PLAINTIFF'S
EXHIBIT
DUP-2301

ASBESTOS SEMINAR

June 1, 1971

DUP 1005281

DU 050918

ASBESTOS CONFERENCE ATTENDEES

June 2, 1972

Biochemicals

J. B. Young - Belle Plant

Central Research

D. J. Beatty - Experimental Station
L. A. Wharry - Experimental Station
E. R. Willis - Experimental Station

Elastomer Chemicals

S. Wenzel - Louisville Plant
W. T. Muncaster - Wilmington
A. F. Myers - Wilmington

Employee Relations

C. W. Eddy - Haskell Laboratory
J. R. Haden - Safety & Fire
D. G. Windsor - Safety & Fire

Engineering

J. R. Allen - Louviers Building
F. H. Fuller - Louviers Building
H. A. Moak - Louviers Building
P. A. Palmer - Louviers Building
J. L. Parsons - Louviers Building
W. M. Uhrich - Construction - Louviers Building
I. Zeise - Construction - Louviers Building

Fabrics & Finishes

J. C. Fang - Marshall Laboratory - Philadelphia
G. A. Johnsen - Marshall Laboratory
T. J. Nelson - Marshall Laboratory
A. J. Geib - Wilmington
G. R. McClure - Wilmington
E. E. Swain - Wilmington

DUP 1005282

Film

C. Franklin - Clinton Plant
A. H. Barton - Spruance Plant
R. Misak - Tecumeseh Plant
W. E. Neff - Wilmington

Industrial Chemicals

G. R. Amery - Niagara Falls Plant
G. F. Reichwein, M.D. - Repauno Works
J. A. Robbe - Repauno Works
J. G. Haverty - Wilmington

Organic Chemicals

W. L. Sprout, M.D. - Chambers Works
J. C. Warner - Chambers Works
W. E. Acquard - Corpus Christi Plant
C. L. Hobbs - Jackson Laboratory

Photo Products

F. Reig - Brevard Plant

Pigments

J. T. Cavanaugh - Edgemoor Plant
R. M. Luckring - Edgemoor Plant

Plastics

Y. L. Power, M.D. - Carney's Point
E. O. Randolph - Carney's Point
A. Schelling - Carney's Point
J. B. Armitage - Experimental Station
H. H. Gibbs - Experimental Station
S. Hattman - Sabine River Works

Polymer Intermediates

J. P. Hooten - Cape Fear Plant
D. Zippler - Savannah River Plant

DUP 1005283

Textile Fibers

J. W. Chromy - Chestnut Run
J. M. Martin - Chattanooga Plant
P. V. Nolan, M.D. - Chattanooga Plant
W. S. McMahon - Kinston Plant
B. R. Bolton - Martinsville Plant
S. J. Bright - May Plant
W. O. Cotty - May Plant
C. F. Higgins, M.D. - May Plant
E. C. Shepherd - Old Hickory
C. M. Gardner - Seaford Plant
F. S. Klein - Seaford Plant
R. P. Coon - Waynesboro Plant
W. J. Gatzek, M.D. - Waynesboro Plant
P. F. Philyaw - Waynesboro Plant
R. E. Sayre - Waynesboro Plant
J. G. Bernard - Wilmington
M. L Bradley - Wilmington
S. Danby, Jr. - Wilmington
R. E. Ferrari - Wilmington
R. B. Hayden - Wilmington
J. A. Sigman - Wilmington
H. E. Swink - Wilmington

DUP 1005284

ASBESTOS SEMINAR

June 2, 1972

8:45 a.m.	Introduction	
8:50 a.m.	Types and Uses of Asbestos	R. J. Hubiak
9:05 a.m.	Health Effects of Exposure to Asbestos	C. F. Reinhardt, M.D
9:30 a.m.	Changing Requirements under OSHA	J. F. Morgan
10:00 a.m.	COFFEE BREAK	
10:30 a.m.	Medical Surveillance of Asbestos Workers	H. J. Trochimowicz
11:00 a.m.	Surveillance of Working Environment	R. J. Hubiak
11:45 a.m.	LUNCH	
1:00 p.m.	Means of Dust Control	Com. S. Barboo, USN
1:45 p.m.	Potential Substitution of Asbestos in Insulation	G. E. Lang, III
2:00 p.m.	Discussion of Topics	
3:30 p.m.	Adjournment	

DUP 1005285

INTRODUCTION

by

John A. Zapp, Jr.

Let me say a few words about why we're having this particular Conference on Asbestos. If I were to rank those chemicals made and used by Du Pont in order of concern to me, I would not put asbestos at the top of the list. But, it has the spotlight on it at the present time for other reasons. There are enough workers throughout the U.S. who are exposed to asbestos and there are enough cases of occupational disease resulting from this exposure to have caused labor unions and the Federal Government to give this problem of asbestosis, and associated lung cancer, the first, and primary attention, under the Occupational Safety and Health Act of 1970. This attention occurred two ways. First of all, asbestos is the first chemical substance to have been made the subject of an emergency standard. This was on the motion of the labor unions that insisted that the current level of exposure as permitted under the Occupational Safety and Health Act of 12 fibers/ml was too high, and therefore, they put pressure on the Department of Labor to set a lower emergency standard. This was set at the current recommended level by the American Conference of Governmental Industrial Hygienists at 5 fibers/ml. This number five is not as low as the labor unions would have liked, so that pressure has continued on the Department of Labor to establish a permanent standard lower than 5 fibers/ml. The mechanism for getting at a permanent standard that affects health, is for the Department of Labor to request the National Institute of Occupational Safety and Health to prepare a criteria document

DUP 1005286

and recommend a standard. So we have another first. This was the first criteria document recommending a permanent standard to be prepared by the National Institute of Occupational Safety and Health and to which they have complied with the requests of the Secretary of Labor by issuing a criteria document, entitled Criteria for a Recommended Standard--Occupational Exposure to Asbestos. A criteria document is not a standard. A criteria document simply describes the effects observed at different levels of exposure. Based upon the criteria document however, one can recommend a standard. Criteria documents are descriptive. They describe. Standards are prescriptive. They say what you can do and what you can't do. This particular document contains a recommended standard and the criteria on which that recommended standard is based. However, it should be pointed out that this document itself does not necessarily reflect the final standard that will be adopted by the Department of Labor. And, I might just quote Dr. Marcus Key, Director of the National Institute of Occupational Safety and Health, in a talk he gave in February where he said, "Please remember, under the Occupational Safety and Health Act, HEW's recommendations are not standards. The Department of Labor will review our recommendations and those of ad hoc review committees and hold public hearings, if necessary, and will promulgate the final standard." Now the public hearings on asbestos have already been held. They lasted about two weeks, and I understand that it accumulated quite a stack of testimony. Now, the next phase of the current phase is the digestion of this testimony by the Department of Labor. Out of that will come their recommendation for a final standard that will be published

DUP 1005287

in the Federal Register to take effect on a certain time after publication. We have not yet reached that point. But because this document is out, because it recommends a low standard of 2 fibers/ml, this standard itself has achieved maximum exposure conditions. It has excited more of a discussion and a lot of questions were being asked by people who might have to deal with this problem. As a result of this attention focused on asbestos, plus the intended standard which we don't really know too much about yet, that has caused us to feel that the time was right for another Seminar on Asbestos.

What we're going to try to do today is to give you some of the dimensions of the problem, but again I caution you. The final standard has not yet been promulgated so don't go back and say you have to do this right away. It may well be that the Department of Labor will not adopt all the recommendations of NIOSH after they have considered all of the testimony before them, all comments of experts, professional societies, industry, and labor. It may be for political reasons they will adopt it. We don't know. So that part is still an unknown. But, I hope that you will leave here today with a better understanding of some of the reasons for the recommendations of the National Institute of Occupational Safety and Health or NIOSH, as you will hear it referred to, and, perhaps a better understanding of what you may have to do when the final standard is adopted.

RJH/neh/jtd
June 28, 1972

DUP 1005288

TYPES AND USES OF ASBESTOS

Asbestos is derived from the Greek word amiantos which means undefilable or undestructible. Southern European countries still use the word amiantos but Northern European countries and North American countries use the word asbestos. This mineral has been known for more than 2500 years. It was used for wicks in eternal flames, woven into linens and tablecloths, or for adding strength to clay pots.

Asbestos also refers to a broad classification of hydrated fibrous mineral silicates which differ in chemical composition. It is generally considered to be a metamorphic product derived from its parent silicate by the action of water containing carbon dioxide and salt in solution. This water, at high temperature and pressure, penetrated cracks in the rock which eventually gave rise to veins of asbestos. There are two main mineral groups into which asbestos can be divided--serpentine or pyroxane and amphibole. Under the serpentine group, the main member is chrysotile. The amphibole group is composed mainly of the following: crocidolite, amosite, tremolite, actinolite, and anthophyllite.

Chrysotile

Chrysotile is derived from a Greek word which means "fine fair of gold". It is the most widely used form of asbestos comprising about 90-95% of the total mined. Chrysotile is a magnesium silicate with the general formula of $Mg_3Si_2O_5(OH)_4$. There are references many times to the color of a particular type of asbestos. Chrysotile is considered the white asbestos even though on initial mining it has a greenish or yellowish color.

DUP 1005289

The diameter of the ultimate fiber is between 0.01 and 0.02 μm. This makes them the finest of the asbestos family. The general characteristics of this asbestos type is its flexibility, tensile strength, resistance to alkalies and a high capacity for resisting heat. However, it is not very resistant to acids, sea water, or moist air. The flexibility of these fibers is due mainly to one physical property; the fibers are acknowledged to be hollow cylinders. Because of their flexibility and softness, they are used for spinning and weaving cloth.

Crocidolite

Crocidolite is derived from a Greek word which means "woolly stone". It is the second most mined type of asbestos making up about 3.5% of the total asbestos output. This asbestos is a sodium-iron silicate with the general formula of $3Na_2O.6FeO.2Fe_2O_3.16SiO_2.H_2O$. Crocidolite is often referred to as the blue asbestos.

The fibers of the amphibole group have ultimate diameters of approximately 0.1 μm or about ten times the diameter of chrysotile asbestos fibrils. The length of these fibers, as mined, vary from one-half to three inches. Crocidolite is the strongest of all natural fibers. Its predominate properties include high tensile strength and good resistance to acids, alkalies, salt water and organic solvents. It is also resistant to the effects of outdoor exposure. The longer fibers of this group can be spun.

Amosite

Amosite is derived from the initial letters of the Asbestos Mines of South Africa. This is the third most widely used type of asbestos

DUP 1005290

and also the last when referring to an asbestos type by color; it is considered brown asbestos. Amosite is an iron-magnesium silicate with the empirical formula of $Fe_5Mg_2Si_8O_{22}(OH)_2$. It occurs frequently with crocidolite deposits but usually only one can be economically mined. Amosite has the same general chemical composition as anthophyllite except that it is higher in iron and lower in magnesium. This type of asbestos occurs only in South Africa.

Amosite possesses good insulating properties and is resistant to acids, alkalies and sea water. Although its fibers are generally from three to eleven inches in length, the brittleness of them makes them inadequate for textile spinning.

Tremolite

The word tremolite is derived from the Tremola Valley in Switzerland where it was first found. The empirical formula for it is $Ca_2Mg_5Si_8O_{22}(OH)_2$. Fibers of tremolite are generally weak and brittle.

Tremolite is the fibrous material in some commercial talc materials. Because of its presence, the hazard to health from this particular type of talc is greatly increased.

This asbestos type is of little commercial value.

Actinolite

Actinolite is very similar in composition to tremolite. The general formula being $Ca(Mg,Fe)_5\ Si_8O_{22}(OH)_2$. When the iron content of tremolite exceeds 2%, the material is considered actinolite. The fibers of this asbestos are very short and brittle. This asbestos type is also of little commercial value.

DUP 1005291

Anthophyllite

Anthophyllite as mentioned earlier is similar to amosite in chemical composition. Its empirical formula is $(Mg,Fe)_7Si_8O_{22}(CH)_2$. It is mined mainly in Finland. The fibers are usually brittle and relatively weak. However, they do have good heat and acid resistance.

(Asbestos properties are summarized in table on page 7.)

Application of Asbestos

After reviewing some of the properties of asbestos, it can be seen how it improves upon the materials with which it is combined. It can be woven. It is resistant to heat, fire, weather, acids and alkalies. When used with other materials, its strong flexible fibers interlock to form reinforcing webs within the composition. The end result is a gain in durability and toughness as well as increased resistance to breakage, abrasion and wear.

Other materials can be found which have better insulating properties than asbestos. However, these materials usually lack the physical and chemical attributes of asbestos. Asbestos, in addition to being stronger and less sensitive to decomposition than either cork or magnesia, also incorporates tiny air cells within its structure. This can be seen when a comparison is made of its surface area with some other materials.

Fiber	Surface Area (sq cm per gram)
Nylon	3100
Acetate rayon	3800
Cotton	7200
Wool	9600
Viscose rayon	9800
Chrysotile	130,000 to 220,000

DUP 1005292

Uses of Asbestos (decreasing order of application)

1) Asbestos Cement

About one-third of the total used in United States

Products are non-corrosive, fire resistant, and have heat insulating properties

Approximately 10-20% fiber content

shingles for roofing and siding

insulation board

casings for electric motors

pipes to carry sewage, water, gas

insulation

2) Asphalt and vinyl floor tiles

Less than one-third of the total used in United States

Products are durable, resistant to grease, oil and alkalies

Contain 15 to 50% asbestos

3) Asbestos papers, millboards, roofing felts

About 20% of the total used in United States

roofing
cartridges
wallboard
table pads
lining stoves, heaters, mufflers, hoods of automobiles
carpets
acoustical ceilings
safes
ovens

4) Automotive industry

About 3-4% of the total used in United States

brake linings

clutch facings

DUP 1005293

5) Textiles

Asbestos content varies from 75 to 99%. It is usually blended with cotton, nylon, orlon, viscose fibers and fibrous glass.

theater curtains

ironing board covers

pot holders

6) Electrical equipment

insulating conductors

7) Filter media

gas masks

chemical processing (acid washes)

8) Filler material

plastics

paints

sealants (roofs, roads)

putties, caulking, crack fillers

Asbestos was first discovered and mentioned around 430 B.C. It was rediscovered around 1720 A.D. in Russia. Commercial production of this mineral did not start, however, until the 1870's. This occurred both in Canada and the U.S.S.R. with about 300 tons being mined in the first year. With other discoveries, annual production was up to 30,000 tons in 1910 and 500,000 tons in 1930. By 1968 annual production had exceeded 4,000,000 tons. The United States uses approximately 40% of the total asbestos mined

DUP 1005294

REVIEW OF COMPARATIVE PROPERTIES

Property	Chrysotile	Crocidolite	Amosite	Tremolite	Actinolite	Anthophyllite
Color	white (gray, green)	blue	brown (ash gray)	white (gray, green)	green	gray-white
Texture	soft to harsh (silky)	soft to harsh	harsh	harsh	harsh	harsh
Flexibility	very good	fair to good	poor	generally brittle sometimes flexible	brittle, non-flexible	very brittle, non-flexible
Fiber diameter (μm)	.01-.04	.06-.10	.06-.10	.06-.10	.06-.10	.06-.10
Acid resistance	poor	good	good	good	fair (insol. in HCl)	very good
Resistance to heat	very good	good	good	good	good	very good
Fiber length (inches)	fraction-2	1/2-3	3-11	short to long	short	short

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DUP 1005295

Dr. Zapp I think the main thing to keep in mind is that asbestos is not a chemical of a single fixed composition but rather a family of fibrous silicates. Bearing this in mind, the next topic that we want to discuss this morning is what these things do to man. What is the nature of the occupational illnesses caused by exposure to asbestos. Dr. Reinhardt will discuss this topic.

DUP 1005296

HEALTH EFFECTS OF EXPOSURE TO ASBESTOS

by

Charles F. Reinhardt, M.D.

The diseases shown on the first slide are the ones which may be associated with exposure to asbestos. First, is the primary one which is asbestosis--a form of fibrosis of the lung. Then there are at least two types, and possibly more, of cancer. There is bronchogenic cancer--a cancer of the bronchial tubes of the lung. This is the common type of cancer associated with exposure to asbestos. Then there is mesothelioma, a rare form of cancer. It is cancer of the pleura and peritoneum. The pleura is the thin membrane which covers the surface of the lung and lines the thoracic cavity. The peritoneum is the same type membrane which lines the abdominal cavity and covers the surface of the organs within the abdomen. In addition, although not listed here, there may be other types of tumors associated with exposure to asbestos since there is an increased incidence of cancer of the gastrointestinal tract in asbestos workers.

(Next Slide) Asbestosis was first described about the turn of this century in London at a post-mortem examination by Dr. Montague Murray. After that, for the next 20 years or so, there were few deaths attributed to asbestosis. However, in the 1930's, asbestos was shown to be a major cause of disability in workers in the asbestos textile industry in England and in the United States. The latent period for this disease is 10 to 20 years. This is the period of time which elapses between the first

DUP 1005297

exposure and the onset of the disease. This is an average which is shown here and it may be shorter or it may be longer, it could be as short as 5 years under very dusty conditions.

Now to move on the symptoms and signs of asbestosis. First, let me mention that the onset of this disease is incideous, that is, it may creep up on an individual and he may be unaware that it is present. One cause of this is that the early symptoms, that is, shortness of breath and chest pain, are rather common types of symptoms that are not particularly characteristic of this disease and therefore, diagnosis at this stage is somewhat uncertain. However, later in the disease, certain signs will occur which are more diagnostic. The first of these is basal râles. This is a physical finding of the lungs which is due to a collection of fluid in the base of the lungs and is detected upon examination of the lungs. There may be clubbing of the fingers, which means an enlargement of the ends of the fingers. Clubbing may also involve the toes. There are usually characteristic x-ray changes of the lungs; typically, there would be a ground-glass appearance. This is due to the diffuse interstitial fibrosis which is characteristic of asbestosis. This type of fibrosis is in contrast to the nodular type seen in silicosis. There may be pleural thickening which may be detected on the chest x-ray. Other findings may include abnormal lung function. I will not describe what each of these is in detail because they are somewhat technical in nature. However, in general, there is a restrictive functional pattern. In asbestosis, the lungs become stiff and lose their elasticity or compliance. One of the characteristic findings is impaired diffusion. This refers to diffusion of gases across the alveolar-capillary membrane in the lungs.

DUP 1005298

(Next Slide) I mentioned pleural thickening because this is a rather characteristic finding in asbestosis. It occurs early in the disease and it may be the only change, at least, for some time. It is not a feature of other kinds of pneumoconiosis or dust diseases of the lungs. The thickened pleura may become calcified to give what is called a pleural plaque. These plaques would occur on the surface of the lung or on the chest wall and even on the diaphragm. The calcification rarely occurs in less than 20 years after the first exposure and it is generally a feature of anthophyllite exposure although it can be seen with exposure to other types of asbestos. The exposures are not always occupational. Pleural plaques have been observed in persons who lived adjacent or near to a source of asbestos. Persons in the neighborhood of an asbestos mine for example, have been found to have these pleural plaques.

(Next Slide) I have some information on asbestos bodies or ferruginous bodies as some people prefer to call them. This is included because if one talks about asbestos or asbestosis very long, he is probably going to hear the term asbestos bodies. These are fibers coated with an iron-containing protein which gives a characteristic golden-brown beading along the length of the fiber. Often the fibers become thickened at each end to form a characteristic dumbbell appearance which can be seen under the microscope. Asbestos bodies in the lung or sputum are not pathognomic of asbestosis, that is, they are not diagnostic. Their presence does not mean the existence of asbestosis; however, this was thought to be the case and originally, asbestos bodies were called asbestosis bodies. However, the feeling is now that they indicate merely a past exposure to asbestos.

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Lungs from urban areas contain typical asbestos bodies in small numbers. Depending on whose figures you read, asbestos bodies may be found in from 50 percent to 100 percent of the lungs which are examined. One complicating factor here is that other mineral fibers can become coated in the same manner and maybe this is why the term ferruginous bodies is preferred by some.

(Next Slide) I thought you might be interested in some of the theories of the pathogenesis of asbestosis, i.e. how it occurs or why it occurs. Originally there was the theory of physical irritation and this means simply what it says. That is, the presence of asbestos fibers in the terminal air spaces causes irritation and damage to the walls of the alveoli of the lungs leading to fibrosis. However, this theory is not generally accepted today. Then there is the solubility theory which says that fibrosis is due to the effects of the silic acid and metal ions leaching out from the asbestos fibers. Again this is not a widely accepted theory on the pathogenesis of asbestosis.

Then there is the autoimmune theory. There are two concepts here. First, the presence of asbestos in lungs and its reaction with phagocytes or fibroblasts produces or localizes abnormal globulin leading to fibrosis. Phagocytes and fibroblasts are kinds of cells which may be found in the lungs. Phagocytes are of particular interest because they are the cells that engulf or scavenge foreign materials that enter the lungs.

The second concept under the autoimmune theory is that there is lysis of trapped phagocytes. They would be phagocytes which have picked up asbestos fibers and they release a substance that is not accepted by the

DUP 1005300

tissue as self. That is, it is a foreign material in the lungs and therefore the body reacts to it by producing fibrosis. Again, these two theories, the autoimmune theories, are not widely accepted. However, the fourth theory, the stagnation of phagocytes, which is somewhat similar to the last one I mentioned, says that the phagocytes disintegrate in situ or in place in the lungs and in doing so release sclerosing agents which are probably lipids or lipoproteins. This is the theory which is currently favored as explaining the development of asbestosis.

(Next Slide) Moving on from asbestosis, we come to bronchogenic cancer. This is the type of cancer of the lung which one normally refers to when speaking of lung cancer; that is, the same type of cancer that occurs in cigarette smokers. It is cancer of the bronchial tubes. In the 1930's, an association was discovered between asbestosis and bronchial cancer. This was especially true in asbestos textile workers in whom an excess risk was firmly established in the 1950's. I mention this because this group of workers apparently has a high exposure to asbestos dust. In other groups of workers this relationship has not been found to be as strong. The association appears to be with asbestosis rather than simply exposure to the asbestos dust. Cigarette smoking is an important additional and possible synergistic factor. In fact, Dr. Selikoff estimates an increased risk factor of 90. That is, the risk of developing cancer in an asbestos worker who smokes would be 90 times greater than an asbestos worker who doesn't smoke. This is quite something and I think it emphasizes the importance that if one is an asbestos worker, he should not smoke. The latent period here is 20 to 30 years; if you remember, this contrast with 10 to 20 years for the onset of asbestosis.

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(Next Slide) Mesothelioma, which as I mentioned on the first slide, is a rare type of cancer. It is a diffuse cancer spreading over the surface of the lungs and pleura and abdominal organs and peritoneum. One of the interesting things regarding mesothelioma of the abdominal cavity is how the asbestos fibers reach the peritoneal surface. In fact they have been found not only on the peritoneal surface but in other organs in the abdominal cavity. No one is sure how they get there. Perhaps they migrate.

The first large group of cases of mesothelioma was reported in South Africa in the late 1950's and it was found that this form of cancer is associated particularly with exposure to crocidolite fibers. However, apparently it is not limited to this type of asbestos. In the case of mesothelioma, asbestosis is often absent as contrasted to bronchogenic cancer. The latent period here is 40 years and you can see that the latent period is stretching out for each one of these conditions. It is rarely less than 20 years for mesothelioma. Smoking has not been shown to be a contributory factor as in the case of the bronchogenic cancer. Exposures are not always occupational. Several cases have been found in persons living near a source of asbestos and even in members of families of asbestos workers. That is, the workers come home with contaminated clothing and apparently there is enough asbestos on this clothing to cause this type of disease in members of the family.

(Next Slide) What are the possible mechanisms for the carcinogenic behavior of asbestos? Several theories have been put forward. The first of these suggests that metal complexes found in asbestos naturally, or they can get there from processing the fibers may be responsible. Such

DUP 1005302

metals as iron, chromium, or nickel may be involved. Particularly the latter two, in certain forms, are known to be carcinogenic. Second, oils associated with asbestos may be a factor. These may be naturally occuring or they may be picked up from sacks or they may occur in emulsions added for processing. It has been found that these oils contain benzapyrene and related polycyclic aromatic compounds which are known to be carcinogenic. Another theory is that asbestos may act as a co-carcinogen, that is, by itself it may not be a carcinogen but in the presence of other materials, it may produce cancer. Lastly there is the prolonged residence in the tissue of a chemically inert material which is incapable of being removed by phagocytosis. This is referred to as the Oppenheimer effect, but it is generally not thought of significance in this case because it seems to apply to larger inert bodies which have been placed in tissues. Also, asbestos cannot be regarded as a chemically inert substance.

In summary, asbestos may produce several types of disease, namely, the characteristic asbestosis or fibrosis of the lungs and certain forms of cancer--the bronchogenic cancer or a rare type of cancer, mesothelioma.

CFR/neh
7/5/72

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DISEASES ASSOCIATED WITH EXPOSURE TO ASBESTOS

1. ASBESTOSIS - A FORM OF FIBROSIS OF THE LUNG

2. CANCER

   A. BRONCHIOGENIC CANCER - CANCER OF THE BRONCHIAL TUBES OF THE LUNGS

   B. MESOTHELIOMA - CANCER OF THE PLEURA AND PERITONEUM

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