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The working conditions, lack of protective equipment and method of handling asbestos material by our pipecoverers and insulators appeared to be a potential health hazard. A study was made of their working environment and sixty (60) employees were given a periodic vital capacity test and chest X-ray. The results of these tests are found in the enclosures. A Very excellent detailed report was published by Drinker et al in the Journal of Industrial Hygiene and Toxicology Vol. 28, No. 1, January 1946, on this subject.

Compensation Cases. One former employee from this shop has been collecting compensation for asbestoses since 1954. He was employed in this trade for nine years, his only exposure to asbestos being at the shipyard. Another claim was paid for about a year but is now rejected. Other claims have been made and rejected. An unrehearsed interview was conducted and recorded on tape with the former employee now on disability retirement. This tape was played and a discussion conducted with small groups of pipecoverers and insulators to encourage the use of protective equipment while working with asbestos material. A written copy of this tape is found in the enclosures.

Dust Studies. In our study of dust particle size and dust counts, we find that particles above 10 microns settle so rapidly that even dust sampling devices fail to catch them in significant numbers. According to DallaValla, this is true for practically all dust except asbestos dust. He states that, "particles of this dust exceeding 400 microns in length have been recovered from lung sections of deceased asbestos workers. Asbestos fibers are thin, often not as much as a micron in thickness, and it is possible they remain floating in air much longer than an equivalent spherical particle of the same mass. Furthermore, their sliver like form permits them to work down into the small alveoli of the lungs and set up a sort of foreign body reaction there."

Lanza gives us some interesting information from his experimental work with animals breathing asbestos dust. He developed typical asbestosis bodies in the lungs of guinea pigs after about 70 days exposure to 43,000,000 particles per cubic foot of air. By removing a group of animals from the exposure, he demonstrated that the reaction to inhaled asbestos dust was not a progressive one. He states that, "these experimental observations seem to be indicating asbestos fibers cause fibrosis in the lungs because they act as mechanical irritants in an organ whose function involves considerable movement. The long fibers cannot effectively be removed by phagocytes and the lymphatic system; they penetrate the walls of the bronchioles and with each respiratory effort they continue to injure adjacent cells. The development of a protective coating about them must materially reduce the friction but as the inhalation continues new uncoated fibers are constantly accumulating to keep up irritation. This is inferred from the lack of progression after the exposure has ceased." Pipecoverers working environment on board naval vessels is constantly changing and it is difficult to get an average dust exposure. Drinker states that, "In view of the varied character of the environmental dust exposure in the pipe

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...it is manifestly desirable to ...
...of the percent of asbestos in the parent
...is affected by the size and shape of the parti-
...in the parent material does not mean you will
find the same percent of material in the suspended dust.

Dust studies were made in the shop where asbestos pads are shaped for shipboard fittings, pipe fixtures and joints. One overhead exhaust system is available near the amosite table. This exhaust system was not operated constantly previous to this investigation. The employees felt the exhaust sucked asbestos material to be drawn by their breathing zone. Dust studies with the exhaust system off revealed 10-20 mppcf. With the exhaust system in operation, the maximum allowable concentration of 5 mppcf was not exceeded. Dust counts made of the very dusty conditions during the removal of old insulation revealed up to 200 mppcf. This operation was being performed by two employees without dust respirators. A wide variety of dust counts both above and below the 5 mppcf was found in other shipboard operations.

Vital Capacity of Lungs. As shown in the enclosures, an attempt was made to determine the significance and value of lung vital capacity test. Health jackets were checked to compare recent vital capacity test with those in the past. The vital capacity in the same person from one year to the next varies considerably, sometimes it increases, sometimes it decreases. With this inconsistent results, we consider the vital capacity test as only a crude indicator. Some graphs of vital capacity results are found in the enclosures. In each case of consistently low vital capacity, however, we did have significant x-ray findings.

We are interested in the changes of vital capacity with the age and were sent the following information from Dr. J. A. Myers' book on Vital Capacity of the Lungs: Between the ages of forty and fifty years Wintrich found a slight decrease in the vital capacity; while between the ages of fifty and sixty years he observed great variation in vital capacities. In well developed people, even at sixty-four years and over, he found that the vital capacity did not differ greatly from that of people between the ages of forty-five to fifty-five. In people after seventy-six years old Wintrich observed a decline in vital capacity to that of childhood ages."

Clinical X-Ray Study: The sixty (60) ladders from shop, 56 have an average age of 46.7 years, and an average of 13.6 years working in asbestos. Out of the sixty 70mm x-rays, nine ladders were recalled for a 14x17 x-ray. Six of these were found to have increased density. A partial health history of these six is found in the enclosures.

Conclusion: Our pipecoverers and insulators are now accumulating a considerable number of years at their trade. We have found some consistently low vital capacity and lung markings on several employees with over 18 years experience. The work habits, personal protection and working environment of these men are not of desirable standards. These conditions, plus their increasing years of exposure and the medical study, indicates the need for corrective action.

Corrective Action:

1. The six employees with lung markings were interviewed, individually, in the medical department. There was a discussion at this time of their working environment, physical condition and the potential health hazard of their occupation.
2. An educational program was conducted with the pipefitters and insulators on the potential health hazard of asbestos material.
3. Shop supervisor issued orders and will enforce the wearing of dust respirators by personnel performing shipyard lagging.
4. Wilson dust respirators were first tested for comfort by the personnel and later furnished.
5. A decision was made by medical department to make one semiannual chest x-ray a 14x17 and one a 70mm.
6. A system is under study which would moisten the cloth before it is fabricated in the asbestos room.
7. The asbestos work room was given a thorough cleaning and arrangements made for a periodic cleaning.
8. The exhaust system in the asbestos room operates continually during working hours.

PARTIAL HEALTH HISTORY OF SIX (6) PIPECOVERERS & INSULATORS

E NO.	AGE	TOTAL YEARS IN ASBESTOS	TOTAL YEARS IN SHIPYARD ASBESTOS	X-RAY 14 x 17	VITAL CAPACITY			
					Apr 57	Apr 58	Jan 59	Feb
1.	70	18	18	Has history since 1952. Latest: Imp: (1) Pulm. fibrosis (2) Bronchestosis occ. silicosis, asbestosis Hist. since 1957	68	46	41	73
2.	63	30	11.	Imp: (1) Early fibrosis of the lung. (2) Mild emphysema Hist. since 52	64	50	55	
3.	63	15	15	Imp: (1) Fibrosis, rt. lung lower $\frac{1}{2}$ (2) Thickened pleura	71	68	55	
4.	57	13	13	No history Latest: Asbestosis of the left lung or silicosis				
5.	50	23	1	Picked up on Pre-employment Latest: Imp: Fibrosis of the lungs due to asbestos or silica		75	62	
6.	49	13	7	Hist. since 56 Imp: Early fibrosis of lung	84		70	
Avg.	56.6	18.6	10.8				57.5	