

FILE NAME: Ford (FD)

DATE: 1977 maybe

DOC#: FD134

DOCUMENT DESCRIPTION: Mt. Sinai Contract Proposal

1977?

The only significant
cancer in medical study
was 4. Sputum cytology indicates
respondents greater
than 40 years of age

directed to subject

CONTRACT PROPOSAL

Investigation of Health Hazards in Brake
Lining Repair and Maintenance Workers
Occupationally Exposed to Asbestos

RFP No. 210-77-0119-0000

~~William J. Nicholson, Ph.D.~~
Environmental Sciences Laboratory
Mount Sinai School of Medicine
100th Street and Fifth Avenue
New York, New York 10029

COPY OF PROPOSAL

002971

PQ

Table of Contents

Proposal summary and data sheet	1
Project summary	3
Technical proposal	1
Introduction	1
A. Characterization of exposure	1
B. Assessment of health effects	2
C. Asbestos related cancers in brake workers	2
Specific aims of this investigation	2
A. Determination of the feasibility of a mortality study	2
B. Clinical investigation of disease in brake workers	2
Materials and methods	3
A. Task I-Characterization of brake repair environment	3
B. Task II-Feasibility study for retrospective mortality study	3
C. Task III-Medical survey	5
Previous experience of this laboratory	8
A. Mortality studies	8
B. Clinical investigations	8
C. Previous studies of brake repair and maintenance workers	8
Significance of this research	8
A. Disease among brake repair workers	8
B. Establishment of clinical surveillance programs	8
Facilities available	12
Organizational responsibility	12
Statement of assurance	12
Contract pricing proposal	1
Current source of support	3
H. E. W. Representations and Certifications	1
Representations	1
Certifications	3
Appendices	1
ILO/UC X-ray classification sheet (mark sense)	
Laboratory examination sheets and forms (mark sense)	
Physical examination	
Past medical history	
Respiratory questionnaire	
Reprints on laboratory brake repair studies	
Personnel curriculum vitae and bibliographies	

COLL. OF. PROGRAM

002972

Project Summary

SAIC-88-200

ed illw evodis dedidreab amonismamz isataydq eds is dedidreab edf

This research will undertake three tasks to evaluate the health hazards associated with the repair and maintenance of automobile and truck brake linings, a characterization of brake repair environments, existing data on mortality, feasibility study, and a clinical study of brake workers.

A. Methods

Within thirty days of the issuance of a contract, data on environmental conditions during brake repair and maintenance will be obtained from published literature, sources within the brake manufacturing industry, management of garages and brake repair operations, and state and federal agencies that may have conducted environmental surveys in these establishments. Work practices will be documented and types of brake linings with the various materials used over the years will be established.

Determination will be made of the feasibility of identifying a cohort of brake lining repair and maintenance workers for a mortality study. Individuals will be sought having significant employment in the industry prior to 1955, through unions representing brake repair and maintenance workmen. Following a determination that a sufficient number of appropriately exposed individuals can be identified, the feasibility of tracing and determining the vital status of a sample of the possible cohort will be undertaken. This task will be completed within 180 days of the issuance of a contract.

A clinical study will be undertaken of 1,200 currently or previously employed brake repair workers and controls to investigate the presence or absence of clinical stigmata of asbestos exposure. Participants in the clinical survey will be sought through unions representing brake repair and maintenance workmen. The findings will be related to duration of employment, type of employment, frequency, regularity or intermittency of brake repair work, duration from onset of employment. History of other potential asbestos exposure will be sought. A comparison of findings will be undertaken with those present in other asbestos-exposed groups (asbestos miners and millers, asbestos factory workers, family contact of asbestos workers, asbestos insulation workers). These examinations will be completed within one year of the issuance of a contract.

B. Rationale

Because few people are available in any one brake repair or maintenance facility, the participants in both the mortality study and the clinical survey will be sought through various unions representing these employees. In this, we have been assured of the cooperation of United Auto Workers, the International Association of Machinists, the Federation of State, County and Municipal Employees, the Transportation Workers, Transport Workers, and the American Federation of Government Employees. The procedures for the conduct of both the mortality study and clinical survey have been developed in numerous earlier studies by this Laboratory of groups of workmen.

002973

Q

C. Facilities

The conduct of the physical examinations described above will be undertaken in various field stations established near the employment of groups of brake repair and maintenance workers. These would include union halls, municipal buildings, or local medical facilities. All have been successfully utilized by this Laboratory in previous similar studies.

D. Other

During the past two years, over 5,000 individuals have been examined for the prevalence of disease related to occupational factors. The geographical settings have ranged from Los Angeles, California, to St. John's, Newfoundland. Currently, twenty-four groups of individuals are under surveillance in prospective or retrospective-prospective mortality studies. Ten of these are under the direction of the principal investigator on this proposal.

002974

Q

Investigation of Health Hazards in Brake Lining Repair and Maintenance Workers
Occupationally Exposed to Asbestos
RFP 210-77-0119-0000

Technical Proposal

I. Introduction

Recent investigations have demonstrated that significant asbestos exposure may occur during brake maintenance and brake repair work. (1) Limited studies have shown that such exposure may be associated with risk of asbestos-induced disease, including both pulmonary asbestosis and asbestos-related cancer. (2) It is not known, however, whether such disease is common or uncommon since appropriate large scale investigations have not been made. The question is of importance in view of the fact that approximately 900,000 workers are regularly or intermittently engaged in such work in the United States at this time (3), responsible for the more than 130 million cars and trucks requiring brake maintenance (4). Additionally, a large number of other workers were formerly engaged in such work in the past and are now either retired or otherwise employed; their number is not known. Automobile production expanded rapidly after World War II (approximately 30,000,000 cars and trucks were in use during 1945) (4), and with it, there was a concomitant sharp increase in the number of brake maintenance employees. This group of workers is now reaching the period of high risk from asbestos related diseases (25 or more years from onset of exposure (5)).

A. Characterization of exposure

Recently, mineralogical and industrial hygiene study of dusts in brake repair work has demonstrated that:

1. Dust levels.

Measurement of fiber concentration associated with brake repair and brake maintenance work in the United States, Great Britain and Switzerland have demonstrated that these may frequently exceed current TLV for asbestos (2 fibers/ml), as counted by optical DSKA techniques. (6) Such levels may persist for 15-30 minutes after cessation of work and may be found not only in the immediate vicinity of the workman, but for varying distances about the workplace. Measurable levels have been found up to 75 feet from the worksite, within garages and maintenance shops.

2. Asbestos content.

Unaltered or little modified chrysotile asbestos is easily demonstrated in brake dust from cars and in the air of the worksite. Although it was at one time thought by some that the heat of braking would destroy virtually all chrysotile, or alter it to forsterite, mineralogical analyses have demonstrated that this is unfortunately not so. (1,6-9)

3. Fiber size.

Between 5 and 10 percent of the fibers found in brake drum dust or in the workshop air are visible only by electron microscopy. A small number of the fibers can be detected by optical microscopy. Therefore,

since the fiber counts referred to in ~~the~~ above relate to optically visible fibers, sub-optical fibers are present at levels of 2×10^6 or more.

B. Assessment of health effects

In an analysis of the health experience of 90 individuals employed predominantly as general mechanics in garage repairs, it was found that a significant number had decreased vital capacities (25%) or x-ray changes characteristic of asbestos exposure (parenchymal fibrosis - 20%, pleural thickening or calcification - 6%). (5) As with other asbestos exposures, the degree of abnormality strongly correlated with onset of vehicular maintenance work. While this preliminary clinical survey was limited in scope and was restricted to volunteers, its results suggest that asbestos disease is likely to be present among garage workers.

C. Asbestos related cancers in brake workers

In addition to ~~clinical manifestations of~~ asbestos exposure among garage employees, concern also exists that these exposures may have led to an increased mortality from asbestos related diseases. In other circumstances, relatively low exposures to asbestos have been causally related to cases of mesothelioma (10-12) and excess bronchogenic carcinoma (13). Asbestosis, and excess gastrointestinal cancer may also be found in groups of individuals exposed to dust concentrations sufficient to produce the x-ray changes described previously (5). As asbestos-related cancers usually do not appear for 25, 30, 40 or more years from first exposure, we are only now reaching a period where significant numbers of individuals may be at risk from asbestos disease associated with brake work. Already, however, there are isolated reports of mesothelioma among such individuals. (11,14)

II. Specific aims of this investigation

This research will undertake two principal tasks to evaluate the health hazards associated with repair and maintenance of automobile and truck brake linings, a mortality feasibility study and a clinical survey of brake workers. Additionally, a thorough characterization of the brake repair environment will be done using existing data.

A. Determination of the feasibility of a mortality study

A determination will be made of the feasibility of identifying a cohort of brake lining repair and maintenance workers for a mortality study to determine if ~~annual rates of death occur~~ among such employees. In order to do this, individuals will be sought having significant employment in the industry prior to 1955. The availability of such individuals will be determined from a review of records of unions representing brake repair workmen. With the determination that a sufficient number of appropriately exposed individuals can be identified, the feasibility of tracing and determining the vital status of a sample of a possible cohort will be undertaken.

B. Clinical investigation of disease in brake workers

A clinical study will be undertaken of ~~currently or previously employed~~ brake repair or brake maintenance workers and controls to investigate the presence or absence of clinical effects of asbestos exposure. The findings

002976

Q

asbestos exposure to brake repair workers

will be related to duration of employment, type of employment, frequency regularity or intermittency of brake repair work, duration from onset of employment. History of other potential asbestos exposure will be sought. A comparison of findings will be undertaken, with those present in other asbestos-exposed groups (asbestos miners and millers, asbestos factory workers, family contact of asbestos workers, asbestos insulation workers). Here data on approximately 5,000 such workers are available for comparison. In this, the various parameters noted above will be taken into account, as well as smoking habits, and known asbestos exposure levels. Since the long-term health experiences of these latter groups are known, it will be possible to some extent to predict the likely health experience of brake repair and brake maintenance workers whose experience has been similar to those who are studied.

III. Materials and methods

A. Task I - Characterization of brake repair environment

1. The types of brake linings manufactured and the materials used therein during the past decades extending into the 1930's will be obtained from representatives of brake manufacturing companies, including the Johns Manville Corporation and Raybestos Manhattan. [See accompanying letters from Paul L. Sundack of Johns Manville, and John Marsh of Raybestos Manhattan.] The information will be specific for the types of cars and trucks in which these materials are used. Furthermore, interviews with union officials, long-term employees and owners or managers of automobile repair facilities will be undertaken to further document use of materials in past years.
2. Work practices engaged in by brake workers will be documented through interviews with union officials, long time garage employees and management of automobile repair facilities. Specific attention will be paid to the amount of grinding, drilling and blowing out of brake drums that has been done in various periods since 1940.
3. All available literature will be reviewed to obtain information on the asbestos exposures of brake repair workers. The various scientific literature abstracting services will be utilized. In addition, data will be sought from manufacturers of brake linings, other industry groups, and state and federal agencies that may have made measurements during various aspects of brake lining installation, repair or removal.

B. Task II - Feasibility study for retrospective mortality study

1. Groups of individuals and their records will be sought to determine the feasibility of a retrospective-prospective cohort study of the mortality experience of brake repair and maintenance workers. It is estimated that at the present time, 100,000 establishments are engaged in brake repair and maintenance work with about one half of these establishments employing the vast majority of these workers. These establishments are small, with few employees. Thus, the search for groups of workers will focus on various unions and trade associations in the trade industry.

002977

a. The International Association of Machinists

b. ~~United Auto Workers~~
c. American Federation of State, County, and Municipal Employees

d. Transportation Workers

e. Transport Workers

f. American Federation of Government Employees

In this investigation, we have already been assured the cooperation of the first three mentioned unions. Indeed, each of these have cooperated with us on our earlier study of various aspects of the problems associated with asbestos exposure during brake repair (see Section IV and also letter from Sheldon Samuels).

Additionally, employers of individuals who would do brake maintenance work would be contacted. These would include:

a. ~~New and used car dealers associations~~

b. ~~Automobile companies~~

c. Government auto pool operations

d. Municipal garages

e. Large taxi and auto fleet operators

During the environmental investigation of garage employees, we received the cooperation of the New York Car Dealers Association whose members made arrangement for us to take dust samples in various operating garages. Additionally, we have worked closely with the Ford Motor Company on the problem of emissions from automotive brakes.

As mentioned previously, the majority of individuals identified would have become first employed after 1945, and thus only now reaching a period of high risk from the asbestos-related diseases. This and the expectation that the degree of excess mortality will be less than that observed in groups of workers exposed continuously in factory operations (14) or applying insulation (5), would require that a fairly large cohort, perhaps 2000 or more individuals, be identified and traced. The individuals to be sought for inclusion in such a cohort will all have begun garage employment with brake work prior to 1955, and, ideally, will have had at least five years of such employment. Their work environments will be characterized by applying information obtained in the completion of Task I to the specific individuals and groups selected for inclusion in a potential cohort.

Approximately a 10% sample of the group so identified will be traced to determine the feasibility of conducting a retrospective-prospective study, the cohort observation period beginning sometime in the past. Sample tracing will establish the vital status of the individuals and determine the feasibility of conducting such a study.

2. The records to be sought from the various cooperating union and industry sources will include:

a. Employment lists

b. Seniority lists

c. Pension and retirement records

002978

Insurance data on death rates of population
Union and Company newsletters

These will be perused to determine if information can be obtained on:

- a. Name
- b. Social Security number
- c. Date of birth
- d. Sex
- e. Employment history, including, if possible information on work locations and job activities.

Consideration will be given to the selection of the most appropriate comparison group for calculation of expected mortality by cause. Often local and state rates are unavailable or unstable for less common causes of death. On the other hand, national rates may not serve as an accurate representation of the general population death rates in the region of interest. It is anticipated that we will primarily be concerned with individuals living in the states of New York, Pennsylvania, New Jersey, and Connecticut. In some of these states good data are available and its usefulness will be studied. Additionally, we will consider the usefulness of reviewing pathological material and medical records to ascertain the existence of unusual causes of death, such as mesothelioma, in this population.

It is unlikely that information exists in available records on race, smoking history, or other employment of an individual. In this proposed research we will investigate an alternative study design, that of a prospective mortality study dating from the time of identification of a cohort. Here, such factors as smoking and specific employment history can be obtained and related to subsequent mortality experience.

C. Task III - Medical Survey

1. A protocol will be developed to study the health effects of occupational exposure to asbestos in brake repair work through the clinical examination of approximately 1200 individuals. As described previously, most brake shops generally employ few men, and thus selection of such a number of individuals for examination will in general, be done through the unions representing workers employed in brake maintenance in repair. Members of the previously described unions (see section III B) have assured us that their members will participate in the planned clinical survey. They will also make available to us lists of retired members who have been employed in this work. From these lists, it is feasible to select a sufficient number of individuals to insure that a total of 1200 individuals are obtained. In this, it appears possible to include, for example, 100 retired workers, 300 individuals with 20 years or more from onset of exposure to asbestos in this trade, 300 who had from ten to nineteen years from onset of work, 200 with one to nine years since onset, and 300 automobile mechanics who would have similar times from onset of garage work but would not have been exposed to asbestos dust during brake repair work. Records will be kept of the total number available from the sources utilized, so that data on the sample size in relation of the total

eeis-85-102

IMPORTANT!

population in each group would be known. From these data decline
~~the potential for~~
~~the potential for~~

The final statistical design of any proposed study will be developed in cooperation with Dr. E. Oyler Hammond, Vice President for Epidemiology and Statistics of the American Cancer Society.

2. It is anticipated that parameters selected for study in the clinical examination will include:

- a. Complete occupational history
- b. Asbestos exposure history
- c. Complete medical history
- d. Detailed history of work repair and brake maintenance work
- e. Smoking history
- f. Specific symptoms: exertional dyspnea, cough, sputum, other chest symptoms
- g. History of previous chest x-ray findings
- h. Use of industrial hygiene precautions, including vacuuming, wet cleaning, respirators, and period of use.
- i. Physical examination, with particular reference to chest, abdomen, clubbing, oro-pharynx, cyanosis.
- j. Clinical biochemical tests (SMA 12)
- k. CBC
- l. Urine
- m. Carcinoma embryonic antigen
- n. Postero-anterior chest x-ray with lateral and oblique films made where indicated. Full size 14 x 17 films will be used.
- o. Pulmonary function studies, including ventilatory tests

It is anticipated that a protocol to be suggested would be similar to those utilized in other clinical field studies by this laboratory. Appendix I includes forms previously used in such examinations by this laboratory. Responses are recorded on mark sense forms for rapid entry into computer systems, with the preparation of reports and the analysis of data.

The protocol to be designed will be submitted to the project officer for review and approval before proceeding with the study.

3. Guidelines to be promulgated by NIOSH for the conduct of pulmonary function tests will be followed. Our current procedures are to record full flow-volume curves on all maximal breathing efforts of an individual. The pulmonary function tests continue until the best full flow-volume curve is reproduced to within 5%. This usually involves a minimum of three efforts but can continue for five or more. Various parameters from the different efforts are also stored in the memory of an SRL.

These include:

- a. Forced vital capacity
- b. 1-sec forced expiratory volume
- c. 3-sec forced expiratory volume
- d. Peak expiratory flow

002980

PQ

Forced expiratory flow at 50% of FVC and
not forced expiratory flow 25-75% of FVC
and expiratory time. In order to ensure
that the best effort is selected and the above numerical parameters
recorded. The flow-volume curves continue to serve as a
permanent record of all efforts of an individual.
A tripartite meeting to discuss the project will be arranged
and will be composed of representatives of the organizations
listed in section III B.

5. All workers will be examined in appropriate field stations to be set up in the New York-New Jersey-Connecticut-Pennsylvania area. Our experience indicates that the facilities will be centered in Union examination halls; community facilities; or medical facilities as physician clinics, hospital outpatient departments. The utilization of such field stations will facilitate the attendance of the workers, since travel will be kept to a minimum. Suitable x-ray equipment will be coordinated.

Each individual participant in the study will be provided with an informed consent form and an assurance that all information in the investigation will be held in accordance with the privacy act (PL 93-759).

The examination will be conducted according to procedures promulgated in 42 CFR Part 85a, October 14, 1976. "Occupational Safety and Health Investigations of Places of Employment" and other appropriate guidelines of NIOSH.

As part of the protocol to be submitted to NIOSH, criteria will be established by which an individual will receive rapid notification of abnormalities in the laboratory test, clinical examination, x-ray and pulmonary function tests. Upon determining such abnormalities, the individual participant will receive notification and, in addition, a report will be submitted to his physician if he so requests.

6. Each individual participants' occupational history, past medical history, physical examination and laboratory data will be thoroughly reviewed by a physician using acceptable medical standards. All chest films will be read independently by three experienced x-ray readers and categorized by the ILO U/C category (see Appendix II below). The films will then be reinterpreted, each of the three readers will participate, together with an additional experienced reader. Parenchymal fibrosis, pleural fibrosis, pleural calcification, neoplasm, non-asbestos disease will all be recorded, or their absence noted. The quality of the film will also be evaluated. A report will be generated, supplying the results of all findings to the individual and to any physician designated by him. No results, however, concerning any individual man will be made available to either the individual's employer or to the union concerned. Full confidentiality of results will be maintained. Statistical results of the findings will, however, be made available to interested industry and labor groups.

002981

Q

7. The SMA-12 and CBCs will be analyzed in the Chemistry Department of Mount Sinai School of Medicine and the blood for carcinogenic embryonic antigen will be examined at the Hoffman-LaRoche Laboratory in Nutley, New Jersey. Each of these has been approved under the Proficiency Testing Program of CDC or the College of American Pathology. As part of the project, the following will be submitted:
- D. Monthly progress reports, technical quarterly reports, and a final report will be submitted in accordance with the requirements of the proposed contract, as described in the Request for Proposal.
- IV. Previous experience of this laboratory

A. Mortality studies

Numerous mortality studies of different groups of workers have been conducted by various members of the Environmental Sciences Laboratory. These studies are listed in Table I. In each we have had the cooperation of the unions representing the workmen and often of the company by whom they were employed.

B. Clinical investigations

A variety of clinical surveys have been undertaken investigating the health hazards in different industries. These are detailed in Table II. In many of these surveys we received the cooperation of both the union and management involved. The surveys were held in such locations as a municipal center, union hall, company medical facility, private medical clinic, hotel, local hospital. In all cases, necessary equipment, supplies and personnel were readily moved to the examination site in question.

C. Previous studies of brake repair and maintenance workers

This laboratory has conducted two previous studies of brake workers and the environment of brake repair and maintenance. Appendix III includes copies of three published articles describing this research.

V. Significance of this research

A. Disease among brake repair workers

Objective clinical and mortality experience among brake repair and brake maintenance workers will be analyzed to determine whether stigmata of asbestos disease is present among these workers. The results will be compared with those among workers in other asbestos-exposed groups, taking into account such important variables as duration of exposure, duration from onset of exposure, intensity of exposure, smoking habits. The data will have predictive value in considering the extent of asbestos disease risk among workers in this trade.

B. Establishment of clinical surveillance programs

Analysis of the findings, in relation to known disease risk among other asbestos-exposed workers, will allow appropriate recommendations to be made appropriate for prospective medical surveillance of brake repair and brake maintenance workers.

002982

Q

Table I

Occupational Cohorts Under Surveillance
(Mortality Studies)

Asbestos

N.Y. - N.J. Insulators	1,250
U.S. - Canada Insulators	17,800
Unarco Asbestos factory workers	1,000
Unarco family	2,500
Asbestos miners, Quebec, Canada	1,200
Paterson neighborhood	6,000
Factory workers - Manville, N.J.	690
Factory workers - Waukegan, Illinois	1,600

Styrene

Production and polymerization workers	500
---------------------------------------	-----

Vinyl chloride

Polymerization workers	1,200
------------------------	-------

Others

Painters	125,000
Titanium dioxide workers	950
Printers	65,000
Roofers	6,000
Abrasive soap workers	215
Wood treatment workers	300
Tunnel and caisson workers	1,000
Ceramic tile workers	1,450
Trichloroethylene - N.Y.C.	450
Nitrosamines	350
Refinery employees	1,350
Electrical workers exposed to PCB	950

002983

Group

1. Asbestos factory workers
2. Families of factory workers
3. Insulation Workers Union
" " "
" " "
" " "
4. Painting Trades
" "
5. PVC textile workers
6. Titanium dioxide pigment
plant workers
7. Lead burners
" "
8. Secondary lead smelter worker
" " "
9. Brake maintenance and repair

Table II

Clinical Field Studies 1975-76

<u>Dates</u>	<u>City</u>	<u>Number Examined</u>	<u>Problem</u>
1975	Paterson, N.J.	110	Asbestos
1975-76	Paterson, N.J.	704	Asbestos exposure
1975	Toledo, Ohio	117	Asbestos
1975	St. Louis, Mo.	95	Asbestos
1976	Nashville, Tenn.	260	Asbestos
1976	Knoxville-Chattanooga	190	Asbestos
1975-76	New York City, N.Y.	110	Asbestos
1975	Toledo, Ohio	85	Solvents, asbestos mixed exposures
1975	St. Louis, Mo.	302	Titanium dioxide dust, SO _x
1975	Toledo, Ohio	279	PVC extrusion, other solvents
1975	St. Louis, Mo.	204	Titanium dioxide dust, SO _x
1975	Brooklyn Navy Yard	25	Lead fumes
1975	Bronx, N.Y. (3rd Ave. E1)	18	Lead fumes
1976	Indianapolis, Ind.	181	Lead
1976	Los Angeles, Calif.	166	Lead
1975	New York City, N.Y.	65	Asbestos, carbon monoxide, lead

Table I

10. Shipyard workers

Dates

1975

1976

1976

11. Floor tile workers

1975

12. Styrene manufacturing, polymerization and extrusion workers 1975

13. Electrical capacitor manufacturing workers 1976

14. Asbestos miners and millers 1976

15. Carnotting workers 1976

16. Michigan farmers and farm product consumers 1976

17. Police firing range instructors 1976

18. Oil formulators 1976

002985

PRODUCED BY FORD

City

Number
Examined

Substances

Groton, Conn.	1,045	Asbestos, lead, radiation
Groton, Conn.	33	Asbestos, PVC dust
Kansas City, Mo.	495	Styrene monomer, other organic solvents including benzene
Monaca, Penn.	325	Polychlorinated biphenyls
Fort Edwards, N.Y.	490	Asbestos
Dale Vette, Newfoundland	65	Cornstarch dust
Hudson, N.Y.	1,040	Polychlorinated biphenyls
Grand Rapids, Mich.	42	Lead
Bronx, N.Y.	37	Microorganisms
Newark, N.J.		

83-18-5188

ATTENTION: MICROFILM

William J. Nicholson
533-28-2199

VI. Facilities Available

The Environmental Sciences Laboratory of the Mount Sinai School of Medicine has full facilities available for the investigation of clinical disease among occupationally exposed groups. Additionally, an extensive laboratory capability exists for the analysis of contamination in air, water and tissue samples. The clinical data to be collected in a survey such as proposed here is entered into the City University of New York computer system through an IBM 5100 terminal housed within the Laboratory. The large CUNY IBM System 370 Computer has been programmed to generate individual reports on clinical findings obtained during examinations, and standard statistical programs are available for the analysis of the overall results.

VII. Organizational Responsibility

Dr. William J. Nicholson will serve as principal investigator for this proposed research and will be directly responsible for the conduct of the feasibility of a mortality study. Dr. Ruth Lilis will have direct responsibility for the conduct of the clinical examination. As director of the Environmental Sciences Laboratory, Dr. Irving Selikoff will maintain close contact with this proposed research and has overall responsibility for all activities of the Environmental Sciences Laboratory and the Division of Environmental Medicine. All research personnel are in this Division and there are no areas of divided responsibility.

Statement of Assurance

The investigations encompassed by this application have been or will be approved by the committee of associates of the investigator(s) in accordance with this Institution's assurance on clinical research dated October 4, 1971.

The undersigned agrees to accept responsibility for the scientific and technical conduct of the project and for provision of required progress reports if a grant is awarded as the result of this application.

March 22, 1977
Date

William J. Nicholson
Principal Investigator

002986

References

1. Rohl, A.N., Langer, A.M., Wolff, M.S., and Weisman, I. Asbestos exposure during brake lining maintenance and repair. *Env. Res.* 12:110-128 (1976).
2. Lorimer, W.V., Rohl, A.N., Miller, A., Nicholson, W.J. and Selikoff, I.J. Asbestos exposure in brake repair workers in the United States. *Mt. Sinai J. of Med.* 43:207-218 (May-June 1976).
3. Department of Commerce. 1972 County Business Patterns, and Census of Population 1970 Occupation by Industry.
4. Automotive News Almanac 1975.
5. Selikoff, I.J., Hammond, E.C. and Seidman, H. Cancer risk of insulation workers in the United States. Biological effects of asbestos, 1973. Lyon, International Agency for Research on Cancer, 209-216.
6. Rohl, A.N., Langer, A.M., Klimentidis, R., Wolff, M.S., and Selikoff, I.J. Asbestos content of dust encountered in brake maintenance and repair. *Proc. Royal Soc. Med.* 70:32-36 (Jan. 1977).
7. Jacko, M.G. and DuCharme, R.T. Brake Emissions: Emission Measurements from Brake and Clutch Linings from Selected Mobile Sources, EPA Report 68-04-0020, 1973.
8. Hickish, D.E. and Knight, K.L. Exposure to asbestos during brake maintenance. *Ann. Occup. Hyg.* 13:17-21, 1970.
9. Lynch, J.R. Brake lining decomposition products. *J. Air Poll. Cont. Ass.* 18:824-826 (1968).
10. McDonald, A.D., Harper, A., ElAttar, O.A. and McDonald, J.C. Epidemiology of primary malignant mesothelial tumours in Canada.
11. Newhouse, M.L. and Thompson, H. Mesothelioma of pleura and peritoneum following exposure to asbestos in the London area. *Brit. J. Ind. Med.* 22:261-269 (1965).
12. Anderson, H.A., Lillis, R., Daum, S.M., Fischbein, A.S. and Selikoff, I.J. Household contact asbestos neoplastic risk. *Ann. NY Acad. Sci.* 271:311-323 (May 1976).
13. Edge, J.R. Asbestos related disease in Barrow-in-Furness. *Env. Res.* 11:244-247 (1976).
14. Greenberg, N. and Lloyd Davies, T.A. Mesothelioma Register 1967-1968. *Brit. J. Ind. Med.* 31:91-104 (1974).
15. Nicholson, W.J. Case Study 1: Asbestos-The TLV Approach. *Ann. NY Acad. Sci.* 271:152-169 (1976).

002987

References

1. Robert L. Langer, A.M., M.D., and William I. Anderson, M.D., of the National Institute of Health, Bethesda, Maryland, have each been contacted, and each have agreed to assist us with this study. Letters to that effect are forthcoming, and will be supplied shortly as an addendum to this application.

2. John Marsh of Raybestos-Manhattan, Fred L. Pundsack of Johns-Manville, and Sheldon Samuels of the Industrial Union Department of the AFL-CIO have each been contacted, and each have agreed to assist us with this study. Letters to that effect are forthcoming, and will be supplied shortly as an addendum to this application.

002988