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OCCUPATIONAL SAFETY AND HEALTH

ENVIRONMENTAL HEALTH AND THE PLANT MANAGER

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*"Man has lost the ability to foresee and to forestall. He will end
by destroying the world."* ALBERT SCHWEITZER

Today we are in the midst of an environmental and consumer protection revolution. In my opinion, Rachel Carson's book, *Silent Spring*, published in 1962, marked the opening campaign in these revolutions. At that time the public concern was heightened because of other things — e.g., radioactive fallout, thalidamide, etc. Since this time we have witnessed one environmental "crisis" after another — cranberry, cyclamates, hexachlorophene, mercury in fish, PCB's, 2,4,5-T herbicide used as a defoliant in Viet Nam, lead, etc.

Along with these environmental changes we are also seeing important social changes with such things as campus unrest, women's liberation, increasing non-medical use of drugs, etc. These latter changes are outside the scope of my presentation.

Dire pronouncements have been made about the effects of pollutants on the health and well-being of man. The specter of illness, decreased life expectancy, death, and extinction of all life as we know it on this planet have been forecast. Some "experts" have prophesized this extinction within a matter of decades.

Pollution and consumer protection have also become political issues. Because of all the charges and countercharges, it is becoming more difficult for the general public to sort out the truths from the half-truths.

In addition to the concern expressed about general environmental pollution and consumer protection, strong legislation to protect the safety and health of the worker on the job has been passed in the United States. Naturally some of this concern about the occupational environment has spilled over into Canada. There is pressure for increasing restrictive legislation with the establishment of limits of exposure to agents on the job — the "numbers game." In Great Britain the Robens Report dealing with safety and health at work has just been published. In this report the creation of a single National Authority for Safety and Health at Work has been recommended. The incorporation of other inspectorates, e.g., air pollution inspectors, into this Authority has been recommended. This has been done to reverse the increasing fragmentation and multiplicity of inspection services to which industries were subjected.

I hope in this presentation to present an overall picture of the environmental

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changes in terms of their effects on man's health and also in terms of their implications to the plant manager.

Environmental health refers to the interrelationship between the environment and the health and well-being of man. Ecology is a broader term and refers to the interrelationship of living things with each other and with their environment.

Man has both an internal and external environment. The internal environment must be maintained within very strict limits if man is to survive. The external environment represent all those external factors and stresses which impinge on man. The external environment includes:

- (1) The environment of air, water, and soil — termed by some the "macro" environment.
- (2) The environment at work, home, and recreation — termed by some the "micro" environment.
- (3) The foods, drugs, and chemicals which man uses or takes into his body.

Man's health and well-being is directly affected by the quality of the air, water, and food he uses. It is also affected by the agents to which he is exposed at work.

We must remember that it is man himself who has created this new, complex, and largely synthetic environment for the benefits it brings. The decision as to what risks may be acceptable in terms of environmental pollutants is one that should be made by society as a whole.

In the past we have depended on two natural defences —

1. The ability of the body to absorb, metabolize, and eliminate these substances without harm.
2. The ability of air, water, and soil to dilute, break down, and get rid of undesirable waste products.

We know that there are limits to these natural defences. Materials used locally have been found to have interlocking widespread effects and to collect in our environment and in our bodies, *e.g.*, DDT.

Along with the environmental changes there has been a change in the disease picture of man. We are seeing more of the chronic and degenerative diseases which have complex and multiple etiology — *e.g.*, chronic bronchitis and emphysema, heart disease, and lung cancer.

Many have tried to link environmental agents in the community and at work with these diseases. There is evidence that many occupational groups are known to have increased risk of cancer, *e.g.*, those engaged in uranium mining.

I should like now to consider these subject areas as they relate to plant management:

1. Community pollution;

2. In-plant pollution;
3. Consumer protection.

Community Pollution

Air Pollution. Air pollution offers a greater potential for adverse health effects than other community pollutants. The increasing use of fossil fuels and the increasing use of automobiles in urban areas are major contributors to air pollution. In terms of health effects there have been several acute episodes of increased death and illness from air pollution. The best known is the London fog of 1952. In these acute episodes there is usually a four- or five-day period of inversion with a heavy buildup of air contaminants to about five to ten times their usual level. Under these conditions, it is the susceptible who are affected — the young and the old with heart or respiratory disease. In terms of chronic effects, many statistical studies have demonstrated increased risk of dying from respiratory diseases and from lung cancer with increasing levels of urbanization and air pollution.

The control of air pollution presents some problems. We cannot hope to eliminate all air pollution. We must, however, apply measures to limit the level of contaminants to those concentrations that are not harmful to our health or to our environment. All new air pollution sources in Ontario must obtain approval of their plant emissions from the Air Management Branch of the Ontario Ministry of the Environment and meet the emission standards and ambient air quality standards of the Air Management Branch. Tanneries can present problems, particularly in odor control.

Water Pollution. In Canada we have long taken our abundance of fresh water for granted. We have about 0.6 percent of the world's population and about 25 percent of the fresh water surface area of the globe. We cannot any longer take this abundance of fresh water for granted. While bacterial diseases spread by water have largely been eliminated, we know too little about the transmission of viruses by water. In Japan we have seen in people mercury and cadmium poisoning caused by industrial water pollution. In Ontario we have the problem of mercury contamination of fish from industrial contamination. In Ontario, too, studies have confirmed the findings from other parts of the world, i.e., that the incidence of heart disease is higher in areas with soft water. We need much more information on the long-term effects of environmental exposure to trace elements in water and soil.

As with air pollution, we cannot hope to eliminate all water pollution. Plant managers should ensure that all plant effluents are in keeping with the requirements of the Division of Industrial Waste of the Ministry of the Environment. The Canadian Public Health Association published drinking water standards which are a useful guide. In Ontario, the Ministry of the Environment has published information on the criteria of water quality. Plant managers should have

access to this information to ensure that their plant operations do not give rise to water pollution. Tannery effluents with their high biochemical oxygen demand (B.O.D.) present special water pollution problems.

Solid Waste. Proper disposal of solid waste is another serious environmental problem. All solid waste disposal sites in Ontario must be acceptable to the Waste Management Branch of the Ministry of the Environment.

Community Noise. Excessive noise is recognized as an occupational health hazard which can lead to noise-induced hearing loss. Factory noise has given rise to complaints of annoyance, irritation, sleep disturbance, and discomfort in nearby residents. Some have attributed health effects, such as emotional disorders, peptic ulcer, hypertension, and heart disease, to excessive community noise. I do not accept these health effects as noise-related.

In terms of control guidelines for community noise, levels are needed and should be established soon. Responsibility for community noise is with the Air Management Branch of the Ministry of the Environment whereas responsibility for in-plant noise is with the Industrial Safety Branch, Ministry of Labour.

In-Plant Pollution

I have previously mentioned the OSHA legislation in the United States and the report of the Robens Committee in Great Britain. These represent a contrast in approaches. The OSHA legislation tends to stress numbers as legal standards — what many call "the numbers game." The setting of standards of work exposure has become very important.

The Robens Report recommends not so much detailed legal standards as it does adoption of guides of practice adopted for each trade association. The Robens report has not yet been implemented and it will be of interest to see the action taken in Great Britain.

I would like to mention threshold limit values, the so-called TLV's. These are commonly used to establish limits for airborne and physical agents in work areas. I think all plant managers and those in business in Ontario should be aware of these and have a copy of them. The preamble should also be read to understand the conditions for their use. Some people regard the TLV's as maximum allowable limits, which they are not. They are time-weighted averages except those carrying a C-prefix, which are maximum values. On the whole, however, they are time-weighted averages which can be exceeded for the time limit specified for eight hours a day, 40 hours a week. Some states, notably Pennsylvania, have gone further, introducing short-term limits, the so-called STL's. Limits for as short as 30 minutes of exposure have been set.

In Ontario, occupational diseases make up only a small proportion of all claims allowed by the Ontario Workmen's Compensation Board. In 1971 there were

about 350,000 claims, of which only 2,651 were for occupational diseases. The commonest disease claims are grouped as follows:

1. Occupational dermatitis — detergents, solvents, oils, greases, and epoxy resins are important causes. Dermatitis claims make up about two thirds of all occupational disease claims. About 80 percent are due to primary irritants and 20 percent are due to sensitizers.
2. Inhalation of noxious fumes — chlorine, carbon monoxide, smoke, welding fumes, toluene di-isocyanate, lead, mercury.
3. Industrial noise deafness. It is of interest to note that this is the third largest group of occupational disease claims. About 200 claims were allowed in 1971. The average cost per claim is about \$5,000. I attach great importance to this group of claims. I would encourage all here to consider the noise exposure within their own plants. The Environmental Health Services Branch will be pleased to conduct noise surveys upon request and it will provide recommendations for a hearing conservation program where indicated. The Branch also has a mobile audiometric testing vehicle for hearing testing of workers from small noisy plants.
4. Communicable diseases — hepatitis, dysentery, diarrhea, tuberculosis, etc. Most of these claims are in hospital personnel.
5. Physical agents — heat exhaustion, heat stroke, frostbite, decompression illness, etc. These are of low frequency.
6. Repetitive trauma — tenosynovitis, bursitis, "white hand" from vibratory effects.
7. Pneumoconiosis — silicosis and asbestosis. These are few in number but important in their disabling effect.
8. Occupational cancer. Skin cancer from coal tar, bladder cancer from betanaphthylamine, sinus cancer in nickel refining, etc. These claims are few in number.

The major problem in leather processing is dermatitis. Many of the chemicals named above are primary irritants of the skin. Chromium compounds are notorious as skin sensitizers. Chrome ulcers in tanners are common. Every effort should be made to protect the skin of workers who handle raw hides, limed and delimed hides, pickling agents, and tanning agents. Impervious gloves, sleeves, aprons, and boots should be provided. Facilities for personal hygiene should be good, with separate lockers for street and work clothing.

There is a second potential exposure to hydrogen sulfide and to carbon dioxide in cleaning out tanning vats. In Ontario there have been fatalities from hydrogen sulfide — one a multiple one on workers entering a vat which had not been used for some time and contained sludge at the bottom. Hydrogen sulfide in low concentrations has a typical odor. It may cause conjunctivitis with photophobia. At higher concentrations it has a rapid action in paralyzing the sense of smell and

the respiratory center in the brain. Regular drill in entry into tanks and vats should be followed. Sampling should be done before entry, and men entering confined spaces should wear a safety harness held by an outside observer.

Some authors have suggested that chronic bronchitis is increased in tanners from exposure to vegetable tanning agents, lime, leather dust, and acids. I do not believe there is any causal relationship here at all. Undoubtedly workers with pre-existing asthma or bronchitis will experience aggravation. Adequate local exhaust for these operations is important.

Isocyanates used in some special operations are a real source of respiratory trouble to some workers. Isocyanates are intense irritants of the respiratory tract. In addition, a number of workers become sensitized to them and exhibit symptoms of bronchial asthma as a result of exposure to them.

Regular use of hand-held vibratory tools may cause callus formation in some workers. Of greater importance and concern, however, is the possibility of other effects from vibratory tools — the so-called "white hand." This is more common in our northern climate.

Tannery operations in common with other plants have similar problems with workers exposed to excessive solvent vapors from organic coatings, welding fumes, and exhaust products from unvented combustion sources.

In past years anthrax infection from the handling of infected hides occurred. Inhalation of anthrax spores could lead to pulmonary anthrax. I am not aware of the occurrence of this infection in tannery workers in Ontario in the last 20 years. Nevertheless, proper disinfection of hides and skins from restricted areas is necessary.

I am not aware of any long-term major disability occurring in tannery workers, such as pneumoconiosis, cancer, or chronic systematic toxicity. Leather dust is regarded as chiefly a nuisance dust, although it is conceivable that a rare individual may become allergic to it. Others have remarked on the safety hazards inherent in tanneries with wet, slippery floors and with floor-level pits and vats.

Overall, although there are significant safety and health hazards, the Ontario experience has been good. I would like to re-emphasize the current interest in noise-induced hearing loss.

The mere recitation of statistics of this type does not convey the entire concern felt about the relationship between work and health. I mentioned the Occupational Safety and Health Act in the United States. This legislation provides for inspection by compliance officers and investigation of complaints made by workers and their unions. Detailed regulations have appeared. In 1972 most of the complaints received were about health matters as opposed to safety matters. I think this serves to illustrate the concern of the worker about his health. We are facing more and more questions about the relationship of chronic bronchitis and emphysema to dust and irritant gas exposure, heart disease to chronic carbon monox-

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ide and other exposure, lung cancer to dust, radiation, and irritant gas exposure, and emotional disorders to the stress of the work environment. Definite studies are needed to answer many of these questions.

It is necessary that plant managers be aware of the chemicals used in their operations and the potential health hazards they present. Plant managers should also be familiar with recommended exposure limits for chemicals and physical agents encountered at the work place. The Occupational Health Protection Branch is available in Ontario to assist in checking into the toxicity of industrial chemicals, or carrying out an industrial hygiene and noise survey.

Consumer Protection

As I mentioned at the onset of my remarks, the general public has become aroused about consumer protection. As with the concern about the general environment and the work environment, much of it has centered on alleged health effects from consumer products.

Fortunately, properly produced leather goods present little risk of consumer health hazard. There is the possibility of contact dermatitis with chrome-tanned leather. Some years ago Gross and Samitz showed that sweat could extract chromium from chrome-tanned leather.

SUMMARY

In summary, I feel that air pollution, water pollution, and solid waste problems presented by the leather goods industries present some difficulties but they are not of serious concern.

In terms of the in-plant environment there are possible hazards presented by contact skin irritants, and some potentially harmful dusts, gases, and vapors. Plant managers should be aware of what is being used and the acceptable work exposure limits for the materials used. In-plant noise should be carefully assessed.

In terms of consumer hazards, finished leather goods present some risk of contact dermatitis in sensitized individuals. By and large, consumer problems are not significant.

As I interpret the situation in Canada and the United States, it seems that increasing restrictions are likely in terms of pollution control, occupational safety and health, and product safety. Because of the increasing tendency to develop numerical codes and standards, the recommendations of the Robens Committee for safety and health at work are of interest.