

occupational health studies

NEWS LETTER

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School of Public Health

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INTRODUCTION

This issue of the newsletter will be devoted to a review of the Joint URW-Company Occupational Health Committees Meeting with the Occupational Health Studies Group that took place in Chapel Hill on March 20-21, 1975. Also included are accounts of industrial hygiene surveys conducted at Firestone, General, Goodyear, and Uniroyal plants.

JOINT URW-COMPANY OCCUPATIONAL HEALTH COMMITTEES MEETING WITH OCCUPATIONAL HEALTH STUDIES GROUP

The health of the rubber workers in the Joint Occupational Health Program was the topic of intense discussion at a meeting of the Joint URW-Company Occupational Health Committees of Firestone, Goodyear, General, and Uniroyal and the Occupational Health Studies Group (OHSG) of the University of North Carolina which was held at the University in Chapel Hill on March 20-21. The participants gathered to discuss the results of the first two and one-half to three years of in-depth study of the health of employees of the rubber industry and to review projects presently underway. Participants also discussed plans for future studies necessary to determine the reasons for certain elevated disease and mortality rates which are being found among rubber workers.



Mr. Hank Smith



Mr. Clyde Boose



Mr. Robert Hassmiller

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Mr. Peter Bommarito



Dr. Robert Harris



Dr. Dexter Forbes

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Dr. Bernard Greenberg, Dean of the School of Public Health at the University of North Carolina, in opening the meeting, thanked both union and management for their patience in waiting for the results of the studies and informed them that the "harvest time" had arrived. For the next two days, then, the physicians, epidemiologists, statisticians, engineers, and industrial hygienists of the OHSG presented the results of their studies in a series of sessions which were filled with findings and proposals likely to be of major concern to all rubber workers and manufacturers.

A spokesman for each Company made brief introductory remarks. Dr. Dexter Forbes for Uniroyal, Mr. Robert Hassmiller for Firestone, Mr. Hank Smith for General, and Mr. Clyde Boose for Goodyear. All agreed on the importance of the meetings both for union and management. Mr. Bommarito, International President of URW, then followed with a brief review of the history of this major research effort, stressed the significance of the findings to URW members, and indicated confidence that the occupational health problems of the industry, especially those caused by fumes, dust and mist, could be solved by research such as that underway at the OHSG.

EPIDEMIOLOGIC FINDINGS AND PROSPECTS

Dr. H. A. Tyroler, Professor of Epidemiology, opened the first morning session by defining epidemiology as the science which determines which factors lead to health and illness in a population. He stressed that the OHSG's interest in the Joint Occupational Health Program has been, and will continue to be, the health and well-being of the rubber workers. Dr. Dragana Andjelkovic first presented the results of morbidity (ill-health) studies; she was followed by Dr. Tony McMichael, who reported the findings of mortality studies.

Morbidity Studies



Dr. Dragana Andjelkovic

In a general determination of ill-health, based on a detailed questionnaire (Cornell Medical Index) which has been successfully used in studies such as this for the past 20 years, it was found that the general health status for a large group of rubber workers was worse than the rate for the general U.S. population for the various age groups tested. For the entire study group, almost 21% of the employees were hospitalized at least once during the year, compared with the rate of 10.3% for the U.S. male population.

Analysis of respiratory symptoms reported by rubber workers showed more phlegm production, chest illness and wheezing than have been reported in studies of electric, postal, transit, and telephone workers, but less persistent cough and disabling chest illness than reported in these industries. Rates of chronic bronchitis among the group of rubber workers are two to four times higher than were found in these other industrial populations. Pulmonary function tests performed by workers correlated well with their reports of respiratory symptoms. Disability retirements due to respiratory conditions, as would be anticipated from these findings, are higher among rubber workers than in the general worker population.

Dr. Andjelkovic also reported that in the questionnaire survey about 30% of the employees responding reported having had skin disease. Occupational dermatitis remains a major concern within the industry. On the other hand, for some other diseases, for example certain types of heart disease, it was found that rubber workers responses showed no greater risk than reported for employees of other industries.

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Mortality Studies

Dr. Tony McMichael next presented the results of detailed studies on the overall death rate, and on the death rate due to specific cancers, within the rubber industry groups studied by OHSG. While the overall death rate was very close to what would be expected in comparison to the U.S. national population, he reported that, for all types of cancers, the rubber workers studied had a death rate which was slightly higher than expected. He also reported that cancer of the stomach was about 50% higher than would be expected among similar persons in the general population. Cancer of the colon was somewhat higher, cancer of the pancreas about average, and cancer of the rectum somewhat lower than one would expect. The death rate from prostate cancer was elevated, lung and bladder cancer within the expected range, and brain and central nervous system cancers were slightly lower than expected. A very significant finding was that there were 30% more deaths from blood cancers (including the leukemias and cancers of the bone marrow and lymph glands) than expected. For lymphatic leukemia specifically, 9 deaths were found among persons aged 40 to 64, where about 3 were expected, a death rate about 3 times higher than expected. Studies are presently underway in efforts to find the reasons for the significantly higher than expected death rates from stomach cancer and from lymphatic leukemia.

Dr. McMichael further reported that death rates from certain non-cancer causes were also elevated; rates for diabetes and arteriosclerosis were both about 30% higher than expected, and the rate for suicide was slightly elevated. Death by accidents were 36% lower than the comparable rate in the general population.

INDUSTRIAL HYGIENE FINDINGS AND PROSPECTS -

Messrs. Gamble, Spirtas, Williams and Dr. Van Ert

Mr. John Gamble opened the afternoon session with a description of the effects of exposure associated with use of an adhesive system (hexamethylene-tetramine resorcinol). While exposed workers reported, via questionnaire, more symptoms related to breathing than did non-exposed workers, actual measurements for permanent effects on lung function indicated no difference between the two groups. However, when employees were tested before their shifts began, and again after six hours of work it was found that a short-term temporary effect occurred among workers working with the adhesive system. Specifically, over the course of a work day there was a drop in pulmonary function as measured in the small airways of the lung, which are comparable to that seen in workers exposed to coal and cotton dusts. This alone does not mean that health damage will occur. Subsequent testing will be required to learn if these reversible functional losses, experienced during a single shift, lead to irreversible lung function changes if exposure continues for a number of years.

Mr. Ted Williams reviewed the characteristics of the work environment and its controls. His discussion was based on sampling and surveys done in a number of plants. He reported on the concentrations of particulate matter, that is of particles such as dust and smoke, which have been measured in the air of work places. Two kinds of measurements are ordinarily made of particulate matter. One kind is for the total amount of particulate material which is suspended in

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air, the other is for that fraction of the total particulate which can be inhaled and retained deep in the lungs. Average values for sampling in approximately 10 plants are:

Particulate Concentrations in Tire and Tube Plants

<u>Location</u>	<u>Total Particulate</u> <u>mg/m³</u>	<u>Respirable Particulate</u> <u>mg/m³</u>
Compounding and Banbury	2.6	0.3
Milling, Calendering and Extrusion	0.9	0.3
Product Fabrication	1.3	0.7
Tire Curing	0.8	0.4
Tube Curing	3.4	1.0
Repair and Inspection	0.7	0.3

Concentrations of solvent vapors have also been measured. Levels of individual components are ordinarily well below the standards. Highest values were generally found around the spray booths where green tires are prepared for curing.

The adequacy of plant ventilation varies from plant to plant and from location to location within a plant. Subjective evaluations of ventilation quality in 15 plants yielded the following listed ratings:

<u>Location</u>	<u>Area Ventilation</u>	<u>Local Exhaust Ventilation</u>
Cement House	Good	Poor to fair
Compounding	Poor to fair	Poor to fair
Banbury	Poor to fair	Poor to fair
Milling and Extrusion	Poor to fair	Poor to fair
Calendering	Poor to fair	Fair to good
Stock preparation and product fabrication	Fair to good	Fair to good
Curing Preparation (spray booths)	Fair to good	Poor to fair
Curing	Poor to fair	Poor to fair
Repair and Inspection	Fair to good	Poor to fair
Maintenance	Good	Poor to fair

Subjective evaluation of housekeeping in these same plants were generally good in curing; fair to good in the cement house, stock preparation, and product fabrication; fair in milling, calendering, extrusion, and maintenance, poor to fair in curing preparation, and repair and inspection; and poor in compounding and Banbury areas.

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Dr. Mark Van Ert next discussed the characteristics of, and monitoring procedures for solvents and particulates. Current methods being used to determine solvent vapor levels include charcoal tube sampling, grab sampling with analysis by gas chromatography, and continuous vapor monitoring with a direct readout Miran infra-red analyzer. The types of dusts most frequently screened are silica laden dusts and talcs which in themselves may contain both free silica and asbestos like fibers. Moreover, fumes generated during curing operations are still being characterized. Particulate levels in curing areas have been measured gravimetrically and further broken down into organic and inorganic fractions. A higher percentage of organic matter persists in tire curing areas whereas, in tube curing, a higher percentage of the particulate matter is inorganic, probably owing to the copious use of talc in tube manufacturing operations. Particulate levels in tube curing are approximately ten fold those found in tire curing operations. In the near future, curing areas will be surveyed for polycyclic aromatics, a class of compounds of interest in carcinogenesis. The Occupational Health Studies Group is also engaged in other areas of environmental monitoring, namely, environmental sampling for vinyl chloride, a known carcinogen, chloroprene, trichloroethylene, hexane and lead. Dr. Van Ert stated that lead exposures are primarily limited to hose and belt plants.

OCCUPATIONAL CLASSIFICATION SYSTEMS

The existence of thousands of different jobs within the industry makes it very difficult to group employees into broad job categories with similar exposure to possible hazardous materials. This type of categorization is essential, however, for conducting the sophisticated scientific investigations which will identify workers engaged in jobs with high risk of disease. Analyzing exposure separately within each of the thousands of jobs in the industry will not accomplish this crucial identification, and a new Occupational Classification system, developed by OHSG to overcome this problem, was presented by Messrs. Gamble, and Spirtas. The system classifies jobs in two ways: 1) Exposure Categories (E.C.'s) - jobs grouped together on the basis of similar suspected or known environmental hazards, and 2) Occupational Titles (O.T.'s) - jobs grouped together on the basis of similar industrial processes and/or materials. The first successful application of the E.C. - O.T. approach was accomplished in an OHSG study which revealed association between jobs involving solvents and the development of lymphatic leukemia. The O.T. classification is especially useful for recommending meaningful environmental control to the industry by identifying specific workers at high illness risk and by isolating the materials and industrial processes responsible for the increased risk. Even when identification of the specific causative agent is not possible, the O.T. system can nevertheless identify problem work areas and ways can then be sought to eliminate the risks.

HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEMS

A possible design for a comprehensive health and environmental surveillance system for the rubber industry was outlined by Dr. R. B. DesJardins. The long range objective of this system would be to collect all information required to monitor both the health of employees and the environmental conditions within the plants. A centralized master file containing certain basic information on employees and plants within the industry would be created, and summary reports

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on the health and environmental conditions in the industry would be generated. Using these reports as guides, the URW, the participating companies, and the Occupational Health Studies Group could pinpoint potential problems at specific plants and could take actions to eliminate them before serious health problems occur. Dr. H. A. Tyroler especially stressed the medical monitoring aspects of the system and the need to look for early disease indicators among employees in high risk areas.

Mr. Earl Arp reviewed the environmental aspects of the surveillance system and explained how exposure information derived from the O.T. classifications could be linked to health data. This is a very important part of the work since it would permit the detection of potential risk from the work environment to each worker in the industry.

Dr. Mike Symons discussed the initial implementation of the surveillance system. A pilot study in one plant is expected to begin early this summer followed by implementations of the surveillance program at three to four month intervals in other plants. The pilot studies will provide cost information for a computer based centralized surveillance system. Initially, a system that would provide a register of all employees working at the plants selected and a log of all deaths, occupational illnesses, and occupational injuries occurring among these individuals will be implemented. The employee register will enumerate all the active workers, individuals temporarily inactive, and living retirees for the designated plant as of the date surveillance begins. The system would provide logs of all health events reportable by law such as deaths, occupational illnesses, and occupational injuries. In addition, the pilot studies will determine whether the eventual computerization of the following items is practical for all employees: (1) The recording of a complete record of each job change while an individual is employed in the rubber industry and (2) Documentation of sickness absences not required by law using various record sources such as hospitalization claims forms.

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(from left to right) Dr. John Cassel and Dr. Clifford Johnson



From left to right are:
Mr. Pat Glenn, Mr. Jake Miller,
and Mr. John Izzard.

Mr. Louis Beliczky addresses
the meeting. From left to
right are Mr. Peter Bommarito,
Dr. Dragana Andjelkovic,
Dr. Herman Tyroler, Mr. Louis
Beliczky, Dr. Tony McMichael,
and Dr. Robert Harris.



Mr. Peter Bommarito speaks.

INDUSTRIAL HYGIENE SURVEYS -

Firestone plants - Bloomington and Decatur

A preliminary industrial hygiene survey and records examination was conducted by Dr. Mark Van Ert and Mr. Ted Williams, industrial hygienists, and Mr. Robert Spirtas, biostatistician, at Bloomington and Decatur, Illinois plants of Firestone Tire and Rubber Company.

The Bloomington plant survey was guided by Mr. E. Semple, Plant Safety Engineer, accompanied by Mr. Richard Brookshire, Safety Committee Chairman, URW Local No. 110. Mr. James Smyth, Plant Manager, and Mr. Ralph Walden, President of URW Local 787, were also involved in arrangements for the survey and the meetings at the plant.

Mr. James Stirrett, Industrial Relations Manager at the Decatur, Illinois plant, arranged a preliminary meeting with union and company officials including Mr. M. Y. Yonas, Plant Manager, Mr. Raymond Maulden, President of URW Local No. 713, Mr. Ken Howard, Safety Director, and Mr. Ralph Largent, Safety Committee Chairman for URW Local No. 713. Mr. Largent and Mr. Howard assisted Occupational Health Studies Group personnel in the two day survey.

In addition to on-site measurements, bulk samples were collected at both plants for subsequent analysis at the Occupational Health Studies Group Laboratory. Data obtained from these surveys will help determine the presence and extent of occupational health hazards. Certain locations within the plants may be selected for future detailed study and evaluation, and alternative control measures will be suggested for various processes or operations observed during the surveys.



Bloomington, Illinois - Firestone Plant. From left to right are Mr. Ted Williams (OHSG); Mr. Richard Brookshire (Chairman Safety Committee); Mr. Ralph Walden (Local 787 Union President); Mr. James D. Smyth (Plant Manager); Mr. E. E. Semple (Safety Engineer); Dr. Mark Van Ert (OHSG); and Mr. John A. Call (Industrial Relations Manager).



Decatur, Illinois - Firestone Plant. Seated from left to right are Mr. James Stirret (Industrial Relations Manager) and Dr. Mark Van Ert (OHSG). Standing are Mr. Ted Williams (OHSG), Mr. Ralph Largent (Chairman of Local 713 Union Safety Committee), and Mr. Ken Howard (Plant Safety Director).

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General Plant - Mayfield, Kentucky

Mayfield, Kentucky was the site of a three day (May 13-15) environmental sampling survey conducted by Dr. Mark Van Ert, Mr. Ted Williams, and Mr. Earl Arp, Industrial Hygienists, and Mr. Bob Atwater, Administrative Officer for the Occupational Health Studies Group. The Mayfield plant survey was guided by Mr. Jim Arvin, Safety Engineer for General Tire and either Mr. Daniel Bruce or Mr. Hal Rice of the Safety Committee, URW Local No. 665.

The purpose of the survey was outlined at a preliminary meeting of plant and union officials including: Mr. James Rippy, Plant Manager; Mr. Sam Levy, Industrial Relations Manager; Mr. Larry Lain, President of URW Local No. 665; Mr. McCalister, Chief of Plant Protection and the aforementioned survey assistants. On May 14, the Studies Group was joined by Mr. Roy Johnson, Director of Safety and Health for General Tire and Rubber Company for companion sampling study.

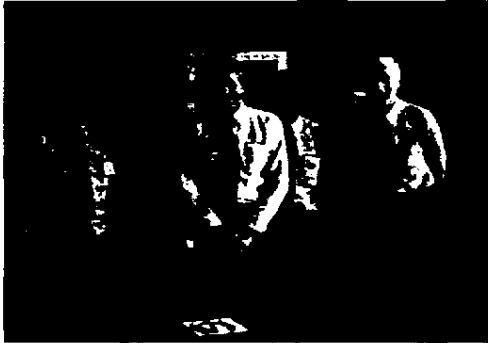
The in-plant environment was monitored primarily for particulate and solvent vapor levels at selected stages of the tire manufacturing process. In addition to these and other industrial hygiene endeavors, bulk solvent samples were collected and returned to the Occupational Health Studies Laboratory for analysis.



From left to right are: Dr. Mark Van Ert (OHSG); Mr. Danny Bruce (Union Safety Committee); Mr. Sam Leoy (Industrial Relations Manager); Mr. Ted Williams (OHSG); Mr. Jim Rippy (Plant Manager); Mr. Jim Arvin (Safety Engineer); Mr. Larry Lain (President Local 665); Mr. McCalister (Chief of Plant Protection); Mr. Bob Atwater (OHSG); and Mr. Earl Arp (OHSG).

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Goodyear plant - Windsor, Vermont



From left to right are Mr. Ted Williams (OHSG); Mr. Oscar Gene (Local 289); Mr. John Floyd (Plant Manager); Mr. M. Gradijan, Jr. (Personnel Manager); and Mr. William Boutilier (Safety Chairman).

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A preliminary survey of the Goodyear Tire and Rubber Company plant at Windsor, Vermont was conducted during April, 1975. Mr. Ted Williams, industrial hygienist of the Occupational Health Studies Group, met with company and union officials at the plant. Procedures for the environmental surveys were discussed, and company and union representatives accompanied Mr. Williams in his work in the plant. In addition to on-site measurements, several bulk samples were returned to the Occupational Health Studies Laboratory for analysis.

Uniroyal plant - Opelika, Alabama

A preliminary industrial hygiene and records survey was conducted at the Opelika, Alabama plant in February. Mr. Dale Herman, biostatistician, and Mr. Earl Arp, industrial hygienist, represented the Occupational Health Studies Group.

The visit was guided by Mr. Johnson and Mr. Ward of Uniroyal and Mr. Childers and Mr. Robinson of URW Local No. 753.

During this three day survey, the processes and materials were examined for potential health hazards in relation to the engineering and administrative controls in use at the plant. An additional objective of the visit was selection of sites for personnel and area sampling during future studies. The Opelika plant has been scheduled for additional study in late summer as part of the multi-plant comprehensive sampling survey.

SCIENTIFIC MEETINGS

Dr. Tony McMichael and Mr. John Gamble presented papers at the American Occupational Medical Association Conference which was held in San Francisco April 13-17. Dr. McMichael presented two papers: I. "Mortality Within A Cohort of Rubber Workers - Relationship To Specific Work Exposures" and II. "Some Limitations of the Age-Standardized Mortality Ratio (SMR) As A Summary Index Of Population Mortality". Mr. Gamble presented the following paper: "Use of Complete Work Histories in Epidemiologic Studies - Review and Proposal".

Dr. Herman Tyroler presented a paper at the Conference on Occupational carcinogenesis sponsored by the New York Academy of Sciences on March 24-27 in New York City. Dr. Tyroler presented "Cancer Mortality Among Rubber Workers" which was authored by himself, Dr. Dragana Andjelkovic, and Dr. Tony McMichael.

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The Occupational Health Studies Newsletter is published and distributed by the Occupational Health Studies Group. We welcome your suggestions and response. All correspondence should be addressed to:

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