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EXHIBIT
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MEDICAL INTERVENTION AND THE PREVENTION OF ASBESTOS-RELATED DISEASE

Working Paper for Discussion at Meeting of the Medical Advisory Panel of the Asbestos International Association

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I. INTRODUCTION

There is no cure for asbestosis, the outlook for the patient with lung cancer is very poor and diffuse malignant mesothelioma of the pleura or peritoneum is invariably fatal within a short period of time after diagnosis. In view of this gloomy future for the affected worker, what can the physician in industry do to intervene or prevent undue suffering on the part of exposed individuals? One way in which the medical officer can be actively involved is by becoming thoroughly familiar with the physical and chemical properties of the raw material in question and knowing the manufacturing details and plant layout in depth. Having insight into the manufacturing process and working conditions in the plant the doctor should be well equipped to deal with the problems which arise in the management of the health of people at work. The practical experience gained by working in the industrial environment will be of little avail unless it is linked to a thorough knowledge of current concepts regarding the etiology, pathogenesis, epidemiology and therapy of the diseases involved. To complete his or her expertise the physician should acquire a more than adequate knowledge and appreciation of the theory and practice of industrial hygiene, including an understanding of sampling and monitoring procedures. Fortified by this experience and know-how, the course to be charted should become clear and the ship will not falter on the many rocks in its path!

It stands to reason that industry wants to employ people who are suited to the tasks required of them and that they should not suffer injury or illness as a result of the work they are called upon to do. In this paper I will attempt to

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set down my thoughts on the subject of medical intervention and its role in the prevention of asbestos-related diseases and will follow the logical sequence starting with pre-placement examinations and concluding with post-retirement or post-severance examinations. I do not intend to describe in detail the methods to be employed but only the purpose and objectives of each type of examination.

II. PRE-PLACEMENT MEDICAL EXAMINATION OF ASBESTOS WORKERS

A. Purpose

The determination of the suitability of a job for the individual and the suitability of the individual for the job, having regard to known facts relating to asbestos and health.

B. Objectives

a. Establish a medical data base for long-term follow-up.

b. Provide guidance to management and employees relating to job suitability based upon defined selection criteria.

c. Counsel the job applicant regarding asbestos health hazards.

C. Methods

a. Establish data base for long-term follow-up by recording essential identification characteristics and initial medical examination findings including the following:

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Identification	Name (Maiden Name) Social Security No. (or similar) Sex Date of Birth Place of Birth Address Name of Spouse Social Security No. (or similar) Address of Spouse (if different from applicants) Spouse's Date of Birth Names, dates of birth, addresses and social security numbers of children Employee I.D. number or clock number (This should never change and be re-allocated to same employee upon resumption of employment after termination.) Job Description Latest dust levels in job and department
Medical Examination	Full occupational history since leaving school Family History Smoking History Alcohol History (Drugs?) Previous illnesses of note especially respiratory ailments Respiratory Symptoms Questionnaire Vital signs and physical examination Special investigations: 17" x 14" PA Chest Roentgenogram Measurement of ventilatory capacity (full pulmonary function evaluation if possible) Measurement of angle between nail and cuticle (?) Sputum Cytology (?)

b. Provide guidance to management and the employee relating to job suitability based upon defined selection criteria itemized below:

(1) Contra-indications to employment in <u>any</u> job where asbestos is used are:

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- History of chronic chest complaint
- Significant exposure in other hazardous dusty jobs in the past
- A history of smoking more than 1 or 2 cigarettes per day.

(2) Contra-indications may be modified and applicant with above mentioned features may be accepted for work in asbestos areas if medical examination reveals no physical, physiological or radiological abnormalities, and if the dust levels in the area are below the currently accepted statutory permissible exposure levels.

(3) Take into account medical findings, including physiognomy and physiology results, in order to determine employee's ability to wear a respiratory protection device if necessary.

c. The job applicant must be counselled at the time of his first interview in the medical department regarding the known facts about asbestos-related diseases. Audio-visual aids, leaflets, demonstrations and personal interviews should be used to impress upon the employee the need for care and caution in the handling of asbestos and asbestos products. It is essential to impress upon the employee the special risks he or she will run if the habit of smoking cigarettes is not discontinued.

D. Remarks

The pre-placement medical examination is an essential tool for use in the medical supervision of asbestos workers because it establishes the principles upon which future management will be based. It gives the prospective applicant an insight into the seriousness of the problem and enables the

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physician to recommend suitability, limited suitability or total unsuitability of the individual for the job. The opportunity which the pre-placement physical examination provides for the medical staff to counsel the individual and establish rapport is unique and should not be missed. This period in the career of the job applicant provides the best opportunity for the recording of identification details and verifying them, in order to establish the data base for long-term follow-up. The format of the examination and recording documents should be such that it is suitable for storage and retrievable by electronic data processing equipment, thus making it more amenable to epidemiological study and analysis.

III. PERIODIC MEDICAL EXAMINATION

A. Purpose

To re-evaluate the job and the individual's suitability to continue doing the same job.

B. Objectives

a. Record medical findings on an ongoing basis in order to allow comparison from one year to the next.

b. Detect changes at the earliest possible point in time in physical condition, physiological status or radiological appearances which may or may not be job related.

c. Subject findings to epidemiological and statistical analysis in order to derive industrial hygiene standards for the protection of the health of employees.

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d. Provide guidance to the worker and to management regarding the possible effects of exposure in specific jobs.

C. Methods

a. Records of medical findings should be relatively simple to maintain provided that a standardized system is in use which follows-on from year to year. The attached paper which I presented at the recent International Conference on Occupational Lung Diseases held in San Francisco, should serve as an illustration. The essential elements in periodic medical examinations for asbestos workers are as follows:

(1) Detailed occupational history, i.e., job changes, changes in department, etc.

(2) Details of exposure (i.e., fiber types, product, etc.) and exposure levels

(3) Repiratory Symptoms Questionnaire

(4) Re-evaluation of Lung Function

(5) Review chest roentgenograms and compare recent and past films

(6) Record smoking habits and other social habits, drugs, etc.

b. (1) Changes in physical condition will be detectable on examination and this should concentrate on eliciting signs of pulmonary fibrosis such as bilateral end-inspiratory fine crackles at the lung bases, finger-clubbing and breathlessnes. Attention should be paid to the history of any chest complaints since the previous examination and pleural effusion or pleural thickening should be sought if the history is suggestive.

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(2) Physiological status is determined by lung function tests. In the follow-up of workers at a work site, the measurement of ventilatory capacity can be easily performed using robust, inexpensive, reliable equipment. The guidelines published by the American Thoracic Society for the performance of these tests, if adhered to, should insure calibration of instruments, training of technicians and reproducibility of results. (Am. Rev. Resp. Dis. (1978) 118(6) Part 2:55.) Where facilities exist for more complete studies they should include measurement of lung volumes and the gas transfer factor for carbon monoxide as measured by the single-breath method. Exercise tolerance should be measured under the supervision of a physician and with adequate facilities for dealing with cardiac arrest.

(3) The radiological surveillance of asbestos workers should be undertaken with the aim of detecting the earliest changes due to the development of pleural thickening, pleural calcification and asbestosis (pulmonary fibrosis) so that the employee can be advised and early removal from further exposure take place. Asbestos workers are a high risk group for the development of lung cancer, especially if they are also cigarette smokers, and particular attention should be paid to this risk when reviewing their chest x-rays.

The ILO/UC 1971 International Classification of Radiographs of the Pneumoconiosis is recommended for use in epidemiological studies of asbestos workers. It is necessary, however, in the

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clinical management of employees, to rely upon an interpretive narrative, rather than a coded system, for the direct day-to-day decisions which have to be made.

Chest radiography is probably the most useful surveillance tool we have, but it is also one of the most difficult to utilize.

c. Medical surveillance systems must be so designed as to allow for record linkage to industrial hygiene control programs. A discussion on this subject is outside the scope of this working paper, but is referred to for the sake of completeness. Epidemiological studies which do not have exposure data incorporated in their design, provide little help in ultimately pronouncing on the adequacy, or otherwise, of dust control measures which have been adopted.

d. Each worker examined must be given the results of all examinations carried out and must acknowledge receipt of the information and signify it has been understood. If a job change is indicated, the reasons should be stated for the worker's benefit, but the decision as to whether this advice is accepted or not must be left to the employee.

Management must always be informed, with the consent of the employee, when an adverse medical opinion is expressed, but the disposition of the case in the light of the medical advice which management receives, must hinge upon agreement reached between employer and employee, trusting that both parties have a full understanding of the facts and

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and the consequences. Management must also be advised of the employees continued suitability to perform current duties if no adverse health effects are found.

D. Remarks

The value of the periodic medical examination depends upon the manner and thoroughness with which it is conducted. It will only serve its purpose as an aid to early diagnosis if the format is standardized as much as is possible, if the strictest attention is paid to the detail of techniques employed in radiology and pulmonary function testing, and if it is borne in mind that the employee's attitude to periodic check-up is different from the attitude he or she had towards the preplacement medical examination.

In the sections above, dealing with the medical examination parameters, mention was not made of sputum cytology. It has been proposed in the United States that this should be performed routinely on persons with 10 or more years of exposure to airborne concentrations of asbestos fibers or who are 45 years of age or older. According to the authors of Section IV of the American Thoracic Society's Epidemiology Standardization Project, "Early data from studies of smoking men at high risk of lung cancer indicate that only one fourth of asymptomatic lung cancers are detected by sputum cytology and the remainder are detected by chest radiography." (Am. Rev. Resp. Dis (1978) 118 (Part 2): p. 96 - refers to Miller, W.E., Muhm, J. R., and Stitik, F. P.: The Earliest Roentgenologic Features of Lung Cancer, Am. J. Roentgenol, in press.)

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IV. POST RETIREMENT OR POST SEVERANCE EXAMINATIONS

The surveillance of the asbestos worker should not cease when he or she leaves employment, for whatever reason, but every effort should be made to continue the process of follow-up for the rest of the individual's lifetime.

The follow-up of retirees should be administratively easier than that of employees whose term of employment is severed prior to retirement, because the former will probably qualify for retirement pensions and remain in touch with the company, whereas contact with the latter will probably be lost.

The follow-up of retirees should preferably take the form of a health questionnaire only, with an annual reminder to each one to see a physician and have a chest X-ray. The aim is to detect lung cancer as early as possible in the hope that therapy might be available to prolong life and alleviate suffering.

With regard to other employees, whose employment terminated prior to retirement, a system should be devised whereby each one, on leaving, is given a carefully worded notice as a reminder to continue with annual examinations and designed to be given to a family physician with the information that the individual had previously been under surveillance as an asbestos worker.

V. CONCLUDING REMARKS

The prevention of asbestos related diseases depends upon engineering technology and dust control. The physician however is ideally placed to intervene at the interface between the worker and his job. The medical examination program is merely one part of the total effort required to safeguard employee health and

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without the collaboration and cooperation of management and the exposed workers, cannot achieve significance. As long as the program is built upon mutual trust and no attempt is made to keep either employer or employee in ignorance of the facts, it will succeed in providing an individual service as well as monitoring the overall effects of exposure on the health of the workforce.

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