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#439 - Tire Dust
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The automobile did not come to dominate American transportation by chance or by public choice. It happened as part of a plan by auto makers to buy up and destroy mass transit companies. General Motors led the way. As recently as the 1920s, many American cities and towns were connected by a network of electric railroads and interurban trolleys. Within cities, electric street railways, trolleys, and elevated trains, moved large numbers of people easily and cheaply, with minimal congestion and pollution. But steel-wheeled electric/rail mass transit systems did not serve the needs of the automobile manufacturers and their allies in the steel, rubber, glass, concrete, and oil industries.

Beginning in the 1920s, General Motors began investing in mass transit systems. According to historian Marty Jezer (and Congressional hearings held in 1974), between 1920 and 1955, General Motors bought up more than 100 electric mass transit systems in 45 cities, allowed them to deteriorate, and then replaced them with rubber-tired, diesel-powered buses.[1] Buses are more expensive, less efficient, and much dirtier than electric/rail systems. (And of course automobiles are even less efficient than buses, by far.) In 1949, General Motors, Firestone Rubber, and Standard Oil of California were convicted by a federal jury of criminally conspiring to replace electric mass transit with GM- manufactured diesel buses; in a noteworthy illustration of justice for corporations, the court fined GM $5000 and forced H.C. Crossman, the GM executive responsible for carrying out GM's policy, to pay $1.00.

Cities where GM managed to eliminate electric/rail systems, and replace them with buses and private cars, included New York, Philadelphia, Baltimore, St. Louis, Oakland, Salt Lake City, and Los Angeles.

Many people think of Los Angeles as the original automobile city. However, before GM converted the city to buses and private automobiles, Los Angeles was served by the largest electric/rail mass transit system in the nation. The Pacific Electric Railway ran more than 1000 trains per day over 760 miles of rail lines to such outlying stations as Redlands, Corona, Santa Monica, Redondo Beach and Balboa, carrying light freight as well as passengers. Its last line, to Long Beach, was abandoned in 1961 --the same year the ingredients of smog were first identified in L.A.'s toxic air.

During this same period, GM worked to convert electric-powered commuter railroads to diesel-powered locomotives, which were far more expensive, more complex, and less reliable than electric locomotives, thus requiring more maintenance, and contributing significantly to the demise of the nation's railroad system. For example, the New York, New Haven, and Hartford line showed a profit during 50 years of operation until 1956, the year it began converting to diesel locomotives; by 1961 it was declared bankrupt and a report by the Interstate Commerce Commission censured GM for contributing to its demise.

We all know some of the consequences of converting the American transportation system from electric/rail to rubber-tired vehicles. The threat of global warming from combustion of fossil-fuels (oil and gasoline) is one part of the problem. Lung cancer from diesel exhaust is another.[2] But recently, another aspect of our transportation system has appeared in scientific and medical literature: serious pollution from rubber tire fragments (tire dust) released by tire wear.

When a rubber tire, bearing the weight of a vehicle, rolls across an asphalt or cement surface, tiny fragments of rubber break off from the tire and become airborne. In the 1970s and early 1980s, scientists working for the rubber tire industry and for the U.S. Environmental Protection Agency concluded that these tire fragments were too large to enter the human lung and so presented no threat to human health.

However, new research published this year by allergy specialists has reached a different conclusion: these new studies show that about 60% of tire fragments (tire dust) are so small that they can enter the deep portions of the human lung where the latex rubber in the tire dust may cause allergic reactions ranging in severity from rhinitis (runny nose), conjunctivitis (tearful eyes), to hives (urticaria), bronchial asthma, and occasionally even a life-threatening condition called anaphylactic shock.[3] Asthma, and asthma deaths, have increased dramatically during the past 20 years, especially among children, and specialists have been searching in vain for causes. (See REHW #374.)

Allergy to latex rubber has become more common in recent years, especially among health-care workers who are exposed more or less continuously to latex gloves, tubes, sheets, and other latex-containing products.[4] An estimated 17 million Americans have an allergic reaction to latex. Examination of latex allergy has shown it to be a true allergy; in technical jargon, it is mediated by IgE antibody to proteins that are present in the natural rubber produced from the tropical rubber tree (Hevea brasiliensis).

Allergic reactions to tire dust may be increasing for several reasons. The number of tires has increased steadily during the last 20 years; the proportion of latex in tires has been increasing; and tire construction has changed from bias ply to radial. Tire dust from radials is finer and thus more respirable, meaning it enters the deepest part of the human lung more easily.

The human nose and throat filter out airborne particles larger than 10 micrometers in diameter, but about 60% of tire dust is smaller than 10 micrometers in diameter and can thus enter the lungs where it can cause allergic reactions in some people.

In 1974, when there were 524.3 million tires in use in the U.S. (on cars, motorcycles, trucks, and buses), tire industry scientists estimated that 600,000 metric tonnes (1.3 billion pounds) of tire dust were released by tire wear in the U.S., or about 2.5 pounds (a little over one kilogram) of dust released from each tire each year. In 1991, there were 782 million tires in use in the U.S.; if each tire releases 2.5 pounds of dust per year, tire dust released in 1991 would total 1.9 billion pounds. A billion is a thousand million. In Los Angeles alone, at least 5 tons (10,000 pounds) of tire dust are released into the air each day.

Radial tires create a finer, more respirable dust than do bias ply-constructed tires, and the percentage of tires that are radial grew from 2% in 1970 to 95% in 1990, so tire dust released in the 1990s probably enters the lungs more readily than tire dust did in previous decades. Conceivably, this might explain part of the recent increases in asthma in the U.S.

In 1994, careful measurement of air near roadways with moderate traffic revealed the presence of 3800 to 6900 individual tire fragments in each cubic meter of air, more than 58.5% of them in the fully-respirable size range. When these fragments were examined chemically, and by mass spectroscopy, they were shown to contain latex. Furthermore, they were shown to produce allergic reactions, comparable in every way to the allergic reactions caused by dust from a pulverized latex glove.[3]

How might these problems be resolved? Allergic reaction to latex was first described in 1979; after AIDS became a major medical problem, more and more medical workers started wearing latex gloves and latex allergies came to light. Some 7% to 10% of all health care workers now exhibit an allergic reaction to latex.

Recently, latex from a new source, the guayule plant (Parthenium argentatum), which grows well in the southwestern U.S., has been shown to not cause latex allergy in exposed people.[6] Latex from the guayule plant could become a growth industry for American farmers; presently, about seven million tons of latex are produced each year from the tropical rubber tree, Hevea, worldwide.

In the case of rubber tires, the problem is more complex than mere

latex allergy, although this may well turn out to be a serious public health problem by itself. The high dollar cost of truck freight, private automobile commuting, and maintenance of our highway infrastructure must be counted as major sacrifices to our rubber-tired transportation system. Furthermore, fine particle air pollution now kills an estimated 60,000 Americans in cities each year.[7] And global warming is a serious threat to many nations from many viewpoints. (See REHW #429, #430.)

However, from the viewpoint of our most important national treasure -- our self-governing democracy --the systematic sabotage of the nation's electric/rail mass transit systems by automobile corporations points up a most serious problem: the ability of "private" corporations to effect sweeping changes in our public life and culture, without public accountability or even debate. If we ever hope to achieve a sustainable environment, and re-establish a fair economy and a working democracy, this is a key problem we will have to acknowledge and address.

--Peter Montague

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[1] Marty Jezer, THE DARK AGES; LIFE IN THE UNITED STATES, 1945-1960 (Boston: South End Press, 1982), pgs. 138-146.

[2] See U.S. Environmental Protection Agency, HEALTH ASSESSMENT DOCUMENT FOR DIESEL EMISSIONS [External Review Draft; 2 volumes: EPA/600/8-90/057Ba and EPA/600/8-90/057Bb] (Research Triangle, N.C.: U.S. Environmental Protection Agency, December, 1994). And see REHW #120.

[3] P. Brock Williams and others, "Latex allergen in respirable particulate air pollution," JOURNAL OF ALLERGY AND CLINICAL IMMUNOLOGY Vol. 95, No. 1, Part 1 (January 1995), pgs. 88-96. And see: M. Michael Glovsky and others, "Can Latex Allergy be Triggered by Air Pollution?" Abstract presented at Experimental Biology '95 in Atlanta, Georgia during April, 1995. Dr. Glovsky's address: Asthma Center, Huntington Memorial Hospital, Pasadena, CA 91105. Phone: (818) 397-3383; fax: (818) 795-0982. Glovsky's work is discussed briefly in J. Raloff, "Latex allergies from right out of thin air?" SCIENCE NEWS Vol. 147, No. 16 (April 22, 1995), pg. 244. See also: L.M. Hildemann and others, "Chemical Composition of Emissions from Urban Sources of Fine Organic Aerosol," ENVIRONMENTAL SCIENCE & TECHNOLOGY Vol. 25, No. 4 (1991), pgs. 744-759.

[4] Doris Jaeger and others, "Latex-Specific proteins causing immediate-type cutaneous, nasal, bronchial, and systemic reactions," JOURNAL OF ALLERGY AND CLINICAL IMMUNOLOGY Vol. 88, No. 3 (March 1992), pgs. 759-768. And: Gordon L. Sussman and Donald H. Beezhold, "Allergy to Latex Rubber," ANNALS OF INTERNAL MEDICINE Vol. 122, No. 1 (January 1, 1995), pgs. 43-46. And: Denise-Anne Moneret-Vautrin and others, "Prospective study of risk factors in natural rubber latex hypersensitivity," JOURNAL OF ALLERGY AND CLINICAL IMMUNOLOGY Vol. 82, No. 5 (November 1993), pgs. 668-677.

[5] Tire use in 1995 is a projection based on trends from 1970-1990 shown in: Bureau of the Census, U.S. Department of Commerce, STATISTICAL ABSTRACT OF THE UNITED STATES 1990 (Washington, DC: U.S. Government Printing Office, 1990), Table 1027; and Bureau of the Census, U.S. Department of Commerce, Statistical Abstract of the United States 1992 (Washington, DC: U.S. Government Printing Office, 1992), Table 1000.

[6] Richard Lipkin, "No-itch latex," SCIENCE NEWS Vol. 147, No. 16 (April 22, 1995), pg. 254.

[7] C. Arden Pope III and others, "Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of U.S. Adults," AMERICAN JOURNAL OF RESPIRATORY AND CRITICAL CARE MEDICINE Vol. 151, No. 3 (March 1995), pgs. 669-674. See also REHW #373.

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