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ORAL TESTIMONY

by

CATERPILLAR TRACTOR CO.

to

State of Illinois

Pollution Control Board

at

Regional Hearing on Asbestos and Spray Insulation

Waukegan, Illinois

October 19, 1971

Mr. Chairman, members of the panel, my name is Fred Engelking. I joined Caterpillar in Peoria in 1937 after receiving a degree in Chemical Engineering from Purdue University. I have been working on friction materials for over 20 years. Presently, I direct the Research and Development programs for nonmetallic materials, including friction material, in the Research Department. I have been a member of the American Society for Testing Materials subcommittee on Friction Materials since 1957.

Caterpillar is pleased to have the opportunity to appear before the Board today. We have six manufacturing facilities in the state, and are the largest private employer in the State of Illinois, with over 41,000 employees. We are vitally interested in the efforts of the Illinois Pollution Control Board to guard the health and environment.

I am here today to present to you information that I hope will assist you in efforts to regulate the use of asbestos and spray insulation in the State of Illinois. Copies of our complete submission are in your hands, and it is our sincere hope that each of you will find time to read the entire booklet. My oral remarks are included in Appendix B.

The Caterpillar product line includes primarily earthmoving equipment. All of this equipment utilizes asbestos brake linings and it is for this reason that we are concerned with Section 702 of Part VII of the proposed Regulation.

Appendix A of the booklet provides a listing of the Caterpillar product line which includes 52 models of earthmoving equipment and 53 models of material handling equipment.

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The lack of a definition for the word "vehicle" in the proposed Regulation is also of concern. Typically, regulatory statutes have differentiated between motor vehicles and earthmoving equipment. There are suggestions for the definition of "vehicle" in the written testimony.

There are reasons for our concern:

Asbestos is used in all types of brakes in all Caterpillar machines because it has outstanding safety and durability characteristics. In spite of many years of research, there are no known safe substitutes for asbestos brake linings for our type of equipment. I would like to acquaint you with a few types of machines other than the familiar track-type tractor.

SLIDE 1

Starting in the upper left hand corner and going clockwise, there is a wheel tractor, motor grader, off-highway truck and wheel tractor-scraper. A wheel tractor loader is in the center.

Unlike most vehicles you may know about, we have 5 different types of brakes. They are dry shoe brakes, dry caliper disc brakes, dry band brakes, oil cooled band brakes, and oil cooled disc brakes.

SLIDE 2

Conventional shoe brakes with dry linings are used in wheel tractor-scrapers, motor graders and most wheel loaders. These brakes are always shrouded to minimize the entry of debris from the outside. Brake lining wear products can be emitted into the environment from this type brake.

Smaller sizes of this type are used on passenger cars.

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SLIDE 3

The second type is called a caliper disc brake. The asbestos-containing pads are forced to grip the disc to produce the braking power. This is the most exposed type of brake and, obviously, wear products can easily enter the environment. Many U.S.-made passenger cars are now using this type brake on the front wheels only. We use caliper disc brakes on all wheels of some loaders.

SLIDE 4

The next three types of brakes are totally enclosed and may be less familiar to you. Wear products cannot be emitted into the environment due to their containment. Track-type tractors and track-type loaders use band brakes. In this photo, the covers have been removed from the compartments so that the brakes are visible. Our larger machines use band brakes bathed in cooling oil such as is shown. The smaller machines use a dry-type band brakes without oil.

SLIDE 5

The fifth type is the totally enclosed oil-cooled disc brake used in our off-highway trucks. These have many discs which are forced to rub against mating steel discs and provide braking power. Due to large rubbing surface area and the oil media, there is very little wear in this type brake. There are no emissions into the environment.

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SLIDE 6

This is a typical friction disc with its mating disc as is used in oil-cooled, multiple disc brakes shown in the previous slide.

Break Wear products:

It is my understanding that the technical paper by Mr. Jeremiah Lynch of the U.S. Public Health Service on "Brake Lining Decomposition Products" has been entered into the record in earlier testimony before this Board at Granite City, Illinois.

We have done similar, but less extensive work, on brake decomposition

SLIDE 7

products. This slide shows scrapings from an unused brake as photographed with an electron microscope at high magnification. So you will have a better feel for this high magnification, the thickness of human hair at this same magnification would cover a screen twice as large as we have in this room.

I have included a 5 micron scale on this and the three succeeding slides because Section 601 in the proposed Regulation states that "only fibers of 5 microns or greater in length...shall be counted" in the emissions from a factory into ambient air. We believe that if it is safe for a factory to emit fibers less than 5 microns in length, it should also be safe for a brake to emit fibers less than 5 microns in length into the ambient air.

Additional research by qualified medical personnel may even show that asbestos fibers much larger than 5 microns are safe in the ambient air. Since these are fibers scraped from unused brake material, they are larger than 5 microns.

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SLIDE 8

Some asbestos fibers from new friction material were heated in an oven to remove the water of crystallization inherent in asbestos. This destroys the fibrous nature, and mechanically rubbing the deteriorated fibers further reduces the fibers to powder. This is a simulation of the formation of brake wear products. You will note no fibers are longer than 5 microns.

SLIDE 9

A sample of brake wear products was taken from a dry brake compartment. There are a few fibers showing and they are much shorter than 5 microns. Dust or clumps of dust occupy most of the picture.

SLIDE 10

This is last slide on brake wear products from a dry brake compartment also shows very few fibers and none of significant size. There are many dust particles.

We believe that our limited study substantiates the findings of Mr. Lynch of the U.S. Public Health Service, that few fibers are emitted as wear products from brakes.

Smoothness of brake operation is vital to safe operation of Caterpillar equipment. You may have experienced a malfunctioning passenger car brake

SLIDE 11

which grabbed and threw you forward at the end of a stop. This pair of curves shows what is happening when you brake a vehicle. In curve A, asbestos material

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is stopping the vehicle. The brake torque or stopping power builds up at the beginning, stays smooth and constant, and finally increases slightly at the end of the stop. The sintered metal friction material produces rough braking in curve 8. There is a lot of vibration and noise followed by a drastic increase in torque at the end. The sudden increase in stopping power causes material to spill out of machines.

SLIDE 12

If this loader is backing up with a raised bucket full of dirt or rock, and the machine stops abruptly, due to grabbing brakes, the material will spill out of the bucket and end up in the operator's lap. Smooth braking action is absolutely necessary for safe operation of our machines.

Safety:

When a brake is designed for a Caterpillar machine, there are three vital factors: safety, durability, and smoothness of stopping. The last two factors enhance the safety factor. The brake must be able to stop the machine in a reasonable distance, time-after-time. Asbestos brake materials have proven performance and durability.

I would like to summarize and make some recommendations. Caterpillar Tractor Co. questions whether the intent of the Asbestos and Spray Insulation Regulations is actually accomplished by the proposed ban of asbestos brake linings. If research work and data on ambient concentration levels of asbestos fibers which are detrimental to society establish a need for asbestos brake control and/or regulation, Caterpillar recommends that Section 702, Part VII of 29-16 (Asbestos and Spray Insulation Regulations) be modified to allow the following exceptions:

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1. That asbestos brake linings (friction material) may be used in a brake system when the friction material operates in either a dry or oil-wetted environment in a totally enclosed brake compartment which prevents the emission of brake wear products into the ambient air.
2. That asbestos brake linings (friction material) may be used in a brake system, when the friction material operates in a nonenclosed brake compartment, until conclusive medical evidence proves that the emitted brake wear products contain harmful amounts of asbestos fibers.

If all evidence indicates the need for asbestos brake controls and/or regulations, Caterpillar would further recommend that reasonable threshold limits of asbestos fiber be established by qualified personnel (based on scientific fact and foreseeable technological advances). Test procedures which measure the concentration of asbestos fibers must also be developed which are understandable, repeatable, and realistic. Place the burden on the manufacturer to design his product to meet reasonable, attainable standards -- don't just prohibit the use of asbestos for brakes.

As mentioned at the beginning of this booklet, Caterpillar Tractor Co. agrees in principle with the objectives of the Environmental Protection Act. The Company stands ready and willing to assist the Board in the establishment of asbestos regulations which serve the intent of the legislation.

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