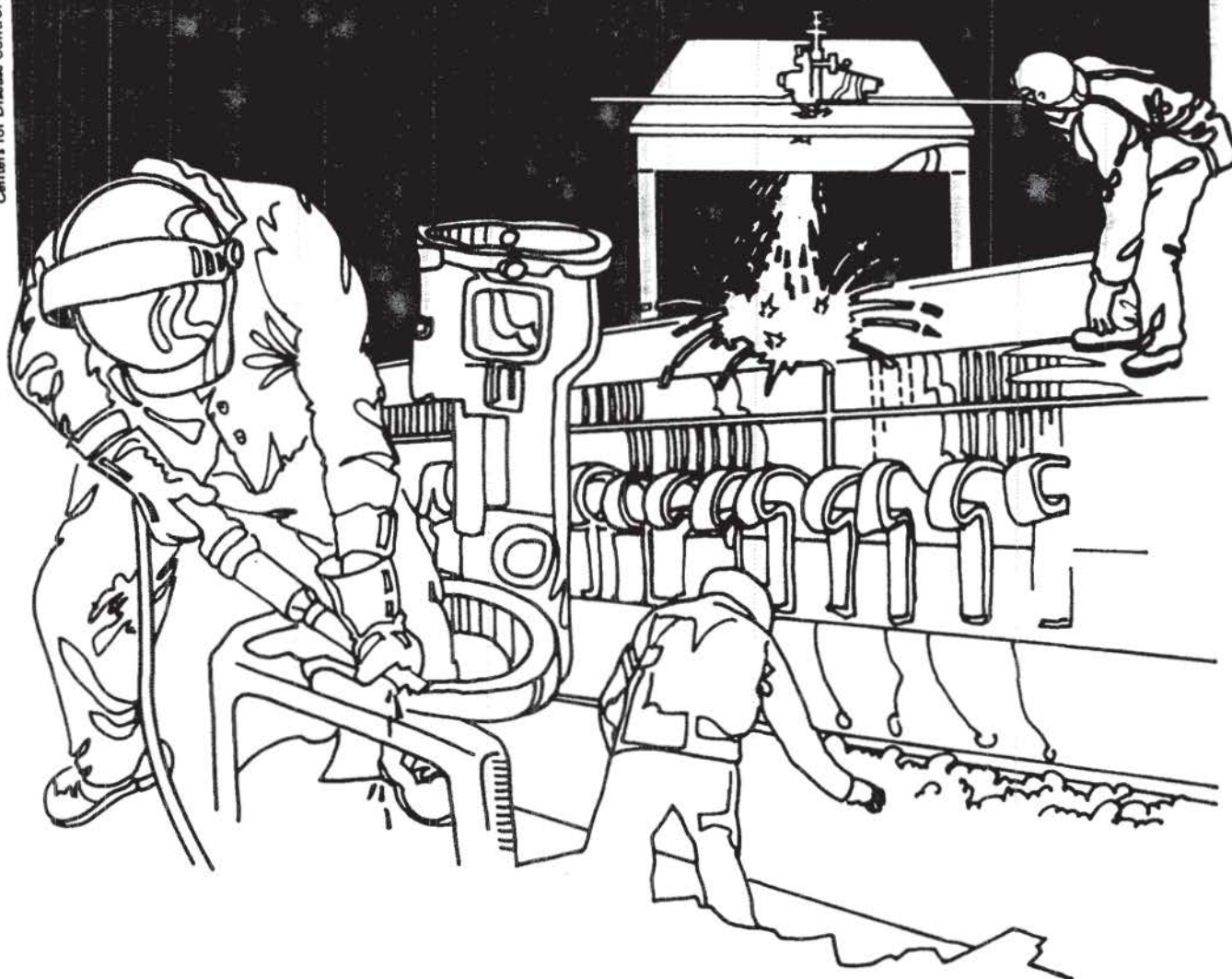


# NIOSH



## Health Hazard Evaluation Report

HETA 83-221-1438  
UNIROYAL, INCORPORATED  
OPELIKA, ALABAMA

## PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

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Opelika, Alabama

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## I. SUMMARY

On April 25, 1983, the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate a possibly excessive incidence of coronary heart disease at the Uniroyal, Incorporated, Opelika Plant in Alabama. With the request form a list was furnished of approximately 50 former employees by department indicating the number of heart attacks and/or bypass operations.

An on-site survey of the facility was made August 2, 1983 by an epidemiologist and assistant, and an industrial hygienist. The plant produces only radial, passenger and small heavy service tires with a workforce of 1200. Death certificates for all workers known to have died since the plant began operation were obtained from the plant personnel office, and coded according to the 8th revision of the International Classification of Disease. This study was restricted to a consideration of mortality. The mortality experience of the workforce was contrasted with nationwide mortality statistics for the years 1963-1982 by means of proportionate mortality ratio (PMR) analysis. A computer program developed by Monson (1) was used to compute cause-specific PMRs. This analysis was restricted to underlying causes of death, although the distributions of other causes, coronary heart disease in particular, as contributing causes of death were also inspected. Environmental conditions of the work areas observed during the walk-through survey appeared to be typical of a tire production plant. No unusual condition was observed. Interviews with worker and management personnel about the plant environment in the past did not reveal unusual working situations.

During the years 1963-1982 there were 42 deaths among workers at the Opelika plant. Forty were males and 2 were females. Neither all cardiovascular nor coronary heart disease mortality demonstrated a discernible excess; however, modest proportionate mortality excesses were noted for all cancers (PMR = 1.20). Most of the cancer excess was attributable to digestive system cancer (PMR = 1.94). Approximately 40 and 30 percent excesses were observed for mortality from all accidents and motor vehicle accidents, respectively. None of these findings was statistically significant at the 0.05 probability level.

The findings from this proportionate mortality analysis did not reveal any striking pattern of cardiovascular disease mortality excess.

The observed excess of digestive system cancers, although based on only 3 deaths, was unanticipated. Two of these deaths were attributed to colon cancer and the third was a primary cancer of the liver. There is no ready explanation for this finding. Plant personnel and medical departments should maintain an ongoing surveillance of mortality and morbidity among the workforce.

Newly occurring cases of cardiovascular disease and cancer should be reported to the medical department, and records containing demographic, clinical and work history information, including environmental conditions at different work sites, should be maintained.

KEYWORDS: SIC 3011, coronary heart disease, digestive system cancer.

## II. INTRODUCTION

On April 25, 1983, the National Institute for Occupational Safety and Health (NIOSH) received a request from an authorized representative of the United Rubber Workers International Union to evaluate at the Uniroyal, Incorporated, Opelika Plant in Alabama a possibly excessive incidence of coronary heart disease leading to open heart surgery and in some cases death. The University of North Carolina under a cooperative agreement with NIOSH was assigned to perform a health hazard evaluation on May 12, 1983.

An on-site survey of the facility was made August 2, 1983 by an epidemiologist and assistant, and an industrial hygienist. The goals of the survey were to conduct out an epidemiological study (dependent on the availability of medical records, worker roster list, death certificates, and job history records), and to develop appropriate recommendations to management to alleviate any problem found.

## III. BACKGROUND

The following information was obtained from initial discussions with management personnel. Production began at the Opelika plant in 1963, and the plant has been expanded several times since. In 1968 an addition of 5 acres of warehouse was constructed, accompanied by a small increase in the labor force. A major expansion in 1968 doubled the passenger tire capacity with a four-fold increase in plant area and the addition of more than 800 wage earners. Heavy service bias tire production was begun at that time. Conversion to radial passenger tire production was initiated in 1972 and completed in January 1974. By 1983 the plant was producing only radial passenger and small heavy service tires with a work force of 1200. No changes in the ventilation systems have been made since 1964; however, some machines have been moved at various times.

Approximately 50 percent of the employees are residents of the Opelika-Auburn area. The nearby communities of Tuskegee, Columbus/Phoenix City and the Lanet Valley each provide approximately 150 employees.

The health hazard evaluation was requested by the union because of a concern of a possible high incidence of coronary heart disease leading to open heart surgery, and in many cases death. With the request form a list was furnished of approximately 50 former employees by department, indicating the number of heart attacks and/or bypass operations.

#### IV. METHODS AND MATERIALS

Environmental evaluations consisted of interviews with management and operating personnel about environmental conditions and a walk-through industrial hygiene survey. No environmental samples were taken during the survey.

The epidemiologic evaluation was restricted to a review of mortality data for plant employees for two reasons. First, national mortality statistics are available for comparisons of cardiovascular and other disease risks among this workers population. Cardiovascular disease morbidity statistics that are suitable for comparison are not routinely available. Second, a morbidity survey of cardiovascular disease would have required more intensive case detection and verification efforts than available resources permitted. Death certificates for all workers known to have died since the plant began operation were obtained from the plant personnel office. These death certificates were coded according to the 8th revision of the International Classification of Disease, adapted for use in the U.S. The coding was performed by a nosologist trained at the National Center for Health Statistics.

The mortality experience of the workforce was contrasted with nationwide mortality statistics for the years 1963-1982 by means of proportionate mortality ratio (PMR) analysis. A cause-specific PMR represents the proportion of all deaths from that cause among the workers, relative to the corresponding proportion in the reference population, in this case the U.S. population. A computer program developed by Monson (1) was used to compute cause-specific PMRs. This analysis was restricted to underlying causes of death, although the distributions of other causes, coronary heart disease in particular, as contributing causes of death were also inspected.

#### V. EVALUATION CRITERIA

Criteria for evaluation of the environmental conditions in the past and present during normal operations were primarily the judgments of the industrial hygienist.

The mortality experience of the workforce was evaluated by means of the computation of cause-specific proportionate mortality ratios (PMRs). The PMR is a measure which represents the observed to expected ratio of deaths from a given cause, where the observed number is the number of deaths in the study population, and the expected is the number of deaths that would have occurred in this population had the workers experienced the same mortality patterns as a non-exposed, reference population. The reference population used here was the U.S. population.

The PMR is thus a comparison of the proportionate distributions (as proportions of all deaths) in the study and reference populations, and can be expressed as:

$$PMR = \frac{\sum (\text{observed deaths from cause X among the study population})}{\sum (\text{expected deaths from cause X among the study population})}$$

$$\text{where: } \sum \text{ Expected deaths} = \sum \left\{ \begin{array}{l} \text{age-specific proportions} \\ \text{of deaths from cause X} \\ \text{in reference population} \end{array} \right\} \left\{ \begin{array}{l} \text{age-specific total} \\ \text{numbers of deaths} \\ \text{from all causes in} \\ \text{study population} \end{array} \right\}$$

The interpretation of a PMR depends on its magnitude. A PMR greater than 1.0 represents a relative excess of cause-specific mortality, while a PMR less than 1.0 indicates a relative deficit.

PMRs were used in this study rather than the conventional standardized mortality ratios (SMRs) because reconstructing an historical cohort and conducting follow-up, procedures necessary for SMR analysis, would have been too time consuming and costly for the purpose at hand.

## VI. RESULTS AND DISCUSSION

Environmental conditions of the work areas observed during the walk-through survey appeared to be typical of a tire production plant. No unusual condition was observed. Interviews with worker and management personnel about the plant environment in the past did not reveal unusual working situations.

During the years 1963-82 there were 42 deaths among workers at the Opelika plant. Forty were males and 2 were females. The sex and race distribution of deaths is shown in Table 1, below.

Table 1  
Race and Sex Distribution  
of Deaths, 1963-82

Race	Sex		Total
	Male	Female	
Black	10	0	10
White	24	2	26
Unknown	6	0	6
Total	40	2	42

Because of the small total number of female deaths, the analysis was restricted to males, and results for whites and blacks were combined. Table 2 gives PMRs for selected causes of death, including all cardiovascular diseases and coronary heart disease, for males in which deaths with unknown race were considered as white, so as to avoid reducing the numbers further. The corresponding results obtained when unknown race was considered as black are presented in Table 3. Neither all cardiovascular disease nor coronary heart disease mortality demonstrated a discernible excess; however, modest proportionate mortality excesses were noted for all cancers (PMR = 1.20 or 1.23). Most of the cancer excess was attributable to digestive system cancer (PMR = 1.94 or 1.93). Approximately 40 and 30 percent excesses were observed for mortality from all accidents and motor vehicle accidents, respectively. None of these findings was statistically significant at the 0.05 probability level.

Table 2

Observed and Expected Mortality, for Selected Causes,  
Among Males, Assuming Deaths with Unknown Race Were White

Cause of Death (ICD code)	Observed	Expected*	PMR**
All Cancers (140-209)	8	6.66	1.20
Digestive Cancers (150-159)	3	1.54	1.94
All Cardiovascular Diseases (390-458)	13	13.40	0.97
Coronary Heart Disease (410-414)	10	9.48	1.06
All Accidents (800-949)	9	6.50	1.39
Motor Vehicle Accidents (810-827)	4	3.24	1.23

\* Based on Proportionate Mortality distribution of U.S. males

\*\* Proportionate Mortality Ratio = Observed deaths ÷ Expected deaths

Table 3

Observed and Expected Mortality, for Selected Causes,  
Among Males, Assuming Deaths with Unknown Race Were Black

Cause of Death (ICD code)	Observed	Expected*	PMR**
All Cancers (140-209)	8	6.47	1.23
Digestive Cancers (150-159)	3	1.56	1.93
All Cardiovascular Diseases (390-458)	13	13.13	0.99
Coronary Heart Disease (410-414)	10	8.92	1.12
All Accidents (800-949)	9	6.20	1.45
Motor Vehicle Accidents (810-827)	4	3.02	1.33

\* Based on Proportionate Mortality distribution of U.S. males

\*\* Proportionate Mortality Ratio = Observed deaths ÷ Expected deaths

## VII. CONCLUSIONS

The findings from this proportionate mortality analysis did not reveal any striking pattern of cardiovascular disease mortality excess. It should be recognized, however, that mortality is not necessarily the best indicator of cardiovascular disease risk, in that non-fatal heart attacks, for example, would not be considered (2).

The observed excess of digestive system cancers, although based on only 3 deaths, was unanticipated. Two of these deaths were attributed to colon cancer and the third was a primary cancer of the liver. There is no ready explanation for this finding.

Interpretations of the study results should be cautious because of the limited scope of the investigation. Mortality statistics can provide some measure of underlying disease risks when the diseases under study are uniformly fatal. This is not the case for coronary heart disease. Further, the validity of proportionate mortality ratio analysis depends on the completeness of data collection. Whether all deaths among workers from this plant have been included has not been determined.

#### VIII. RECOMMENDATIONS

While the present study did not indicate an unusual occurrence of cardiovascular disease mortality, it would nonetheless be prudent for the plant personnel and medical departments to maintain an ongoing surveillance of mortality and morbidity among the work-force. This surveillance should not be restricted to cardiovascular disease, as other diseases, possibly including digestive system cancers, may be found to occur at a seemingly excessive rate.

Newly occurring cases of cardiovascular disease and cancer should be reported to the medical department, and records containing demographic, clinical and work history information, including environmental conditions at different work sites, should be maintained. In this way future disease incidence can be indexed to potentially etiologic workplace exposures in subsequent epidemiologic surveys.

#### IX. REFERENCES

1. Monson RR (1974). Analysis of relative survival and proportional mortality. Computers and Biomedical Research 7:325-332.
2. Kuller LH (1976). Epidemiology of cardiovascular diseases. American Journal of Epidemiology 104:425-456.

#### X. AUTHORSHIPS AND ACKNOWLEDGEMENTS

The cooperation of Mr. Bill Lett and Mr. Gerald Ford and other management and union officials in the environmental evaluation is hereby acknowledged.

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Copies of this report have been sent to:

- (a) Uniroyal, Inc., Opelika, Alabama
- (b) United Rubber, Cork, Linoleum and Plastic Workers of America, Local No. 753, Opelika, Alabama
- (c) United Rubber Workers International Union, Akron, Ohio
- (d) U.S. Department of Labor, OSHA, Region IV
- (e) NIOSH Region IV
- (f) Alabama State Department of Health
- (g) Alabama Department of Labor