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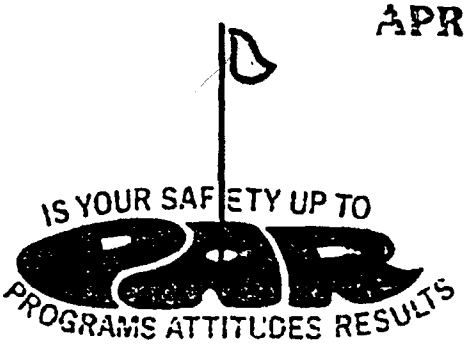

January 26, 1982

Legal Section
Industrial Commission of Ohio
246 North High Street
Columbus, Ohio 43216

OD# 18506-22
James Priest
The Goodyear Tire and Rubber Co.
Akron, Ohio 44316
Risk # SI002351 Manual #4410

Attn: Judy Spencer

Dear Ms. Spencer:

A visit was made to the offices of the Goodyear Tire and Rubber Company located at 1144 E. Market St. Akron, Ohio 44316 to determine conditions under which the claimant had worked.

The company currently manufactures rubber industrial products, chemicals, wheels, rims and aerospace products. Passenger tires are no longer made at this location. A research and development technical center is replacing the Plant 1 manufacturing facility. There are currently 8 thousand total employees at the Akron manufacturing complex with approximately half of that total being hourly employees. Mr. B. E. Young, Compensation Manager, and Mr. Paul Bankovich, Industrial Hygienist were contacted.

The claimant's job experience with the company is as follows:

8-17-30	Continuous hire date, Plant 1 Banbury mixer
1/42	Sheetmetal apprenticeman
8/42	Banbury mixer
10-14-42	Plant 2 Shipping department
10-10-45	Plant 3 Shipping department
10-1-47	Plant 1 Shipping department
5-3-59	Plant 1 Tube department
7-1-72	Retired

No medical records were available.

According to Mr. Young the Plant 1 banbury mixers were not currently operating due to construction of the new technical center, and the plant 1 tube department was also no longer operating. It was felt that the other departments in which the claimant had worked i.e shipping would not entail contact with materials capable of causing his respiratory condition.

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As a banbury mixer operator the claimant would feed raw ingredients (rubber, fillers, extender oils, accelerators, antioxidants) into the banbury mixer. This internal mixer breaks down rubber for thorough and uniform dispension of the other ingredients.

The claimant alleges exposure to various dusts including iron oxide and carbon black (synonym: lamp black).

According to the claimant a bright red powder, allegedly red iron oxide, was used as a pigment for master batches of rubber used to make pink floor tiles.

Mr. Young contacted Mr. R. Heldridge, the current Chief Compounder who indicated that the time interval made it impossible to state what materials the claimant may have used as records no longer exist.

A literature search found a typical list of components used in the manufacture of rubber products published in the March 1952 issue of Industrial Hygiene Quarterly. (Enclosed)

Red iron oxide is listed in this table as a color pigment and carbon blacks of various types are listed under reinforcing fillers.

The inhalation of iron oxide fumes or dust may cause a benign pneumoconiosis (siderois). It is probable that the inhalation of pure iron oxide does not cause fibrotic pulmonary changes, where as the inhalation of iron oxide plus certain other substances may cause injury.[1]

The threshold limit value of 5 mg/m^3 was set at a level to prevent the development of x-ray changes in the lungs on long-term exposure.[2] Diagnostic signs and symptoms include benign pneumoconiosis with x-ray shadows that may be indistinguishable from fibrotic pneumoconiosis.[3] There are no well demonstrated health hazards to humans from exposure to carbon black.[3]

The morbidity and mortality rates of workers in a plant engaged in the manufacture of carbon black over a 17.5 year period (1939 to 1956) were not significantly different from these of the general population.[4]

Repeated inhalation by monkeys caused deposition of the dust in the lungs with minimal or no fibrous tissue proliferation. Repeated exposure of the monkeys to 1.6 mg/m^3 for a total of 10,000 hours produced electrocardiographic changes interpreted as right atrial and right ventricular strain, probably a result of massive deposition of the dust in the lungs.[5]

The threshold limit value of 3.5 mg/m^3 is set at a level considered to be safe for carbon black exposures. There have been no diagnostic signs or symptoms reported.[3]

Carbon black is one of the most common particulates since it constitutes 35% of the material added to the banbury and it is also in powder form, while rubber which makes up 50% of the tire mixture is handled in large blocks.[6]

In the tube room the claimant worked as a balancer, weighing tubes to check their weight. The claimant makes reference to silicone. Silicone is a synthetic polymer. It is believed the claimant is refering to residual silicone mold release compound deposited on the tire and tube surfaces. When the rubber was buffed to apply a patch this material would become airborne. Soapstone, zinc stearate and talc are also known dusting agents.

A review of the toxicology of the silicones in 1961 pointed out that in addition to their low or neglible toxicity by all routes except the eye in some cases, the hazard by inhalation is also negligible because the vapor pressure in most silicon fluid vapors is quite low. A Dow Corning 555 fluid administered as a spray to rabbits as a 2% solution, 30 seconds twice daily for 90 days, showed no sign of irritation or foreign body reaction in the lung. Similarly, a fog of silicone antifoam presented to animals for 2 hours resulted in no pulmonary edema or other harmful effects.[7]

Zinc stearate is employed chiefly in the rubber industry as a dusting and mold-release agent or lubricant. Observations in the rubber industry have revealed no adverse effects from many years inhalation of zinc stearate dust. It is classified as a nuisance particulate with a threshold limit value of 10 mg/m^3.[2]

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In contrast to fibrogenic dusts which cause scar tissue to be formed in the lungs when inhaled in excessive amounts, so-called "nuisance dusts" have a long history of little adverse effect on the lungs and do not produce significant organic disease or toxic effect when exposures are kept under reasonable control. The nuisance dusts have also been called (biologically) "inert" dusts, but the latter term is inappropriate to the extent that there is no dust which does not evoke some cellular response in the lung when inhaled in sufficient amount. However, the lung-tissue reaction caused by inhalation of nuisance dusts has the following characteristics:

(1) The architecture of the air spaces remains intact.
(2) Collagen (scar tissue) is not formed to a significant extent.
(3) The tissue reaction is potentially reversible.

Soapstone does not have a precise mineralogic definition but is of variable composition dependent on its source; talc is mined as soapstone, but some forms of soapstone have as little as 50% talc.

The fibrous talc in soapstone dust causes fibrotic pneumoconiosis and an increased incidence of cancer of the lungs and pleura. The threshold limit value for soapstone was set at 3 mg/M^3 respirable mass and/or 6 mg/M^3 total mass, to prevent systemic effects. Diagnostic signs and symptoms include cough, dyspnea, digital clubbing, cyanosis, basal crackles and cor pulmonale.[5]

The non-asbestos form of talc, also termed non-fibrous has not been proven to cause the effects produced by exposure to fibrous talc. The threshold limit value of 20 million particles per cubic foot or 6 mg/M^3 was set at a level to prevent lung effects. Diagnostic signs and symptons include productive signs and symptons include productive cough, wheezing, signs and symptoms of chronic obstructive lung disease.[5]

A search of the Division of Safety and Hygiene files indicate the following surveys at Goodyear by Lester Merritt, Industrial Hygiene Engineer.

2-15-49 Plant 1, Building #11, rubber compounding dept., cutting and weighing rubber, impinger sample, 3.2 million particles per cubic foot
"most of the dust in this portion of the plant would be talc or soapstone."

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2-15-49	Plant 1, tire dusting area, midget impinger sample 29.6 mppcf "spraying a liquid material containing talc or soapstone on the inside of the tire casing.... dry talc was wiped on the outside."
2-15-49	Plant 1, #4 tube machine, 5th floor, midget impinger, 5.2 mppcf, operator transfers tubes from extruding machine belt to a belt leading to the splicer also inspects and sets rejects to the side. "The dust in this area would be primarily talc or soapstone which emanates from the inside of the tube, as a coating of talc is sprayed inside the tube at the time of extrusion".
4-5-49	Plant 2, Banbury mixer-feeder area midget impinger 5 minute sample, weighman 35 million particles per cubic foot. "Most of the dust would be talc which emanates from the sheet rubber at the time it is tossed on the scales". Two batches were weighed during the period of sampling. The rubber and other components are left in the machine (banbury mixer) for approximately 2 1/4 minutes. The machine operator and one helps weighs the compound ingredients. Approximately 350 pounds of rubber and 12 pounds of compound compose a batch.
11-14-50	Millroom, moving boxes of rubber, oxides, clay, sulphur, lampblack etc. to small batch mills. "At the time of the visit, the writer estimated that there would be from 5 million to 10 million particles of dust per cubic foot of air in this area. None of the ingredients used in this department contained free silica. Most of the dust would be talc or soapstone."
11-14-50	Cutting small samples of rubber from the sheets produced by the banbury mills. 3rd floor. The writer estimated that the dust in this area would vary from 5 million to 15 million particles per cubic foot of air, most of which would be talc.

Part III in a series of four reports on the health effects of respirable particulate exposures in the rubber industry focused on Respiratory Morbidity in Processing Workers.[6]

Respiratory questionnaires and pulmonary function tests were administered to 65 men exposed to dust in the processing area from three rubber tire manufacturing plants in 1972 and 1973. Similar tests were done on 189 "control" workers. Compared with the controls, the processing workers had a higher prevalence of chronic productive cough. Overall the processing group showed a decrease in the ratio $FEV_{1.0}$ to FVC. The processing workers with more than ten years of exposure showed a significant decrease in the ratio $FEV_{1.0}$/FVC, the $FEV_{1.0}$, the residual $FEV_{1.0}$, and the flow rates at 50% and 25% of the forced vital capacity. None of the pulmonary function effects could be soley explained on the basis of smoking, age, ethnic, or socioeconomic factors: all were related to the length of exposure. Based on these results the authors concluded that exposure in the processing area (compounding, banbury) produces pulmonary disease.[6]

Another case control study of 4302 male, hourly rubber workers actively employed at the Akron plant of a large unidentified rubber company on January 1, 1964 was identified and followed for 10 years during which time there were 73 pulmonary disability retirement cases. Emphysema was the principal pulmonary condition requiring premature termination of employment due to disability accounting for 53%. When compared proportionally with the Social Security Administrations approved disabilityretirements for all industries, the rubber industry demonstrates an excess in disability retirements attributable to the pulmonary diseases, more specifically emphysema. Pulmonary disability retirees spent significantly greater lengths of time employed in curing preparation, curing and the finishing and inspection work areas. Each of these work areas involved exposures to either particulate matter or solvents or both. Significant risk was associated with a smoking rubber workers' exposure to dust and fumes, generally, and talc and carbon black more specifically. Exposure to mixing, extrusion, curing preparation, curing, finishing and inspection, service or reclaim operations was similarly associated with an excess in risk of developing a pulmonary disability retirement for smoking rubber workers. Interactive effects of occupational exposures were noted for smoking and exposures to mixing, extrusion, curing preparation, curing, finishing and inspection, service and reclaim operators, dust and fume exposures generally and carbon black more specifically.[8]

As can be seen from the list of typical compounds used in the rubber industry (enclosure), the investigation of the possible relationships between work environment and disease in a chemically complex industry such as the rubber industry is very difficult. The work environment of the rubber industry is very diverse in its physical and chemical exposures. Many organic and inorganic chemicals are used or have been used in the past; there are many jobs and processes with qualitatively different exposures. The search for possible causal relationships between occupational exposure and disease is difficult considering both the diversity of environmental agents and internal job mobility. The problem is compounded by the lack of information on environmental exposures to agents used in the past, which would be of particular importance in studying chronic diseases having long latency periods.

In conclusion, a disease is occupational if:

(1) The medical findings of disease are compatible with the effects of a disease - producing agent or agents to which the worker has been exposed;

(2) There exists in the workers' occupational environment (past or present) exposure to an agent or agents sufficient to have caused the disease; and

(3) The weight of evidence supports that the disease is of occupational rather than non-occupational origin.

Respectfully submitted,

John Hollis
Industrial Hygienist

JH/nh
Enclosure: Components used in the manufacture of Rubber Products

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