumonia and pulmonary tuberculosis is greatly increased. The disease may be definitely diagnosed by an X-ray study.

Sand, or to use the chemical term Silica, is used extensively in industry. As a result we find silicosis in many industries; and because it is so common and because its effects are so serious, it is the most important of the occupational diseases and compensation insurance for silicosis is one of the gravest problems facing the carriers today.

FORM OF COVERAGE

The nature of silicosis gives the underwriter a few hints to aid him in formulating a rating plan and an underwriting policy. Two main points are of importance:

- (a) Once contracted, it proceeds at a rate which varies with circumstances to the ultimate death or total disability of the subject.
- (b) No means are known of arresting its development.

Manifestly the conclusions are that every claim will be for permanent disability or for death. There is no known way to

rehabilitate a claimant physically. In the underwriting of compensation for industrial accidents, the desirability of a risk might be increased through the application of mechanical safeguards or through the safety education of employees. *Accidents* can be prevented but there is nothing to stay the progress of silicosis. Therefore, assuming no labor turnover, a risk would decrease in desirability from an underwriting viewpoint due to the progressive nature of the disease. Ultimately the employer would be unable to obtain insurance. A condition of this kind is contrary to public welfare, and the affected employee is certain to suffer. The alternative is to provide for the lean years in the fat years; to reserve a portion of the premium of each year to pay the ultimately inevitable claim.

A common sense thought is this, but disturbing elements enter into it. New employees come and old employees leave. The employer changes carriers. The hiring of one silicotic employee might throw the risk from the preferred class to the undesirable class. The underwriter who accepts the risk as new business has no accumulated premiums to pay possible claims. Of course, he might charge an excess premium to remedy this and to discourage switching, *but there are* legitimate reasons for changing carriers and in this case what title would the previous carrier have to the premiums he has accumulated on the risk? It might be possible to write policies for long term periods, but this device would not entirely mend the difficulty. Perhaps the only solution would be to make the carrier liable only for that proportion of the total award which its period of coverage bears to the total period of exposure of the employee. This suggests the underwriting, not of business enterprises, but of individual employees. The insuring of specific employees also solves the labor turnover problem. If a silicotic employee is hired the underwriter will know that another carrier is holding in reserve a contribution toward the claim. The implication here is that a central record of all exposed employees be kept by the insurance companies, preferably by the National Council on Compensation Insurance. A necessary condition is that policies of compensation insurance for silicosis be written on a per capita basis, instead of on a payroll basis as they are now written, and that the names of the exposed employees be indicated on the policy.

RATING PLANS

We now use the word "Subject" to mean a single employee, much in the manner that life insurance companies term a unit of coverage a "Life". Of the non-silicotic subjects a certain number will eventually contract the disease. For this number the underwriter must accumulate his reserve. Inasmuch as it is not known which of the group will be affected by the disease, it is necessary to assess the premium against the entire group. Suppose that it is determined that one man in three exposed becomes silicotic and assume that the premium charge for a silicotic subject is found to be an amount which we will designate by S . Then it would be necessary to charge an amount $S/3$ for each of the non-silicotic subjects.

With silicotic subjects it is necessary to consider three possibilities:

1. That the subject will die of silicosis.
2. That he will die of some disease complicated by silicosis (such as pneumonia or tuberculosis).
3. That he will die from causes unrelated to silicosis, as from an automobile accident.

It is necessary to distinguish between death by silicosis and death by diseases complicated by silicosis because proposed legislation provides that a lesser benefit shall be paid in the latter event. Of course, no compensation is payable in the third case. Assume that the average length of life from the first exposure to ultimate industrial disability of a subject who dies from silicosis is m years. Assume that out of k silicotic subjects experience indicates that a will die of uncomplicated silicosis. Assuming an average benefit of \$1.00, a dollars will be needed at the end of m years. $\frac{a}{m}$ must be collected each year or an annual per capita charge of $\frac{a}{km}$ must be made.

Suppose that experience indicates that b of the k silicotic subjects dies of diseases complicated by silicosis and that n years is the average period from first exposure to death or disability. Assume an average benefit of \$0.75. The carriers need \$0.75 b dollars at the end of n years, an annual premium of $\frac{\$0.75 b}{n}$

must be collected or a per capita charge of $\frac{\$0.75 b}{kn}$ must be made.

The total of these two charge $\frac{a}{km}$ plus $\frac{\$0.75 b}{kn}$ must be made for each silicotic subject.

The result of this calculation is to be applied to the average benefit under the accident or occupational disease laws of the state for which rates are being made. A difficulty here is that the average benefit at the time the premium is collected will be much lower than the average benefit when claim is made. Inflation and rising wage scales complicate the situation. The underwriter who in 1936 collects a premium based upon an average award of \$1,000.00 and who is faced in 1950 with a claim when the average award is \$2,000.00 is not going to enjoy the situation. His chances of collecting an additional premium from the employer based upon an exposure of 14 years prior are very meagre. The employer of 14 years before may be out of business. If still in business another carrier may be providing coverage. It would be hard to persuade him that an obligation to the 1936 carrier existed after 14 years. The introduction of a trend factor might solve the difficulty but where is the mathematical giant who can compute a trend factor reliable for the entire industrial life of a man?

A possible solution is for the current carrier to collect enough premium to make up the deficit in the previous carrier's reserve and to cede it to him after the manner of reinsurance, or to modify our previous provision making the carrier responsible only for that proportion of the award which his period of coverage bears to the total period of exposure modified by the ratio between the average award at the time of his coverage and the average award at the time of the claim.

The laws of various jurisdictions vary as to the responsibility of the carriers. Some states hold that carriers during the entire period of exposure are liable for the award. Others hold that the carrier at the time claim is made is responsible for the entire award. It is not proposed here to pass upon the justice or lack of it in either method, but it may be noted that in the first case, in accordance with the proposed plan, the carrier has a fund ready to pay its proportionate share of the award. In the second case it will be necessary for the carriers to agree to reimburse

the carrier held responsible for their proportional share of the award.

It might be deemed desirable to inaugurate experience or schedule credit schemes for the rating of individual risks. Due to the uncontrollable development of silicosis such credit can be given only where no evidence of the disease is present.

DATA

Eventually the carriers can build up from their case records something akin to life mortality tables showing the annual per capita charges for a basic award of \$1.00. These tables may be so refined as to differentiate between industry, race, and age of subject. These tables once established would change very slowly since changes in the table relating to silicotic subjects would be effected only by the success of the medical profession in combatting silicosis and the diseases complicated by it. Changes in the proportion of men contracting silicosis is only effected through the discovery and perfection of mechanical guards and through preventive hygiene. The tables would not be affected by increase or decrease in industrial activity, payroll fluctuations, state lines or the claim-wiseness of employees. It is essential for the construction of such tables as well as for rating purposes that X-ray examinations be made of exposed subjects at the beginning of each policy year.

PARTIAL DISABILITY

The subject of awards for partial permanent disability has been purposely avoided because there seems to be no definite crystallization of legal opinion on the subject. It is no more than reasonable to assume that the amount of any award paid for partial disability should be subtracted from a later award made for total disability. We have made allowance for permanent total disability, and an award for partial disability merely means paying out part of this reserve before permanent disability takes place. It will be necessary, however, to make an allowance for those cases where a recovery for partial disability is allowed, but where no claim is ever made for total disability. For example, an employee is awarded compensation for partial disability and

then is killed in an automobile accident. In states where recovery is allowed for partial disability an increment based upon the expected number of such cases and the average permanent partial disability award for silicosis must be added to the premium charge.

Compensation underwriters are seriously alarmed over the silicosis risk. However, the loss producing factors are far fewer than they are in industrial accident insurance. From this small preliminary survey one would judge that the probabilities involved may be closely measured. Perhaps it will not be the unsolvable problem it is expected to be.