REPORT OF THE PHYSICAL EXAMINATIONS AND X-RAY EXAMINATIONS OF ASBESTOS WORKERS IN ASBESTOS AND THETFORD MINES, QUEBEC.

54

The report herewith presented deals with the examination of 141 employees of the Canadian Johns-Manville Co., Asbestos, Que. and 54 employees of the Asbestos Corporation of Canada, the Keasby-Mattison Co. and Johnson's Mine, all of Thetford Mines, Que. 40 of the men of the Canadian Johns-Manville Co. were examined by Dr. E. M. Stevenson and Dr. Joseph Wyatt, who performed the physical examinations and X-ray examinations respectively. The other examinations were all performed by me, except the X-ray examinations. Actually, Drs. Stevenson and Wyatt examined 57 men; but since 17 of these men were re-examined by me I am including them in my list. Drs. Stevenson and Wyatt carried on their work in November 1929. My examinations were done in July 1930 in Asbestos, and in September 1930 in Thetford Mines.

The Asbestos and Thetford groups are very dissimilar with respect to age distribution and length of service in the asbestos industry, but racially and economically the two groups are much alike.

Table I gives the age distribution of the men and Table II the distribution according to length of service in the asbestos industry.

1084

PLAINTIFF'S EXHIBIT

MET-595

T A B L E I.

AGE DISTRIBUTION OF ASBESTOS WORKERS

	Asbestos		Thetford Mines	
Age group	Number	Percentage	Number	Percentage
15 - 19	3	2.1		
20 - 24	24	17.0	2	3.7
25 - 29	24	17.0	5	9.3
30 - 34	26	18.5	6	11.1
35 - 39	25	17.7	4	7.4
40 - 44	18	12.8	13	24.1
45 - 49	14	10.0	7	13.0
50 - 54	3	2.1	6	11.1
55 - 59	1	0.7	4	7.4
60 - 64	1	0.7	6	11.2
65 - 69	1	0.7	1	1.9
Not stated	1	0.7		
T O T A L	141	100.00	54	100.0

T A B L E II

LENGTH OF SERVICE IN ASBESTOS INDUSTRY

Years of service.	Asbestos		Thetford Mines	
	Number	Percentage	Number	Percentage
0 - 4	44	31.2	1	1.85
5 - 9	65	46.1	8	14.8
10 - 14	11	7.8	8	14.8
15 - 19	10	7.1	16	29.6
20 - 24	6	4.3	9	16.7
25 - 29	2	1.4	9	16.7
30 - 34	2	1.4	1	1.85
35 - 39	1	.7		
40 - 44			2	3.7
TOTAL	141	100.0	54	100.0

It will be noted that while 63 percent of the men in Thetford Mines were over 40 years of age only 28 percent of the men in Asbestos were over 40. And further with respect to length of service 83.4 percent of the men examined in Thetford Mines had worked in the asbestos industry for 10 years or more, but in Asbestos only 22 percent had worked for more than ten years.

Table III shows the dispositions of the men in various parts of the industry. Since the numbers are

small broad occupational groupings are used. In Asbestos the occupations are divided into 3 groups - mill, pit and factory; in Thetford Mines only the first two occupational groups are used, since no asbestos manufacturing is carried on there. All the men of the Thetford Mines group could be so classified, but 5 men were excluded from the Asbestos group since they did not appear to be exposed to an unusual amount of dust.

T A B L E III

LENGTH OF SERVICE IN DIFFERENT OCCUPATIONS IN ASBESTOS INJURY

	ASBESTOS			THETFORD MINES	
Years of service	Mill	Drilling pit	Factory	Mill	Drilling pit
1- 4	14	7	24	1	
5- 9	36	8	16	2	6
10-14	6	6		7	1
15-19	7	5		18	4
20-24	3	1		8	1
25-29	1	1		5	1
30-34	1	1		1	
35-39	1				
40-44					2
TOTAL	69	27	40	40	14

The past occupational history in industries other than the asbestos industry was significant only in 5 cases. Of these one had been a grain inspector

for 6 years and so exposed to very dusty conditions, one had been an underground copper miner for 18 years, one a copper miner for 2 years, a fourth had worked in a cement plant for 9 years, and the fifth had operated a drill in an iron mine. This last individual showed X-ray evidence of pneumoconiosis, the others did not have pneumoconiosis.

In Table IV are given observations of weight in relation to height by age. The average weights are taken from the figures compiled by the Association of Life Insurance Medical Directors and the Actuarial Society of America.

T A B L E IV.

WEIGHTS AND HEIGHTS ACCORDING TO AGE

		Pounds Under average				Pounds over average			
		20-29	10-19	5-9	-4 to +4	5-9	10-19	20-39	40+
ASBESTOS	No.	21	28	19	26	16	19	9	4
	%	15.3	20.9	13.6	17.1	11.4	13.6	6.4	2.9
THETFORD MINES	No.	9	12	8	9	5	6	7	1
	%	15.7	21.4	14.3	16.7	8.6	11.1	12.3	1.3
Group of 10,000 male Industrial workers	%	12	18	11	23	9	14	10	3

The group of 10,000 male industrial workers referred to in the above table was studied by the United States Public Health Service (see Public Health Bulletin

No. 162). It will be noted that there is very little distinction between this large group and the group of asbestos workers so far as degrees of overweight or underweight are concerned.

In the consideration of individual defects some interesting facts have been found. In this study only the 101 men at Asbestos and the 54 men at Thetford Mines are considered, since the records of the men examined by Dr. Stevenson are not strictly comparable with mine.

TEETH:-

Dividing the men into two groups according to whether the teeth did or did not need attention, of the Asbestos group 49.5% required attention, and of the Thetford Mines group 51.8 %.

HEARING:-

Acuity of hearing was tested by means of a watch. (My own hearing, which has been tested by an audiometer, was considered normal, and used as a standard) The watch test is admittedly very rough. In noisy occupations impaired hearing is frequently found in the older employees. Of the 101 men at Asbestos 10 showed definite hearing loss. This is not an excess proportion since any

group of adults will show a similar picture. In Thetford Mines 28 of the 54 men suffered from well marked hearing loss. This is a very high persentage, and comparable to what may be found in weaving sheds and boiler shops. All these men, except two, had been exposed to loud noise in their work for 10 years or more, and it is reasonable to suppose that noise played a part in their hearing disability.

The number of men with infected TONSILS was 27 in Asbestos and 13 in Thetford Mines, and almost identical ratio to the total in both groups.

Defects of the THYROID were rare. 4 men in Asbestos and 1 in Thetford Mines had enlarged thyroids.

BLOOD PRESSURE:-

Readings were recorded in all men over 40 years of age. Except in exceptional circumstances the blood pressure was not taken in the younger men. Consequently although the groups examined in Thetford Mines was smaller than that in Asbestos more blood pressure readings were taken there. 2 men in Asbestos had blood pressures of over 150 and 2 blood pressures under 100 m.m. of mercury. 8 men in Thetford Mines had blood pressures of over 150 and 2 blood pressures under 100.

The incidence of HERNIA is of interest from the compensation standpoint. In Asbestos all new employees must pass a physical examination before employment. There were 4 cases of inguinal hernia discovered among the 101 men examined there. In addition to these 5 men had been operated upon for this condition

In Thetford Mines physical examination is not required before employment. There were 5 cases of inguinal hernia among the 54 men examined and 2 cases which had been operated upon.

Some interest has arisen in connection with the occurrence of the so-called ASBESTOS CORNS. These are usually pin head sized elevations of the skin, somewhat like minute warts. None of these were detected in the Asbestos men probably due to my ignorance of their appearance. 8 of the Thetford Mines men had these growths on their hands and several others reported having had them at one time or another.

L U N G S

Of the 101 men examined by me at Asbestos only 4 suffered from definite first stage pneumoconiosis. These will not be considered on account of the doubtful diagnosis.

Of the 40 men examined by Drs. Stevenson and Wyatt 14 were diagnosed as first stage pneumoconiosis (asbestosis 1) (I am including the 17 men examined by Drs. Stevenson and Wyatt and subsequently re-examined by me in my group of 101). The much lesser incidence of pneumoconiosis in my group of men may seem surprising, but it must be remembered that the X-ray negatives were not read by the same men. In my group the X-ray diagnoses were made by Dr. Meriwether of Pitcher, Oklahoma, and in the other group the interpretations were by Drs. Wyatt and Peacock. Further the men group examined by Drs. Stevenson and Wyatt were, in general, older than those in my group.

Of the 54 men examined at Thetford Mines 24 were diagnosed by X-ray as suffering from pneumoconiosis (asbestosis), of these 4 were diagnosed as probably first stage asbestosis, 8 as early stage, 4 as definite first stage and 8 as second stage.

The pertinent facts regarding the definite cases of asbestosis are given in tables V and VI.

Table V

Exam. No.	Diagnosis	Age	Occupational history	Symptoms	Signs.
			Asbestos Group.		
66	A.1	39	Screen & cyclone 10 years	cough, dyspnea loss of strength	deficient expansion ess, crepitations left apex.
71	A.1	47	general operator mill foreman 34 years	cough, dyspnea frequent colds	poor expansion, percussion diminished left chest, crepitations all over both lungs.
86	A.1	42	loading cars in mill & foreman 28 years	no symptoms	no abnormal signs.
94	A.1	30	driller 7 years	no symptoms	no abnormal signs.
2000	A.1	41	Millwright 31 years	dyspnea, cough	no abnormal signs
2001	A.1	?	motor attendant for 11 years	no symptoms	faint moist rales 3 & 4 rib in front.
2002	A.1	33	millwright 14 years	no symptoms	no abnormal signs
2009	A.1	30	labourer & watchman in mill 3 years	no symptoms	slight dullness right base, left chest expands more than right.
2015	A.1?	25	labourer top floor mill, 2 years	no symptoms	breath sounds at apices harsh
2020	A.1	47	in mill 16 years	no symptoms	no abnormal signs
2021	A.1	52	millwright 30 years	no symptoms	expansion slightly limited
2025	A.1	64	mason in mill 26 years	no symptoms	expansion limited
2027	A.1	48	mine (work not stated) 12 years	no symptoms	no abnormal signs
2032	A.1	43	driller 4 years	no symptoms	no abnormal signs
2033	A.1	41	driller 23 years	no symptoms	no abnormal signs
2034	A.1	60	driller 4 years spareman 6 years foreman 25 years	no symptoms	absent vocal fremitus
2036	A.1	37	driller 3 years trackman 4 years	no symptoms	bronchial rales left side
2092	A.1	22	pipe coverer (factory) 4 years	no symptoms	no abnormal signs.

Table VI

Exam. No.	Diagnosis	Age	Occupational history	Symptoms	Signs.
			Thetford Mines Group		
1	A.1	42	filling bags 6 years oiler 10 years foreman 4 years	no symptoms	coarse clicks above heart & at both bases behind.
5	A.1	43	driller 25 years	no symptoms	no abnormal signs
6	A.1 (probably)	39	cleaner in mill 3 yrs. filling bags 4 yrs,	dyspnea	no abnormal signs
11	A.2	58	millwright 27 years	dyspnea	no abnormal signs
12	A.2 (early)	43	sweeper 18 years	cough & expectoration, Oss, blood in sputum, dyspnea loss of weight	coarse crepitations left apex behind
13	A.2	52	millwright 21 years	cough & expectoration, dyspnea, loss of weight & strength	dry rales over rt, chest behind, expansion deficient
15	A.1 (probably)	47	millwright 21 years	cough	occasional dry rales at left base
18	A.1	26	driller 11 years	no symptoms	no abnormal signs
19	A.1 (early)	45	driller 17 years	history of pleurisy, sister died of t.b.e.	noabnormal signs
21	A.1 (early)	52	millwright 18 years	dyspnea	no abnormal signs
23	A.1 (early)	62	driller 40 years	No symptoms	many crepitations right base.
26	A.1 (early)	29	driller 6 years general work in pit 4 years	No symptoms	no abnormal signs
28	A.1	44	filling bags 1 year dust shed 6 years	history of hemoptysis	no abnormal signs
30	A.1 (early)	35	in mill 3 years in tunnel feeding crusher 3 years	cough, dyspnea suspected t.b.e in 1925	no abnormal signs
32	A.1 (early)	58	crusher11 years sweeper in mill 4 yrs. oiler in mill 3 years	no symptoms	no abnormal signs
33	A.1	56	feeding boxes in pit 25 years, feeding the mill 3 years	sister died of t.b.e. 1889	Showers of fine crepitations both lungs behind from 4 vertebra down, percussion note diminished
39	A.1 (early)	59	millwright 26years foreman 26 years	dyspnea	no abnormal signs
40	A.1	62	feeding crusher 10 year cleaning in mill 15 yrs.-	dyspnea	crepitations in rt.axilla & l. base behind,
41	A.1 (probably)	46	feeding crusher in mill 6 years, driers 1year, foreman in mill 9 years	no symptoms	no abnormal signs

Table VI (continued)

Exam. No.	Diagnosis	Age	Occupational history	Symptoms	Signs.
			Thetford Mines Group (cont'd)		
49	A.1 (early)	34	loading boxes in pit 2yrs., driller 6 yrs.	no symptoms	no abnormal signs.
51	A.1 (probably)	51	operator in mill 6 yrs., millwright 10 years	no symptoms	percussion less resonant over right lung, showers crepitations right side front & back, ¼ over left up. er lobe front & back.
53	A.1	50	oiler in mill 10 yrs. foreman mill 2 yrs.	son died t.b.C. daughter has tuberculosis.	expansion poor, many crepitations l. apex & in r. axilla, crepitations r.& l. upper lobes behind ½ at both bases.
54	A.2	41	mill repairs 12 yrs. mill foreman 10 yrs.	cough, dyspnea	expansion poor, percussion poor at aphees. no rales.
29	A.1 (late)	44	Foreman mill 15 yrs. millwright 7 yrs.	no symptoms	no abnormal signs.

It will be noted that of the 141 men examined at Asbestos 17 were diagnosed as first stage asbestosis, while of the 54 examined at Thetford Mines 21 were diagnosed as first stage asbestosis and 3 as second stage asbestosis. This is not to be interpreted as indicating an excess hazard in Thetford Mines. The increased incidence of pneumonoconiosis in Thetford mines is simply a reflection of the different distribution with respect to age and length of service. Reference to tables 1 and 2 will recall the great differences in these two things.

In the great majority of cases the length of service in dusty work was more than 5 years as indicated in thefollowing table:

length of service	Number of cases	Number of men examined.
0 - 4 yrs.	2	44
5 - 9	9	73
10 - 14	7	19
15 & over	23	39
Total	41	175

From this table one would conclude that asbestosis is not likely to develope with an exposure of less than 5 years, but that with exposure of more than 10 years there is a great possibility of it developing. It is, however, of interest to remember thatmany men with long periods of exposure do not develope any signs of asbestosis.

As to occupations of 41 drillers 13 were cases of asbestosis, of 109 mill workers 27 were cases of asbestosis and of 40 workers in the factory only 1 case showed x-ray evidence of the disease. Evidently there is littke difference in the hazard in mill workers and drillers. The mill workers appear to be exposed to far greater dust concentrations than the drillers and it is rather difficult to understand the high incidence of asbestosis among the drillers. However, it may or may not be of interest to note that

that the drillers are occasionally exposed to granite dust.

None of the cases of asbestosis appeared to suffer from disabling symptoms. Perhaps the most common symptom was shortness of breath, but less than half the cases complained ofthis symptom (11 of the 41 cases).

As to physical signs I was unable to find any pathognomonic signs which would enable one to make a diagnsis in the absence of the x-ray picture. Inspection of the lungs was of little value since it was difficult to evaluate the degree of diaphragmatic excursion and sometimes expansion appeared to be deficient when actually it was not. If a respiration tank had been available some quantitative idea of vital capacity might have been attained; the measurement of chest expansion by a tape measure was given up after the first 100 examinations.

Since there is not standard pitch of percussion note and no standard intensity of tactile fremitus or vocal resonance one has to compare one side of the chest with the other to detect abnormalities. But asbestosis is essentially a symmetrical lesion and in this disease the comparison of the two sides of the chest is of little help. The same observations apply to the quality of the breath sounds.

The most frequently found abnormality was the presence of rales, particularly crepitant rales. In many of the more severe cases showers of these rales occurred throughout both sides of the chest,particularly on coughing, but in ten of the three cases of second stage asbestosis these rales were not heard, so that evidently these are not a constant sign of the disease. On clinical examination two or three of the cases with large numbers of crepitant rales at thapices were thought to be tuberculous but the x-ray examination did not confirm this impression

Tuberculosis did not play an important part in the study. None of the cases of asbestosis appeared to be complicated with this disease. Indeed the incidence of definite tuberculosis in the two groups of 195 individuals was very low. There were several suspected cases on clinical examination which were not confirmed by x-ray and several suspected cases by x-ray which showed no real evidence in the way of signs and symptoms. Only one case in the groups can be considered as actively tuberculous.

It was difficult to obtain sputum from most of the men since very few of them were coughing. About 12 sputa were examined for tubercle bacilli and asbestos bodies. No tubercle bacilli were found but one case did show several asbestos bodies. This case was diagnosed by X-ray as probably asbestosis (first stage) but is not included in the number of asbestosis cases since the x-ray film was not satisfactory.

Conversation with physicians and mine managers in the asbestos regions indicated that no hazard to health was suspected in connection with work in the asbestos mining and milling industry.

In general it may be said that the hazard of pneumonoconiosis in the asbestos mining and milling industry has been demonstrated, but evidently the disease does not incapacitate to any great degree and apparently it is not particularly associated with tuberculosis.

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1078