

**Program of the
National Institute for Occupational Safety and Health**

FY 1985 Program Plan

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

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PREFACE FOR FY 1985 PROGRAM PLAN

In October 1980, the United States Public Health Service reorganized the Center for Disease Control and thus marked a "significant milestone in the evolution of federal activities in the prevention of unnecessary morbidity and premature mortality."¹ The CDC became the "Centers for Disease Control" with a new organizational structure to better concentrate its resources on achieving specific outcomes, namely: "prevention and control of infectious diseases; prevention of disease, disability, and death associated with environmental hazards; occupational health and safety; prevention and control of chronic diseases; and the promotion of health."¹ Although CDC's reorganization was a direct response to recommendations of an ad hoc advisory committee,² the concepts reflected a shift that was taking place in public health as a whole...a broad awareness that chronic diseases and injuries had become the most important national health problems of mid-twentieth century America.

The new organization of CDC also brought closer to realization a noble idea first expressed years ago by an innovative pioneer of modern public health, Dr. Joseph Mountin. As an Assistant Surgeon General in the U.S. Public Health Service, Dr. Mountin in the 1940s visualized a series of "national centers" in the Public Health Service, each devoted to a particular aspect of public health. He was directly influential in establishing CDC, and he encouraged the creation of other national centers to deal with other problems.³ Although efforts were made to establish other national centers, especially in the 1960s, CDC was the first and only tangible fulfillment of Dr. Mountin's dreams. CDC has thrived into the eighties as convincing evidence of the validity of Dr. Mountin's idea.

The reorganization of CDC in 1980 brought Dr. Mountin's original plans much closer to realization. It created within CDC a Center for Environmental Health, a Center for Health Promotion and Education, a Center for Infectious Diseases, a Center for Prevention Services, a Center for Professional Development and Training. The National Institute for Occupational Safety and Health (NIOSH) was already established by the Occupational Safety and Health Act of 1970, and had been functioning since 1973 within CDC as a "national center" for the prevention of occupational diseases and injuries.

As the lead organization in the Public Health Service for preventing work-related diseases and injuries, NIOSH is charged by Congressional mandate to: (1) respond to requests to investigate health hazards in the workplace, (2) perform research on work-related health problems, (3) recommend to the Occupational Safety and Health Administration (OSHA), and the Mine Safety and Health Administration (MSHA), on the basis of scientific findings, appropriate regulatory activity, and (4) assure the development of ("raise up") in the Nation the necessary professional personnel to carry out the mandates of the Occupational Safety and Health Act. Established to carry out these four "R's," NIOSH is a unique organization in the U.S. Public Health Service. As a research Institute, it must maintain the highest standards of scientific integrity; as a

responsive service organization, it must maintain a ready capability to respond both to emergencies and to the on-going concerns of the working public; as a policy recommending organization, it must maintain an up-to-date awareness of all significant scientific developments in this broad and complex field, and the ability to synthesize this information into meaningful policy recommendations; as a stimulant for the development of professional personnel, it must effectively encourage the academic community to provide appropriate training for those entering an ever-changing field. That this is a difficult job is self-evident. That it needs doing, is even more clearly manifest when one considers the toll of work-related diseases and injuries. At least 10,000 workers suffer job-related acute trauma resulting in death each year; at least 3,000,000 are seriously injured; and perhaps as many as 100,000 die from work-related diseases.

The task is further complicated by the interface between the occupational diseases and injuries and the health problems deriving from community environmental hazards. While workers generally are affected "first and worst" by toxic environmental hazards, the general community is not far behind. Moreover, it is increasingly clear that the company fence is a thoroughly pervious barrier between the workplace and the community environment. If the disaster in Bhopal taught anything, it was that occupational and community environmental issues are inseparable.

Just as innovation and entrepreneuring are strong values in modern America, the workplace is the point of introduction for new technologies and new agents. In this way, workers are the first citizens exposed to new hazards. Occupational exposures generally involve exposures to higher concentrations for longer periods than is typically the case with environmental exposures in the community. Moreover, the workplace typically presents exposures to more than one agent and places the worker at risk of a variety of health effects. As a result, NIOSH finds itself "out front" on the leading edge in detecting new injuries and illnesses that result from environmental exposures. The nature of the exposures--and their potential for producing multiple health effects--mean that NIOSH must also be "out front" in science and biotechnology to assure its ability to respond usefully.

Although NIOSH has almost no authority to regulate the workplace or to intervene directly to change conditions there, it has distinct opportunities to lead through suasion. This leadership depends on the credibility of its scientific findings and recommendations. Because the Institute's recommendations address issues affecting the most vital national economy in the world, it cannot afford the luxury of frivolous or capricious opinion. Its recommendations are under intense scrutiny and must be supported by a rigorous scientific process. We, in NIOSH, feel that our position is perhaps unique among all governmental organizations in this regard. We feel a tremendous obligation to be prudent and sound in our recommendations. We understand that, in profoundly significant ways, the life and health of the American worker depend on what we do.

In 1981, shortly after Dr. Elliott Harris, Deputy Director of NIOSH, and I were appointed, we established four directions that we felt were essential to secure the credibility of NIOSH as a leader in occupational safety and health. These directions were described in detail in the Preface to the FY 1983 Program Plan of NIOSH as follows:

1. Strengthen mechanisms to assure excellence in research and recommendations of the Institute.
2. Focus the scientific skills and resources of the Institute on the most important diseases and injuries caused by work.⁴
3. Facilitate an expanded participation of State and local health agencies in efforts to prevent work-related health problems.
4. Improve the access of workers to the benefits of health promotion.

In the Preface to the last Program Plan (for the years 1984 to 1989), we reviewed our progress against these directions, noting that we had achieved the first two and had made substantial progress toward realizing the third and fourth. Moreover, we added new directions calling for improved national surveillance of occupational diseases and injuries and a broadened partnership in attempts to prevent occupational diseases and injuries.

Since we published last year's Plan, a number of important developments have taken place. We have virtually completed defining an appropriate role for NIOSH in health promotion. Six Schools of Public Health are now designing Health Risk Appraisal instruments that will include occupational risk factors for hourly wage workers. Moreover, we have succeeded in bringing the needs of hourly wage workers to the attention of health promoters across the Nation. There are gratifying signs that health promoters in many settings now offer programs appropriately targeted to include workers who previously had no access to these programs.

We have also sharply increased our involvement with State and local health agencies. While our task clearly is not completed, we are gratified by the widespread interest of State and local health departments in occupational health issues and the increasing participation of these agencies in efforts to prevent work-related diseases and injuries. The degree of participation and the scope of these programs in State and local health departments are constrained only by the availability of resources to commit to these efforts. Health departments, the traditional backbone of public health in the United States, have clearly demonstrated their desire to be important partners in preventing work-related diseases and injuries.

Since our last report, we have convened the first NIOSH National Symposium on the Prevention of Leading Work-Related Diseases and Injuries, May 1-3, 1985. To this gathering of 400 leading professionals, we introduced, for debate and discussion, five proposed national strategies for the prevention of leading work-related diseases and injuries. The discussions were wide ranging, the debates brisk, and the proposed strategies significantly enriched.

Among the things emphasized by participants at the Symposium was the need for intensified surveillance for each one of the five leading work-related diseases and injuries. Our awareness of the problems caused by lack of adequate national surveillance of work-related diseases and injuries has been heightened. We are gratified to report Congressional interest in this aspect of the problem, including a hearing on the subject before the House Committee on Government Operations, Subcommittee on Manpower and Housing.

Another important outcome of the NIOSH National Symposium on the Prevention of Leading Work-Related Diseases and Injuries was a step forward in expanding the partnership of professionals committed to preventing work-related diseases and injuries. The registered participants reflected a wide range of interest in occupational safety and health, including substantial representation from labor, business, academic community, practitioners of medicine and public health, and voluntary agencies, as well as local, State, and federal government agencies. The process by which these concerned professionals came together to discuss proposed national strategies for prevention significantly extended the common ground from which all are attempting to prevent work-related diseases and injuries. While we clearly have not completed the job of "building an expanded partnership in occupational safety and health," we have made an auspicious beginning and expect to continue with future national symposia of this type.

SURVEILLANCE, THE PRINCIPAL NEED

We must recognize that a principal and pressing need for the immediate future is the surveillance of work-related diseases and injuries. By "surveillance" we do not mean the medical screening and surveillance applied to individual workers, but epidemiologic surveillance, the collection of information on the epidemiology of work-related diseases and injuries to discern major trends, groups at elevated risk, and the changing dynamics of disease; all this is needed to enable prevention. Surveillance may be thought of as a reflex arc that includes the collection of information, the analyses of that information, and then appropriate action based on the information. A critical ingredient of surveillance is the response to the collected information, including disseminating analyses of the data to those with a need-to-know for action and to those who reported.

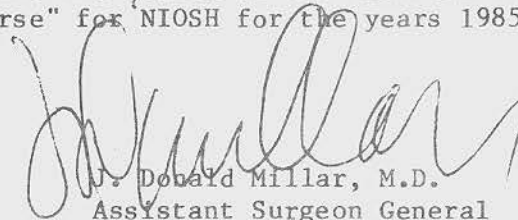
Awareness of the need for surveillance is not new. As the editor of Public Health Reports wrote in 1913, "No health department, State or local, can effectively prevent or control diseases without knowledge of when, where, and under what conditions cases are occurring."⁵ Those comments were made as State Health Departments began to systematically report, on a national basis, cases of quarantinable diseases. The well-established, State-based system for surveillance of infectious disease has expanded briskly in the last 70 years. By contrast, not a single occupational disease or injury is presently "reportable" through that national public health system. Thus, surveillance for occupational diseases and injuries is 70 years behind surveillance for infectious diseases.

This does not mean that there are no systems for surveillance of occupational diseases and injuries. Indeed, one might say that there is a bewildering array of different systems collecting different information, from different sources, for different purposes. The problem is that these systems, taken individually or together, do not produce an accurate national picture that can facilitate effective prevention. Hence, if NIOSH is to exercise leadership in the field of occupational safety and health, it must assume leadership in improving this situation. This 1985 Program Plan incorporates a number of projects exploring new and improved means of surveillance; surveillance activities are included in the programs of five divisions of NIOSH. We recognize the need to integrate these various activities and to recommend to the Nation surveillance systems that will produce adequate information for the practice of prevention. Improved national surveillance of work-related diseases and injuries is clearly a major theme of our Program Plan for FY 1985 to 1990.

CONCLUSION

In addition to his concept of "national centers," Dr. Joseph W. Mountin left us other important legacies. One is the importance of adapting public health activities to real needs. Dr. Mountin observed that "the content and scope of health services, like society itself, undergo constant changes. As old problems are solved, or fade into minor significance, new ones, or those unappreciated in the past, arise to take their place."³ He felt that the only effective response to this change was informed planning. As he put it, "a high degree of efficiency cannot be obtained, except when following a chartered course." Those words, written in 1928, are no less true today.

In NIOSH we are trying to assure that the resources committed to our charge are used to stretch the frontiers of knowledge, to permit rapid and effective response to important developments, and to produce the information that calls for action. We dedicate all of this to one central purpose: protecting and preserving something of inestimable value--the life and health of the American worker. The Plan that follows is our attempt to provide a "chartered course" for NIOSH for the years 1985 to 1990.



J. Donald Millar, M.D.
Assistant Surgeon General
Director
National Institute for Occupational
Safety and Health

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INTRODUCTION

The National Institute for Occupational Safety and Health conducts research to help assure that no worker will suffer from a work-related disease, disability, or fatality. The primary legislative authorities that establish the Institute's responsibilities are:

1. The Occupational Safety and Health Act of 1970 (Public Law 91-596) created NIOSH in the Department of Health and Human Services (then DHEW) to conduct research in occupational safety and health. NIOSH is authorized to develop recommended occupational safety and health standards and to conduct education and training programs that will provide an adequate supply of qualified personnel in the field of occupational safety and health. This Act also established the Occupational Safety and Health Administration in the Department of Labor (DOL) to conduct inspections, promulgate and enforce related standards, and conduct education and training programs for workers.
2. The Federal Mine Safety and Health Amendments Acts of 1977 (Public Law 91-164) amended the Federal Coal Mine Health and Safety Act of 1969 (Public Law 91-173). The 1977 Act created the Mine Safety and Health Administration in DOL and gave the Public Health Service authority to conduct surveillance and recommend health standards for the mining industry.
3. The Public Health Services Act of 1966 (Public Law 89-749), Title III, Part A, Research and Investigation, provides for (a) dissemination of information and practical application of research activities, (b) studies and testing of substances for carcinogenicity, teratogenicity, and mutagenicity, (c) the interchange between the United States and participating foreign countries of research scientists engaged in biomedical research, and (d) assistance to the States to meet health emergencies or problems involving or resulting from disasters or disease.

The research of the Institute focuses on the list of Ten Leading Work-Related Diseases and Injuries. The list was developed considering the magnitude and severity of each problem, and the potential for preventing it. The selection of research projects is based upon how well they address the leading occupational health problems and the DHHS Objectives for the Nation.

As the year progresses, modifications will be made to the projects in our FY 1985 Program Plan as a result of research findings, emergencies, etc. NIOSH is committed to improving this Plan in both content and presentation, and would, therefore, appreciate suggestions for improving it. Please send recommendations or questions regarding this Plan to Joyce Johnson, NIOSH, Centers for Disease Control, Building 1, Room 3040, 1600 Clifton Road, Atlanta, GA 30333.

IDENTIFY WORK-RELATED DISEASES AND INJURIES

NIOSH's goal, to identify work-related diseases and injuries so as to detect and define significant changes in the status of occupational safety and health, is the foundation of the NIOSH policy to prevent occupationally induced illness, injuries, and deaths.

In attempting to accomplish this goal, a strategy of surveillance and containment has evolved. Surveillance activities include: (1) the detection and reporting of work injuries and diseases; (2) analyses of these reports to arrive at a better understanding of the causal factors of injury and disease; and (3) effective communication of these findings in ways that will lead to intervention.

To the extent possible, existing national and State systems are used to detect work-related injuries, diseases, disabilities, and deaths. Where these systems fall short of providing site specific information on a timely basis, NIOSH has initiated efforts to cooperate with the States to use existing reportable disease systems or to build appropriate new systems to meet these shortcomings. For example, through cooperative agreements, NIOSH and State health department staffs analyze surveillance data in order to establish a better sense of the time, person, place, and descriptions of affected workers. These findings provide a basis for further research and for public health action. Much of the same information can also be used to measure progress in preventing work-related injuries and diseases.

NIOSH investigators determine priorities for research and public health action, and measure progress in prevention strategies. As mentioned above, facts are generated from national and State data bases. Data also are generated from requests by workers and employers for health hazard evaluations (HHEs). Scientific hypotheses are generated from these HHEs. Responding to requests for HHEs is one way NIOSH collects intelligence about new and emerging problems.

Efforts to achieve the Institute's goals have led to the development of a list of the Ten Leading Work-Related Diseases and Injuries. This list is "intended to be dynamic; it will be reviewed periodically for necessary updating as knowledge increases and as conditions change and are brought under better control."¹

The two programs used to identify OSH problems are as follow:

PROGRAM AREAS: Surveillance
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The NOHSM surveys began in 1984 and will continue through 1990. As each commodity group survey is completed, MSHA will use the data to improve and refine its health standards enforcement program. MSHA expects to begin using these data early in 1985.

In addition to NOHSM, numerous targeted environmental investigations of potential health hazards identified by MSHA, BOM, and through literature reports, have been completed. Several significant sources of previously developed NIOSH and State environmental data have been identified and a portion of these records have been obtained for computer entry. MSHA environmental data records have been accessed and portions retrieved as requested for use in various projects and hazard evaluations. Progress has also been made on the development of a computer-based file system (Mine Environmental Data Analysis Library), which will allow environmental data to be stored, edited, retrieved, and analyzed for research evaluations.

Disease Surveillance in General Industry and Mining

The development and use of the NIOSH disease surveillance system in DSHEFS and DRDS will continue to respond to the following initiatives: (a) the leading work-related diseases and injuries; (b) adaption of existing national, State, and other health data systems; (c) statistical and epidemiologic activities that identify and interpret trends in, or possible determinants of, work-related disease, disability, and mortality; and (d) the need to disseminate the surveillance information. A major emphasis of the system during this period will be placed on lung diseases, occupational dermatitis, and heavy metal poisoning as stated in the Objectives for the Nation.

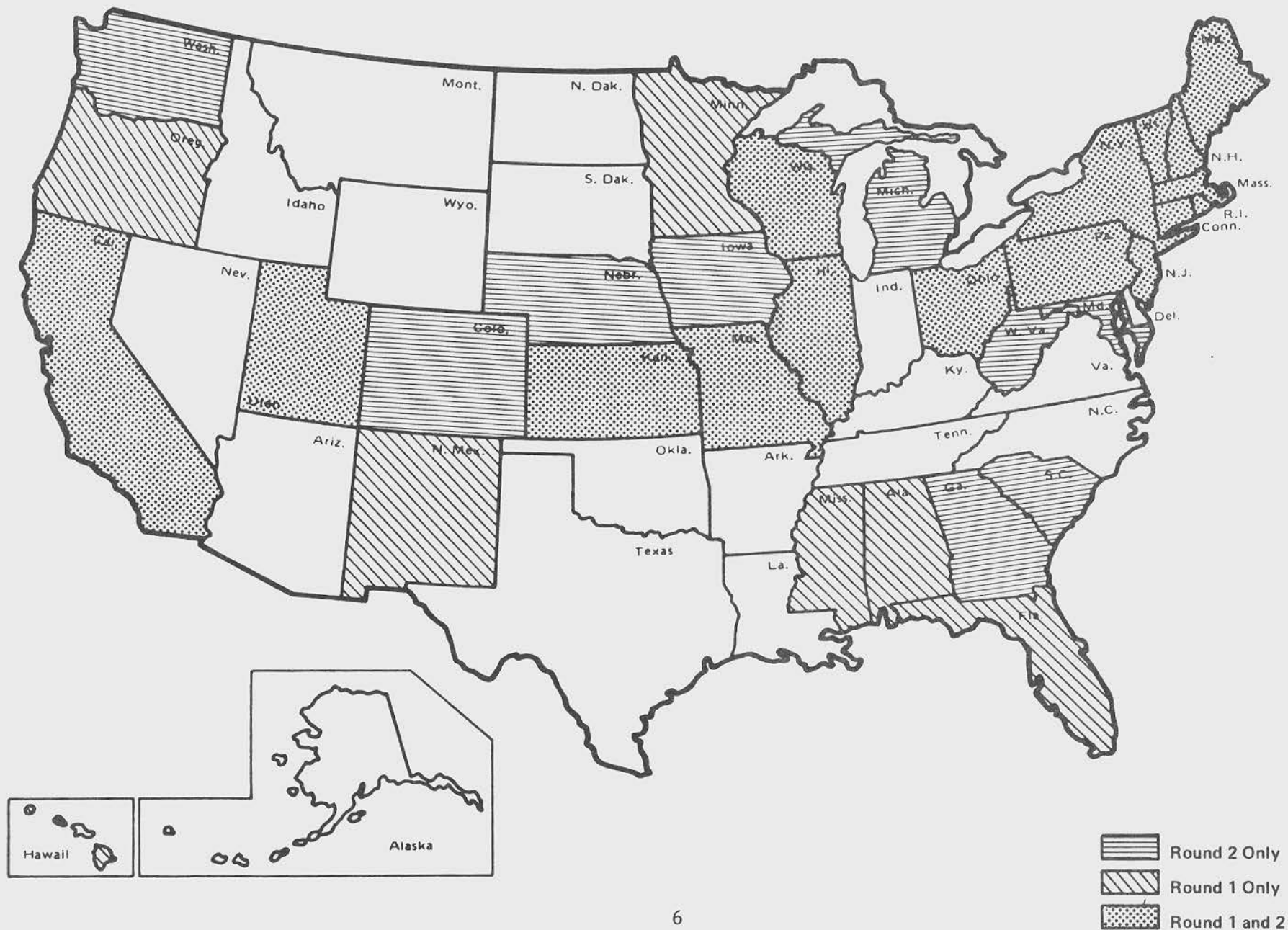
State interest in occupational health surveillance is apparent and widespread. Apart from the States' response to the NIOSH surveillance cooperative agreements (Figure 1), State epidemiologists expressed their interest in collaborating with NIOSH in a variety of surveillance-related activities (Figure 2). In addition, NIOSH has supported industry and occupation coding training in 33 states. This training is the result of a collaborative effort between NIOSH, the National Center for Health Statistics, Bureau of the Census, and State Vital Statistics Offices. This expression of State interest, and the related training activities, is consistent with the program objective to develop, maintain, and improve a nationwide system for the identification and monitoring of work-related disease, disability, and mortality.

Safety Surveillance

The Division of Safety Research (DSR) assesses, through basic descriptive epidemiology, the distribution of occupational injuries by occupation, industry, age, sex, and related demographic and causal categories. These factors are analyzed for effective problem definition and priority setting, and studies are conducted of high-risk worker populations to quantify and evaluate specific causal risk factors. In FY 1985, DSR surveillance will continue to identify high-risk worker groups and problems in the musculoskeletal, traumatic injury, and fatality areas. In the latter group, construction, confined spaces, and electrocution fatalities will receive special emphasis.

STATE AND TERRITORIAL INTEREST PARTICIPATING NIOSH SCANS PROGRAM

Figure 1



STATE AND TERRITORIAL INTEREST SURVEILLANCE-RELATED ACTIVITIES

Figure 2



Source: August 10, 1982 Draft Report NIOSH-State Occupational Safety and Health.

DSR develops descriptive statistics based on estimates developed from the Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS), The Bureau of Labor Statistics' Supplementary Data System (SDS), Bureau of Labor Statistics' Work Injury Reports (BLS-WIR) surveys, individual State data through State cooperative agreements, the U.S. County Business Pattern, the Bureau of Labor Statistics' annual survey, and National Safety Council annual reports.

Institute Priorities

The Division of Standards Development and Technology Transfer (DSDTT) collects and abstracts toxicological data for chemical substances in its Registry of Toxic Effects of Chemical Substances (RTECS). The computerized data system contains information on over 69,000 substances, a portion of which have been linked with NOHS.

Working in concert and with data from the surveillance components of DSHEFS, DRDS, and DSR, DSDTT will provide a scientific basis for Institute priorities in occupational injury and illness. Recommendations from NIOSH task groups on the "Leading Work-Related Diseases and Injuries" also will be utilized.

In FY 1984 and FY 1985, data from the Bureau of Labor Statistics will be used to prioritize industries for risk of injury. In FY 1985, DSR, in coordination with other NIOSH divisions, will conduct a joint project to develop a comprehensive prioritization methodology and profiles of injury experience for various industries.

PROGRAM AREA CONCENTRATION

OCCUPATIONAL LUNG DISEASES: DSHEFS, in collaboration with DRDS, initiated an FY 1984 project, the National Reporting of Selected Occupational Diseases. Starting with silicosis, this project will eventually encompass State-based reporting of asbestosis, byssinosis, and coal workers' pneumoconiosis.

DSHEFS, through the use of National Center for Health Statistics' mortality tapes and a computer-based mapping and analysis system, has developed the capability to monitor patterns of mortality from occupationally-related causes of death. This will aid NIOSH in assessing progress toward the objective that, by 1990, among workers newly exposed after 1985, there should be virtually no new cases of four preventable occupational diseases; asbestosis, byssinosis, silicosis, and coal worker's pneumoconiosis.

The 1981-1983 National Occupational Exposure Survey (NOES) has compiled information on potential exposure agents in a probability sample of approximately 5,000 worksites. When the data are analyzed, it will be possible to estimate worker populations potentially exposed to agents linked to lung disease and to describe the industries and occupations where those potential exposures occur.

DRDS will (1) inventory chemical and mineral substances brought into mining environments and used in general maintenance or in extracting or processing ores, (2) sample bulk-settled dust materials that are generated in individual mines, (3) collect information about occupational health surveillance programs available to miners, and (4) identify potential exposure conditions in the mines covered by the survey. After obtaining this information, the toxicity of the substances and effects of the physical agents and ergonomic stresses identified will be determined, and exposures within the entire mining industry will be projected. In FY 1984, DRDS began the fourth round of the mandated X-ray surveillance program for coal miners. An analysis of data from the previous rounds indicates a prevalence of 1.09 percent of simple coal workers' pneumoconiosis in miners with less than ten years of exposure and a net progression from category 0/0 of 1.2 percent. Although both findings indicate that changes in radiographic evidence of coal workers' pneumoconiosis are consistent with those expected under the mandated dust levels, caution must be used in their interpretation. Coal workers' pneumoconiosis, particularly at lower dust levels, may take considerably longer than the ten year observation period to develop. Therefore, these results must be considered as preliminary. Issues for consideration and research in the future use of these surveillance data are selection bias, differences in X-ray interpretation, and miner participation.

In FY 1985, DRDS will continue to conduct the coal miner x-ray surveillance effort and will continue to use these data to assess the effectiveness of the 2 mg/m³ MSHA dust standard. These results should provide the necessary information of whether the 1990 objective of virtually no new cases of coal workers' pneumoconiosis has been achieved. In addition, in FY 1985, DRDS will implement several new approaches to increase miner participation in the surveillance program.

MUSCULOSKELETAL INJURIES: NOES surveyors recorded a number of potentially chronic trauma hazards during the course of their plant investigations. The study included passive postures, awkward postures, lifting postures, arm transports, shoulder transports, hand/wrist manipulations, and finger manipulations. Table 1 shows the estimated total number of employees potentially exposed to chronic trauma hazards from the NOES data base. This table also shows female employees potentially exposed to these hazards. Tables 2 and 3 show the total number of employees exposed to the chronic trauma hazards discussed above from the NOES data base in the top three industries and top three occupations, respectively. As expected, Table 2 shows that the special trade and general building contractors, apparel, and textile products industries pose a high risk of exposure to chronic trauma hazards. Table 3 shows that assemblers and laborers (both construction and otherwise) are at greatest risk with regard to chronic trauma hazards.

Table 1.

ESTIMATED NUMBER OF EMPLOYEES, INCLUDING FEMALE EMPLOYEES,
POTENTIALLY EXPOSED TO CHRONIC TRAUMA HAZARDS--NOES, 1980-83

<u>AGENT</u>	<u>ESTIMATED NO. OF PLANTS</u>	<u>ESTIMATED NO. OF EMPLOYEES</u>	<u>NUMBER OF FEMALE EMPLOYEES</u>	
			<u>NUMBER</u>	<u>%TOTAL</u>
Passive Postures	113,565	3,514,000	1,650,400	47.0
Awkward Postures	86,266	1,590,300	241,200	15.2
Lifting Postures	153,811	3,062,400	601,300	19.6
Arm Transports	180,071	4,535,500	1,229,100	27.1
Shoulder Transports	139,336	2,791,400	506,100	18.1
Head/Wrist Manipulations	176,780	4,897,800	1,623,400	33.1
Finger Manipulation	124,518	3,532,200	1,984,700	56.2

Table 2.

ESTIMATED NUMBER OF EMPLOYEES POTENTIALLY EXPOSED TO CHRONIC TRAUMA
HAZARDS IN HIGHEST RISK INDUSTRIES--NOES 1980-83

<u>AGENT</u>	ESTIMATED NO. OF EMPLOYEES	STANDARD INDUSTRIAL CLASSIFICATION			TOTAL
		CODE	DESCRIPTION	NO. OF EMPLOYEES	
Passive Postures	3,514,000	23	Apparel, other textile products	413,300	11.8
		35	Machinery, exc. Electrical	298,800	8.5
		20	Food, Kindred Products	267,200	7.6
Awkward Postures	1,590,300	17	Special Trade Contractors	316,400	19.9
		15	General Building Contractors	153,000	9.6
		80	Health Services	83,100	5.2
Lifting Postures	3,062,400	80	Health Services	389,400	12.7
		17	Special Trade Contractors	320,100	10.5
		15	General Building Contractors	234,300	7.7
Arm Transports	4,535,500	17	Special Trade Contractors	385,100	8.5
		20	Food, Kindred Products	300,100	6.6
		80	Health Services	291,800	6.4
Shoulder Transports	2,791,400	17	Special Trade Contractors	284,100	10.2
		15	General Building Contractors	214,600	7.7
		20	Food, Kindred Products	214,400	7.7
Hand/Wrist Manipulations	4,897,800	23	Apparel, Other Textile Products	425,600	8.7
		17	Special Trade Contractors	407,600	8.3
		35	Machinery, exc. Electrical	333,300	6.8
Finger Manipulations	3,523,200	23	Apparel, Other Textile Products	638,500	18.1
		36	Electrical, Electronic Equipment	299,000	8.5
		35	Machinery, Exc. Electrical	239,700	6.8

Table 3. ESTIMATED NUMBER OF EMPLOYEES POTENTIALLY EXPOSED TO CHRONIC TRAUMA BY OCCUPATION

<u>AGENT</u>	ESTIMATED NO. OF EMPLOYEES	OCCUPATIONAL CLASSIFICATION			PERCENT TOTAL
		CODE	DESCRIPTION	NO. OF EMPLOYEES	
Passive Postures	3,514,000	785	Assemblers	363,000	10.3
		744	Textile Sewing Mach. Opers.	357,000	10.2
		777	Misc. Mach. Opers. n.e.c.	178,000	5.
Awkward Postures	1,590,300	453	Janitors, Cleaners	134,400	8.5
		575	Electricians	123,500	7.8
		869	Construction Laborers	97,900	6.2
Lifting Postures	3,062,400	869	Construction Laborers	265,700	8.7
		095	Registered Nurses	256,400	8.4
		889	Laborers, exc. Constr.	188,100	6.1
Arm Transports	4,535,500	785	Assemblers	300,700	6.6
		869	Construction Laborers	246,600	5.4
		889	Laborers, exc. Constr.	210,800	4.7
Shoulder Transports	4,897,800	869	Construction Laborers	250,000	9.0
		889	Laborers, exc. Constr.	172,700	6.2
		804	Truck Drivers, Heavy	153,400	5.5
Hand/Wrist Manipulations	4,897,800	785	Assemblers	650,600	13.3
		744	Textile Sewing Mach. Opers	352,700	7.2
		453	Janitors, Cleaners	187,600	3.8
Finger Manipulations	3,532,200	785	Assemblers	650,600	18.2
		744	Textile Sewing Mach. Oper.	629,100	17.8
		575	Electricians	126,600	3.6

*Bureau of the Census

OCCUPATIONAL CANCERS: In FY 1983, a DSHEFS' staff member chaired the Subcommittee on Occupational Cancer Risk at the request of the Chairman, HHS, Committee to Coordinate Environmental and Related Programs (CCERP). A report was submitted to the Chairman, CCERP, in FY 1984 in which 23 recommendations were made to improve data bases for occupational cancer risk estimation. The recommendations were made in an effort to answer four specific questions: (1) Are the data systems in place today that will lead to better estimates in the future? If not, what is needed? (2) Given the current state of knowledge concerning the causes of cancer, is it reasonable to attempt to refine the estimation process? (3) Should a conference involving non-government scientists be convened to explore further the occupational risk estimation methodology? (4) What additional research is needed in this area? DSHEFS also completed an extensive literature search on bladder cancer in connection with the surveillance project, "Estimation of Occupationally Related Mortality and Morbidity," and compiled information through NOES of potential exposure agents in a probability sample of about 5,000 worksites. It will now be possible to estimate worker populations potentially exposed to carcinogens and to describe the industries and occupations involved. Additionally, a model has been developed which is capable of making predictions concerning a chemical compound's potential for carcinogenic properties based on its molecular structure.

SEVERE OCCUPATIONAL TRAUMATIC INJURIES

Utilizing NEISS, DSR is able to produce basic injury surveillance data. In FY 1983 and FY 1984, several MMWR articles related to acute occupational trauma and deaths were published as follows:

1. National Institute for Occupational Safety and Health, Division of Safety Research. Severe Occupational Traumatic Injuries. MMWR 33(16):213-215. 1984.
2. National Institute for Occupational Safety and Health, Division of Safety Research. Occupational Finger Injuries--United States, 1982. MMWR 32(45):589-591. November 18, 1983.
3. Sanderson, L.M., Frost, J.L., Electrocution of a Truck Driver. MMWR 33(2):14-15. 1984.

DISORDERS OF REPRODUCTION: The National Occupational Hazard Survey (NOHS) and National Occupational Exposure Survey (NOES) have compiled information on potential exposure agents in a probability sample of about 5,000 worksites. This survey can be used to estimate worker populations potentially exposed to agents which contribute to reproductive problems and to describe the industries and occupations involved.

NEUROTOXIC DISORDERS: In conjunction with the National Center for Health Statistics, DSHEFS combined data from the National Occupational Hazard Survey (NOHS) with data from the National Health and Nutritional Examination Survey (NHANES) to examine the relationship between blood lead, potential occupational exposure to lead, and smoking. The results of this examination were published in the April 29, 1983, issue of the Centers for Disease Control Morbidity and Mortality Weekly Report. Two observations stood out from this

preliminary analysis. First, the mean blood lead determinations for men in the United States with potential occupational exposure to lead was significantly greater than that for men without potential exposure to lead. Second, smoking appeared to have an additive effect to the potential occupational exposure to lead in producing elevated blood lead levels.

NOISE-INDUCED LOSS OF HEARING: In FY 1983, NOHS data identified industries that have low, medium, and high environmental noise levels. These results are now being correlated with self-reported hearing loss by respondents in the 1971 and 1977 National Health Interview Surveys (HIS). When completed, this analysis will help to estimate the extent of work-related hearing loss among American workers. This type of study can also be repeated using data from NOES. Work will continue on collaborative projects between Division of Respiratory Disease Studies (DRDS) and the Division of Biomedical and Behavioral Science (DBBS) on mining surveillance activities involving hearing loss among non-coal miners and heat stress in mining (entailing surveyor training in audiometry and five mine heat stress surveys).

DERMATOLOGIC CONDITIONS: Using NOHS and NOES data, DSHEFS will be able to estimate the number of U.S. workers potentially exposed to chemical agents that are known to cause dermatological problems, and to describe the industries and occupations involved. Also, DSR, through NEISS, receives reports of dermatologic injuries, which are treated in hospital emergency rooms.

Figure 3

NEISS HOSPITALS JANUARY 1985



IDENTIFY WORK-RELATED DISEASES AND INJURIES

***** SURVEILLANCE *****

DIVISION OF RESPIRATORY DISEASE STUDIES

1. COMPUTER SUPPORT
PROJECT OFFICER: LARRY F BOYCE (FTS-923-4306) START DT: 08/70 END DT: C
OBJECTIVE: PROVIDE DATA PROCESSING SUPPORT TO DRDS.
2. INCREASE PARTICIPATION RATES FOR NATIONAL STUDY OF COAL MINERS
PROJECT OFFICER: ROBERT W WHEELER (FTS-923-4474) START DT: 10/84 END DT: 09/86
OBJECTIVE: TO TAKE ACTION TO REVERSE THE CONTINUAL DECLINE IN THE RATES OF MINER PARTICIPATION IN THE NATIONAL STUDY OF COALWORKERS' PNEUMOCONIOSIS.
3. SURVEILLANCE SYSTEM FOR OCCUPATIONAL RESPIRATORY DISEASE
PROJECT OFFICER: THOMAS B RICHARDS (FTS-923-4223) START DT: 09/84 END DT: 09/86
OBJECTIVE: TO DEVELOP A SURVEILLANCE SYSTEM FOR OCCUPATIONAL RESPIRATORY DISEASE.
4. NATIONAL OCCUPATIONAL HEALTH SURVEY OF MINING
PROJECT OFFICER: WALLACE G CARR (FTS-923-4496) START DT: 10/82 END DT: 12/90
OBJECTIVE: TO DESCRIBE OCCUPATIONAL HEALTH PROGRAMS AND POTENTIAL EXPOSURES IN THE MINING INDUSTRY AS REQUESTED BY MSHA.
5. MINING ENVIRONMENTAL DATA ANALYSIS LIBRARY (MEDAL)
PROJECT OFFICER: ALWIN L DIEFFENBACH (FTS-923-4496) START DT: 10/81 END DT: C
OBJECTIVE: TO MAKE HISTORICAL ENVIRONMENTAL DATA AVAILABLE TO NIOSH RESEARCH PROJECTS.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

6. MONITORING REPRODUCTIVE OUTCOMES
PROJECT OFFICER: JOYCE A SALG (FTS-684-4332) START DT: 10/83 END DT: 12/85
OBJECTIVE: TO UTILIZE PARENTAL OCCUPATION AND INDUSTRY INFORMATION FROM BIRTH AND FETAL DEATH RECORDS TO MONITOR ADVERSE REPRODUCTIVE OUTCOMES.

7. ANALYSIS OF HEALTH INTERVIEW SURVEY DATA
 PROJECT OFFICER: SHARON E SHILLING (FTS-684-4332) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO USE THE HEALTH INTERVIEW SURVEY DATA FOR THE SURVEILLANCE OF
 OCCUPATION-RELATED ILLNESS IN THE UNITED STATES.
8. CASE-CONTROL SURVEILLANCE TO TEST HYPOTHESES GENERATED BY COMPUTER MAPS
 PROJECT OFFICER: ROBERT D DUBROW (FTS-684-4332) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO USE CASE-CONTROL STUDIES BASED UPON DEATH CERTIFICATES TO TEST
 HYPOTHESES GENERATED BY GEOGRAPHIC CORRELATION ANALYSES.
9. MORTALITY SURVEILLANCE OF OCCUPATION AND INDUSTRY
 PROJECT OFFICER: WILLIAM E CROUSE (FTS-684-4332) START DT: 10/80 END DT: C
 OBJECTIVE: TO ENHANCE THE U.S. MORTALITY STATISTICS SYSTEM THROUGH THE COLLECTION,
 CODING, AND ANALYSIS OF DECEDENT OCCUPATION AND INDUSTRY DATA.
10. DISABILITY SURVEILLANCE OF OCCUPATION AND INDUSTRY
 PROJECT OFFICER: THOMAS J FISCHBACH (FTS-684-4332) START DT: 10/80 END DT: C
 OBJECTIVE: TO MONITOR PERMANENT DISABILITY AWARDS AS AN AID TO THE IDENTIFICATION
 OF OCCUP. AND IND. GROUPS EXPERIENCING ABNORMAL PATTERNS OF DISABILITY.
11. SURVEILLANCE COOPERATIVE AGREEMENTS BETWEEN NIOSH AND STATES (SCANS)
 PROJECT OFFICER: NINA R LALICH (FTS-684-4332) START DT: 10/79 END DT: C
 OBJECTIVE: TO ASSIST IN THE DEVELOPMENT OF A COOPERATIVE NIOSH-STATE OCCUPATIONAL
 HEALTH AND SAFETY SURVEILLANCE PROGRAM.
12. REGISTRATION OF DISEASE AND EXPOSURE COHORTS
 PROJECT OFFICER: JOYCE A SALG (FTS-684-4332) START DT: 10/78 END DT: C
 OBJECTIVE: TO MAINTAIN DISEASE AND EXPOSURE REGISTRIES, AND FACILITATE PERIODIC
 CASE REVIEWS OR EPIDEMIOLOGIC ANALYSES.
13. COMPUTER GENERATED MAPS
 PROJECT OFFICER: NINA R LALICH (FTS-684-4332) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO DEMONSTRATE THE FEASIBILITY OF USING COMPUTER-GENERATED MAPS FOR
 OCCUP. HEALTH SURV., AND EVALUATE THE UTILITY TO NIOSH AND OTHERS.
14. NATIONAL REPORTING OF SELECTED OCCUPATIONAL DISEASES
 PROJECT OFFICER: ROBERT J MULLAN (FTS-648-4353) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO DEVELOP AND IMPLEMENT A STRATEGY FOR STATE-BASED REPORTING OF
 SELECTED OCCUPATIONAL DISEASES.

15. INCREASING OCCUPATIONAL HEALTH EDUCATION FOR PHYSICIANS
 PROJECT OFFICER: ROBERT J MULLAN (FTS-684-4353) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO ESTABLISH A WORKING GROUP TO DEVELOP AND IMPLEMENT A PLAN FOR
 INCREASING PRIMARY CARE PHYSICIAN AWARENESS OF OSH CONCERNS.
16. ESTIMATION OF OCCUPATIONALLY RELATED MORTALITY AND MORBIDITY
 PROJECT OFFICER: JOHN H MORRISON (FTS-684-4353) START DT: 10/82 END DT: C
 OBJECTIVE: TO DEVELOP AND IMPLEMENT THE NECESSARY METHODS TO ESTIMATE
 OCCUPATIONALLY RELATED MORTALITY AND MORBIDITY.
17. SENTINEL HEALTH EVENT LIST MAINTENANCE
 PROJECT OFFICER: LEELA I MURTHY (FTS-684-4353) START DT: 10/82 END DT: C
 OBJECTIVE: TO MAINTAIN SURVEILLANCE OF THE SCIENTIFIC LITERATURE FOR IDENTIFYING
 NEW SENTINEL HEALTH EVENTS SHE(O)s AND UPDATING CURRENT SHE(O)s.
18. ACCESS TO OSHA INSPECTION DATA
 PROJECT OFFICER: JOSEPH A SETA (FTS-684-4491) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO LINK ENVIRONMENTAL MEASUREMENTS COLLECTED DURING OSHA COMPLIANCE
 ACTIVITIES TO THE NOHS AND NOES DATA BASES.
19. ACCESS TO NOHS DATA BASE--PROFILE DEVELOPMENT
 PROJECT OFFICER: JOSEPH A SETA (FTS-684-4491) START DT: 10/78 END DT: C
 OBJECTIVE: TO DEVELOP INFORMATION PROFILES FROM THE NATIONAL OCCUPATIONAL HAZARD
 SURVEY DATA BASE UPON REQUEST.
20. HAZARD PROFILING SYSTEM
 PROJECT OFFICER: DAVID S SUNDIN (FTS-684-4491) START DT: 10/83 END DT: C
 OBJECTIVE: TO PROVIDE A QUICK ACCESS REPOSITORY FOR DATA ON HAZARDS, OCCUPATIONS,
 AND INDUSTRIES TO ACCOMMODATE INFORMATION REQUESTS.
21. SELF-SURVEY MECHANISMS
 PROJECT OFFICER: DAVID S SUNDIN (FTS-684-4491) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO UPDATE A NIOSH COOPERATIVE EXPOSURE SYSTEM WITH NEW/CURRENT METHODS
 IN USE.
22. TRADENAME INGREDIENTS--NATIONAL OCCUPATIONAL EXPOSURE SURVEY (NOES)
 PROJECT OFFICER: DAVID S SUNDIN (FTS-684-4491) START DT: 10/77 END DT: C
 OBJECTIVE: TO OBTAIN INGREDIENT INFORMATION FROM THE MANUFACTURERS OF THE NEARLY
 100,000 TRADENAMED PRODUCTS RECORDED IN THE NOES.

23. MATERIAL LOCATOR SYSTEM
PROJECT OFFICER: HERBERT L VENABLE (FTS-684-4491) START DT: 10/80 END DT: C
OBJECTIVE: TO ASSIST UNIONS IN ORGANIZING INFORMATION RECEIVED FROM THEIR
MEMBERSHIP ON POTENTIAL EXPOSURE AGENTS.

DIVISION OF SAFETY RESEARCH

24. TRAUMATIC INJURY WORKING GROUP PROJECT
PROJECT OFFICER: DONALD L CAMPBELL (FTS-923-4802) START DT: 10/84 END DT: 09/85
OBJECTIVE: TO PRODUCE A NATIONAL STRATEGY REPORT FOR THE CONTROL OF TRAUMATIC
OCCUPATIONAL INJURIES THROUGH THE WORKING GROUP.
25. OCCUPATIONAL SAFETY SURVEYS
PROJECT OFFICER: WILLIAM F PERRY (FTS-923-4811) START DT: 06/77 END DT: C
OBJECTIVE: TO PROVIDE TECHNICAL ASSISTANCE TO BLS AND SELECTED STATE AGENCIES IN
ORDER TO ENHANCE THEIR WORKERS TO CONDUCT OCCUPATIONAL SAFETY SURVEYS.
26. GENERAL SURVEILLANCE
PROJECT OFFICER: ROBERT J CLEVELAND (FTS-923-4812) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE SURVEILLANCE AND INJURY DATA SUPPORT TO OTHER DSR EFFORTS AND TO
MANAGE DAS ACTIVITIES. INCLUDES COOP AGREEMENTS, STATE RISK FOLLOW-UP.
27. PRIORITIES DEVELOPMENT AND SURVEILLANCE SYSTEM COORDINATION
PROJECT OFFICER: ROBERT J CLEVELAND (FTS-923-4812) START DT: 10/81 END DT: C
OBJECTIVE: PROVIDE INPUT TO DEVELOPMENT OF A METHOD FOR PRIORITY SETTING AND
DEVELOP A PILOT STATISTICAL PROFILE DOCUMENT.
28. IDENTIFICATION OF PERMANENT DISABILITY COSTS AND CAUSES
PROJECT OFFICER: ROBERT J CLEVELAND (FTS-923-4812) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO IDENTIFY COSTS AND CAUSES OF PERMANENT DISABILITY INJURIES IN THE
TRAUMATIC AND MUSCULOSKELETAL INJURY AREAS.
29. NEISS OCCUPATIONALLY RELATED DATA SHARING
PROJECT OFFICER: JOSEPH GUSTIN (FTS-923-4806) START DT: 08/80 END DT: C
OBJECTIVE: TO SUPPLY SURVEILLANCE DATA FOR ESTIMATING TOTAL U.S. OCCUPATIONAL
INJURIES, AND TO SUPPLY CASES FOR FOLLOW-UP STUDIES.

30. FATAL OCCUPATIONAL INJURY SURVEILLANCE

PROJECT OFFICER: MICHAEL B MOLL (FTS-923-4805)

START DT: 10/84

END DT: C

OBJECTIVE: TO ESTABLISH A FATAL OCCUPATIONAL INJURY DATA BASE USING DEATH
CERTIFICATE INFORMATION.

HEALTH HAZARD EVALUATIONS/TECHNICAL ASSISTANCE

PROGRAM AREA GOAL:

Identify work-related diseases and injuries so as to detect and define significant changes in the status of occupational safety and health.

PROGRAM OBJECTIVES:

- By 1986, conduct 35 fatality and injury investigations (FACE).
- By 1986, perform 50 evaluations of superfund sites for EPA.
- By 1986, provide industrial hygiene and medical support for hazardous waste evaluations conducted under the Interagency Agreement with EPA's Superfund Group.
- By 1987, extend visibility of respiratory complaint systems to users through use of advertising and standard formats for complaints.
- By 1988, increase slightly from 1983 levels the number of general industry health hazard evaluations that are handled, and improve the quality and effectiveness of the program.

PROGRAM DESCRIPTION:

Health Activities

The purpose of this program is to conduct the Health Hazard Evaluation Program mandated by the Occupational Safety and Health and the Federal Mine Safety and Health Acts. This program responds to requests for assistance from employers, employees, and their authorized representatives, other federal agencies, and State and local agencies to determine the toxic effects of chemical, biological, or physical agents that are found in the workplace. To accomplish this, medical, epidemiologic, and industrial hygiene investigations are conducted at the workplaces of concern. In FY 1984, there were 67 request for assistance from State or local health departments, and 31 HHEs conducted jointly with State or local health departments.

These investigations evaluate the substances, processes, work practices, etc., found in the workplace, and make conclusions about potential occupational health hazards based on the most recently published criteria (i.e., OSHA and MSHA standards, NIOSH recommendations for standards, and Threshold Limit Values (TLV) published by the American Conference of Governmental Industrial Hygienists), and on the medical or epidemiologic findings of the evaluation. Recommendations for improved work practices, control techniques, industrial hygiene procedures, and medical monitoring are then made to the employer to reduce the risk of adverse health effects on the employees.

A major effort over the next three-to-five years will be to develop methods to work more closely with State health departments in conducting occupational health hazard evaluations. This will include: (a) participation of State-based EIS officers and other health department personnel in field evaluations; (b) increased dissemination efforts aimed at assisting State health departments; (c) responding to requests for assistance; (d) assigning NIOSH employees to States; and (e) awarding Cooperative Agreements to State health departments to conduct health hazard evaluations. Cooperative Agreement States include New Jersey, Rhode Island, and Iowa.

NIOSH expects that over the next three-to-five years, the number of general industry and mining health hazard evaluation requests will increase slightly, and the quality and effectiveness of the evaluations will improve. The Health Hazard Evaluation Program currently receives about 450 to 550 requests per year, and this number could increase to at least 600 requests per year. The increased number of requests would be handled by better triaging of incoming requests and ongoing evaluations, and by better collaboration with State health departments.

To improve the quality and effectiveness of the program, the priorities of the program will be coordinated with efforts in other parts of NIOSH, particularly in the context of the PHS 1990 Objectives for the Nation. More coordination with other Centers at CDC and with other NIOSH divisions will be implemented. This effort will be directed at improving the industrial hygiene, medical, and epidemiologic methodologies used, and at identifying significant occupational health problems appropriate for further evaluation by these groups. We also will increase our dissemination efforts through MMWR articles, trade name and technical journal articles, and other publications.

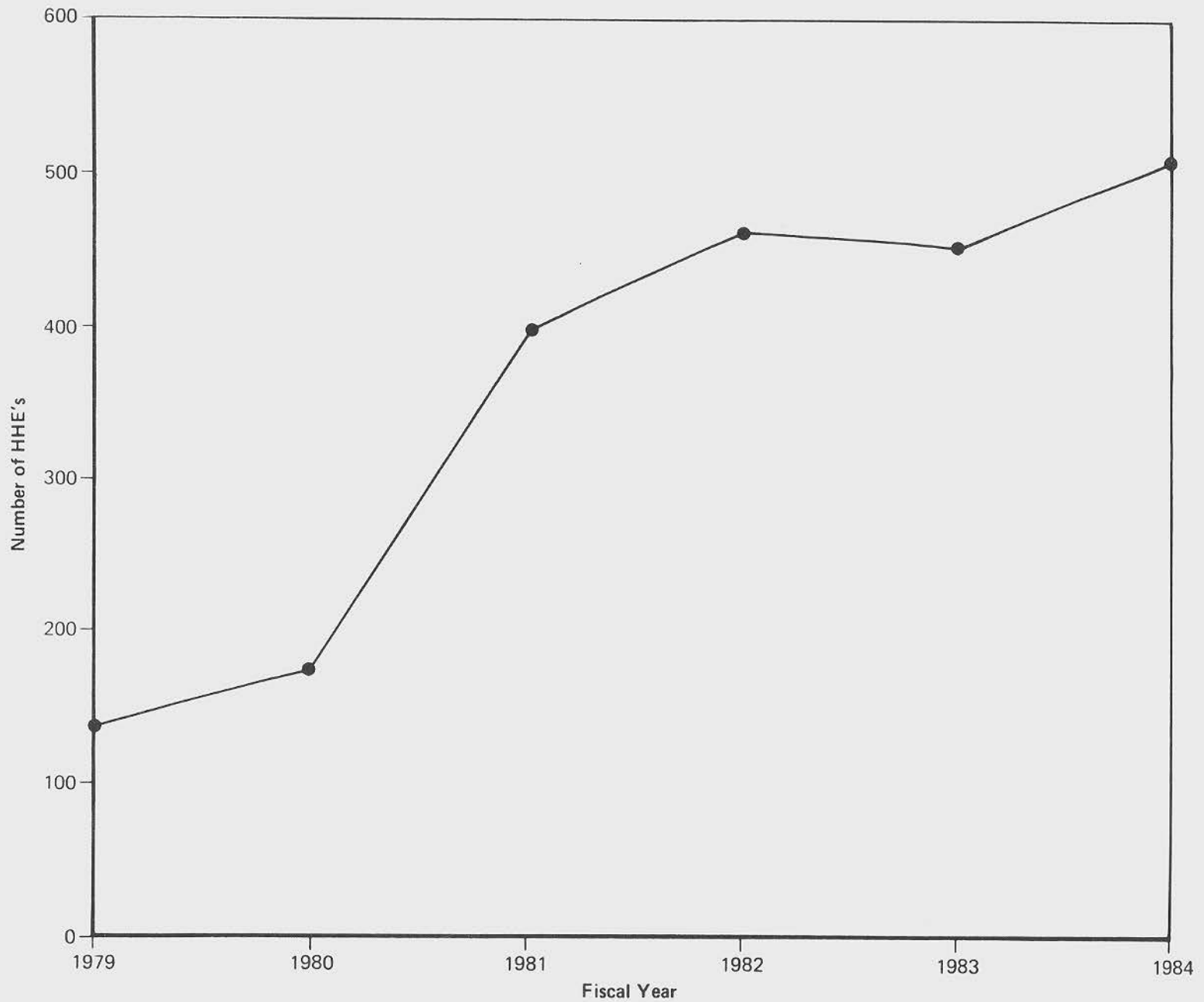
Dissemination efforts targeted at informing specific occupational or industrial groups of the methods of controlling specific occupational health hazards will be emphasized, including occupational dermatitis, lung diseases, and heavy metal poisoning as required in the PHS 1990 Objectives for the Nation. The number of general industry, mining, and other health hazard evaluations conducted the last several years are shown in Figures 4 and 5.

Safety Activities

In response to the problem of occupational fatalities and the lack of existing data suitable for risk assessment, DSR is conducting the Fatal Accident Circumstances and Epidemiology (FACE) project. This project is a technical assistance program keying on case-comparison analysis of causal factors which increase workers' risk of fatal injury. For each fatal accident, a survey of the accident site and collection of circumstance-specific information is made. Also, interviews are conducted with representative comparison workers and surrogates (supervisor, co-worker, and next-of-kin) of the victim. This study will produce scientifically-collected data suitable for detailed risk assessment. DSR is presently collaborating with the States of West Virginia, Pennsylvania, and Ohio in the collection of this information and is devoting particular emphasis to confined space, electrocution, and construction fatalities. Technical assistance is also provided, upon request, by DSR to other public officials, such as OSHA, in major events resulting in loss of life.

**GENERAL INDUSTRY HEALTH HAZARD EVALUATION PROGRAM
NUMBER OF HHE'S
FY 1979-FY 1984**

Figure 4



MINING HEALTH HAZARD EVALUATION PROGRAM

	1977	1978	1979	1980	1981	1982	1983 TO DATE
ALL HHE'S	3	8	16	72	38	49	39
MINING	0	5	12	47	24	23	9

HHE'S BY MAJOR TYPE

	TOTAL NO'S	COAL/ MINERALS	CHEMICALS	PHYSICAL AGENTS	ORGANIC AGRICULTURAL
MINING	122	42%	50%	8%	0.8%
ALL OTHERS	101	38%	31%	2%	29%

	TOTAL NO'S	COAL	SILICA	OTHER MINERALS/ METALS	FIBROUS MINERALS
MINING	51	14%	18%	63%	5%
ALL OTHERS	39	0	13%	15%	72%

Figure 5

PROGRAM AREA CONCENTRATION

OCCUPATIONAL LUNG DISEASES: During FY 1984, the general industry Health Hazard Evaluation Program completed investigations involving silicosis and isocyanate-related asthma among foundry workers, acute respiratory disease among workers unloading wood chips, and occupational asthma among workers at a polyurethane foam plant (exposed to TDI). Investigations were also conducted at two plants producing plastic materials exposed to a plastic blowing agent, and at a beverage canning plant where they were exposed to an amine compound.

During FY 1984, the mining HHE program recommended follow-up surveillance for the only operating wollastonite mine in the United States which is currently marketing its product as a safe substitute for asbestos insulating materials.

The results of the MSHA technical assistance evaluation of surface mine driller exposures to silica were presented at the 1984 mining session of the AIHC. The DRDS report found that sixty-eight percent of the measurements exceeded the NIOSH recommendation of 50 ug/m³ for respirable free silica and recommended further evaluation of this worker population. Thirty-seven percent of the measurements exceeded the Federal Mine Safety and Health Standard. The paper will be published in the American Industrial Hygiene Association Journal (AIHAJ) in 1985.

MUSCULOSKELETAL INJURIES: In collaboration with DBBS, the general industry health hazard evaluation program is conducting several health hazard evaluations. These evaluations include musculoskeletal injuries, including back and neck strain among microscope users, carpal tunnel syndrome among workers at a fish packing plant, and carpal tunnel syndrome and upper limb injuries among workers at two book publishing facilities. DBBS completed a paper reviewing the 20 HHEs that have been completed in this area. They also completed the first use of the whole-body vibration van to study vibration of heavy equipment operators.

OCCUPATIONAL CANCERS: A study of workers exposed to methylene dianiline found a high incidence of bladder cancer. A study of union records for the Plasterers' Union found a high incidence of lung cancer.

SEVERE OCCUPATIONAL TRAUMATIC INJURIES: DSR's FACE program is emphasizing occupational fatalities due to confined spaces, electrocutions, and construction activities.

CARDIOVASCULAR DISEASES: Currently, mining HHEs are evaluating what appears to be clusters of heart disease at two coal preparation plants (one bituminous, one anthracite). At this point, one plant shows a small but excess mortality rate from cardiovascular disease when compared with the general U.S. population. A review of the National Coal Study tippie workers, of which preparation plant workers are a subset, also indicates an excess risk of cardiovascular disease as well as leukemia.

DISORDERS OF REPRODUCTION: Three studies of clusters of adverse reproductive events among VDT users are currently being investigated. Other investigations included evaluations of anesthetic gas exposures for hospital operating rooms and dental offices. Also, DBBS participated in two HHEs (ethylene dibromide and ethoxyethanol) concerned with male reproductive problems in order to apply their new methodology for sperm analysis.

NEUROTOXIC DISORDERS: A study at a veterinary clinic found a peripheral neuropathy among workers exposed to fenthion, an organophosphate pesticide used to bathe animals for flea control. In collaboration with the Vermont State Health Department, and the Center for Environmental Health, a study of mercury-exposed workers at a thermometer plant was conducted. Children of these workers also were found to have elevated urinary mercury levels. Several other neurotoxic field studies (chlorinated solvents, ethylene oxide and a 2,4-D type herbicide) were conducted in collaboration with DBBS. Three other studies of pesticide-related problems are also being conducted.

DERMATOLOGICAL CONDITIONS: Several evaluations of occupational dermatitis were conducted including severe irritant dermatitis among forestry workers exposed to EDB, dermatitis due to coolant fluid exposure at a machining facility, phototoxic dermatitis among workers exposed to UV-cured inks at a citrus processing facility, and dermatitis among workers exposed to solvents and metals at a federal assay office.

PCB-RELATED INCIDENTS: Several evaluations of PCB-related incidents were conducted including a fire at a PCB storage facility in Florida, a transformer fire at a Miami office building, a capacitor fire at a power station, and the contamination of a research laboratory, probably due to prior incineration of PCBs. As part of these evaluations, the Health Hazard Evaluation Program has developed a sampling method for the assessment of surface concentrations of PCBs, dioxins, and furans; evaluated the effectiveness of decontaminated fire fighters' protective clothing with fluorinated hydrocarbons; and evaluated the effectiveness of high-pressure application of non-ionic surfactant formulations to decontaminated building surfaces.

EXPOSURE STUDIES: Several important evaluations of exposure for specific occupational groups were conducted including four field studies of exposures to grain fumigants; three studies finding elevated chlordane levels in treated buildings; several studies of roofers' exposures during different roofing operations; a study of exposures for road construction workers paving with sulfur-treated asphalt; and a study demonstrating high exposures to hydrogen sulfide at a wastewater treatment plant where one worker had recently died after being overcome.

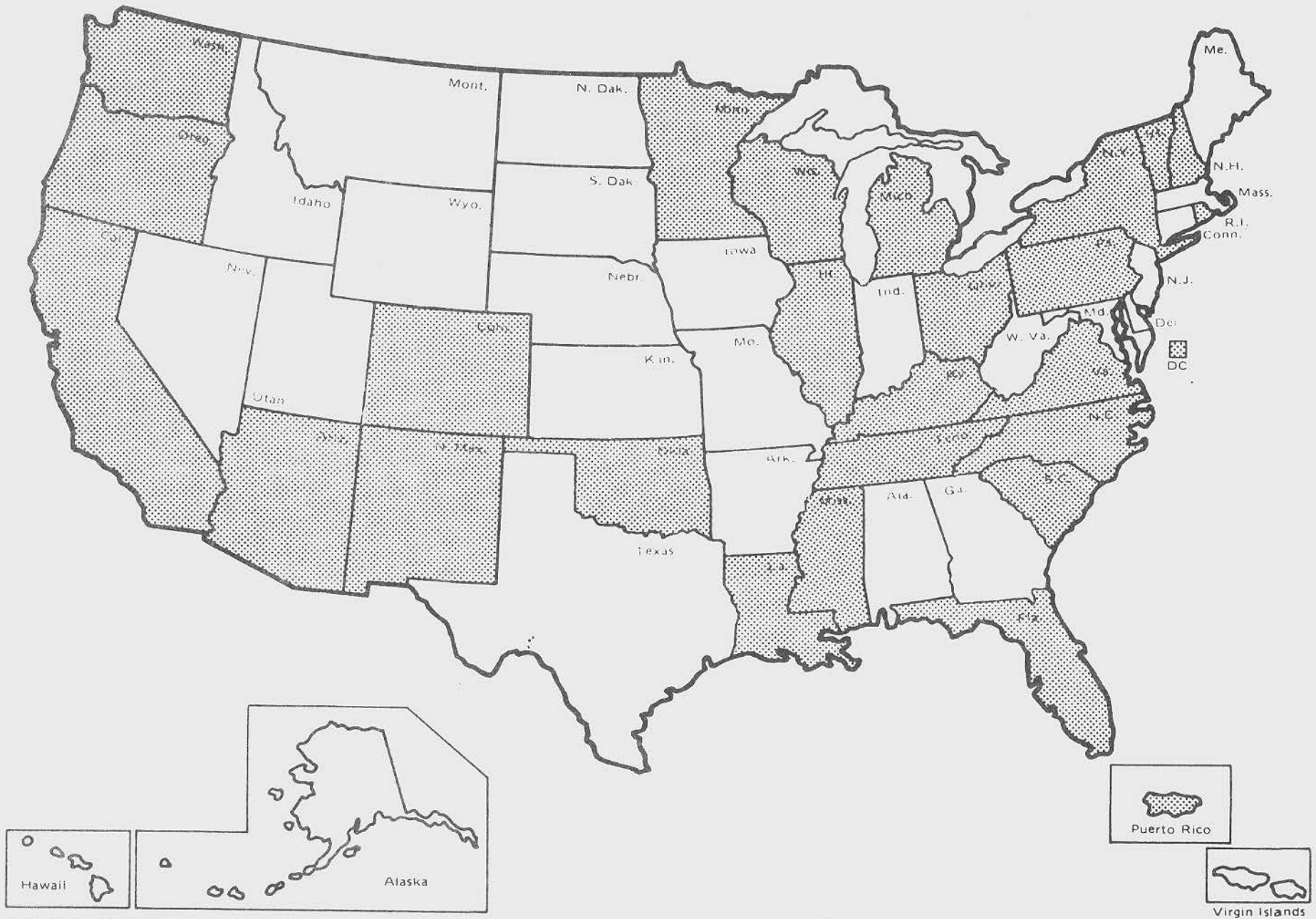
CONTROL OF EXPOSURE: Health hazard evaluations at nine indoor firing ranges demonstrated that the use of non-lead jacketed bullets reduced lead exposure from over twice the OSHA PEL to one-third of that level. A study at an art academy demonstrated a significant reduction in solvent exposures after solvent-based pigments were replaced with water-based pigments. DSHEFS and DSR collaborated on a field study of the effectiveness of disposable respirators in a work environment of high airborne particulate matter.

INDOOR AIR QUALITY: During FY 1984, over 75 requests for evaluations regarding indoor air quality were received. Improved methods for ventilation assessment and for the evaluation of exposures to microorganisms were implemented for several of these evaluations.

HAZARDOUS WASTE SITES: DSHEFS conducted several evaluations at hazardous waste sites as part of the NIOSH Interagency Agreement with EPA. A large industrial hygiene survey demonstrated relatively low long-term exposures during the cleanup of a large hazardous waste site near Cincinnati. During another evaluation, two workers collapsed due to solvent exposure while wearing protective clothing which was quite permeable to solvents. DSHEFS also provided technical assistance and consultation to EPA at several dioxin-contaminated sites, primarily in Missouri.

Epidemic Intelligence Service Officers in Occupational Safety and Health Activities

Figure 6



State Health Departments where Epidemic Intelligence Service Officers are available to assist with Health Hazard Evaluation Activities

***** HEALTH HAZARD EVALUATIONS/TECHNICAL ASSISTANCE *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. BEHAVIORAL-ERGONOMIC EVALUATIONS RE HHEs, TAs, CTAs
PROJECT OFFICER: ALEXANDER L COHEN (FTS-684-8291) START DT: 10/80 END DT: C
OBJECTIVE: OFFER EVALUATIONS OF JOB RELATED MUSCULOSKELETAL, NEUROTOXIC, STRESS
PROBLEMS AND ERGONOMIC INPUTS INTO CONTROL TECHNOLOGY ASSESSMENTS.
2. BRANCH ADMINISTRATION AND CONSULTATION
PROJECT OFFICER: ALEXANDER L COHEN (FTS-684-8291) START DT: 10/84 END DT: C
OBJECTIVE: ADVISE ON JOB RELATED NEUROTOXICITY, STRESS, ERGONOMICS, AND HEALTH
MOTIVATION ISSUES AND MANAGE STAFFING/PROGRAMMING NEEDS.
3. CLINICAL CHEMISTRY AND BIOLOGICAL MONITORING CONSULTATION AND SUPPORT
PROJECT OFFICER: ANTHONY W SMALLWOOD (FTS-684-8339) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE CLINICAL, BIOCHEMICAL, AND BIOLOGICAL MONITORING DATA FOR
HHEs AND RESEARCH PROJECTS.
4. HEALTH HAZARD EVALUATIONS OF PHYSICAL AGENTS
PROJECT OFFICER: WILLIAM E MURRAY (FTS-684-8482) START DT: 10/84 END DT: C
OBJECTIVE: TO RESPOND TO THOSE HEALTH HAZARD EVALUATION REQUESTS WHICH INVOLVE
POTENTIAL HAZARDS FROM PHYSICAL AGENTS.
5. PAEB BRANCH ADMINISTRATION AND CONSULTATION
PROJECT OFFICER: JAMES M SMITH (FTS-684-8477) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE ADMINISTRATIVE ASSISTANCE AND SUPPORT IN FIELDS OF RADIATION,
VIBRATION, BIOACOUSTICS AND OTHER JOB RELATED PROBLEMS.
6. COMPARATIVE INHALATION TOXICITY OF LEAD OXIDE AND LEAD SULFIDE
PROJECT OFFICER: DENNIS W LYNCH (FTS-684-2874) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO DETERMINE AND COMPARE THE ORGAN SYSTEM TOXICITIES OF INHALED LEAD
OXIDE AND LEAD SULFIDE.

7. BIOLOGICAL MONITORING METHODS DEVELOPMENT AND EVALUATION
PROJECT OFFICER: LARRY K LOWRY (FTS-684-8338) START DT: 10/84 END DT: C
OBJECTIVE: DEVELOP BIOLOGICAL MONITORING METHODS AND EVALUATE THEIR USEFULNESS IN
ASSESSING ANIMAL AND HUMAN EXPOSURES.

DIVISION OF RESPIRATORY DISEASE STUDIES

8. MINING HEALTH HAZARDS EVALUATIONS AND TECHNICAL ASSISTANCE
PROJECT OFFICER: JOHN L HANKINSON (FTS-923-4755) START DT: 10/84 END DT: C
OBJECTIVE: TO PERFORM HHEs AND TAs IN THE MINING INDUSTRY; TO PERFORM HHEs AND
TAs IN GENERAL INDUSTRY RELATED TO RESPIRATORY CHALLENGES.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

9. TECHNICAL ASSISTANCE AT HAZARDOUS WASTE SITES
PROJECT OFFICER: JAMES M MELIUS (FTS-684-4382) START DT: 10/84 END DT: C
OBJECTIVE: TO PROVIDE TECHNICAL ASSISTANCE TO EPA AND STATE HEALTH DEPARTMENTS AT
HAZARDOUS WASTE SITES.
10. HEALTH HAZARD EVALUATIONS AND TECHNICAL ASSISTANCE
PROJECT OFFICER: JAMES M MELIUS (FTS-684-4382) START DT: 10/80 END DT: C
OBJECTIVE: TO CONDUCT GENERAL INDUSTRY HEALTH HAZARD EVALUATIONS AT THE REQUEST
OF EMPLOYERS, EMPLOYEES, AND OTHER GOVERNMENTAL AGENCIES.
11. OCCUPATIONAL CANCER CONTROL HAZARD EVALUATIONS
PROJECT OFFICER: JAMES M MELIUS (FTS-684-4382) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO CONDUCT EVALUATIONS OF POSSIBLE CANCER CONTROL TECHNIQUES AS PART
OF GENERAL INDUSTRY HEALTH HAZARD EVALUATIONS.

DIVISION OF SAFETY RESEARCH

12. FATAL ACCIDENT CIRCUMSTANCES AND EPIDEMIOLOGY PROGRAM
PROJECT OFFICER: LEE M SANDERSON (FTS-923-4804) START DT: 10/83 END DT: 09/88
OBJECTIVE: TO PROVIDE TECHNICAL ASSISTANCE AND RISK FACTOR ASSESSMENTS OF
ELECTROCUTIONS AND CONFINED SPACE FATALITIES THROUGH EPI. EVAL.

EVALUATE WORK-RELATED DISEASES AND INJURIES

The core of the Institute's scientific research is the evaluation of work-related diseases and injuries. NIOSH tests scientific hypotheses through the disciplines of epidemiology, toxicology, kinesiology, and the physical and behavioral sciences. The goal for this program is to evaluate work-related diseases, injuries, and occupational hazards so as to understand their causes and to detect their vulnerabilities to prevention.

NIOSH focuses its research on the ten leading work-related diseases and injuries. They are listed below.

The list is intended to be dynamic; it will be reviewed periodically for necessary updating as knowledge increases and as conditions change and are brought under better control.

PROGRAM AREAS: Occupational Lung Diseases
Musculoskeletal Injuries
Occupational Cancers (other than lung)
Severe Occupational Traumatic Injuries
Cardiovascular Diseases
Disorders of Reproduction
Neurotoxic Disorders
Noise-Induced Loss of Hearing
Dermatologic Conditions
Psychologic Disorders

OCCUPATIONAL LUNG DISEASES

PROGRAM AREA GOAL:

Evaluate occupational lung diseases and occupational hazards so as to understand their causes and to detect their vulnerabilities to prevention.

PROGRAM OBJECTIVES:

- By FY 1986, advise MSHA about the health effects of the use of diesel engines in underground mines.
- By FY 1986, promulgate guidances for worker registries for emerging energy industries.
- BY FY 1986, promulgate revised Coal Mine Dust Personal Sampler Unit (CMDPSU) certification regulations.
- By FY 1988, assess the adequacy of the current NIOSH recommended standard for crystalline silica.
- By FY 1988, complete 70 cancer epidemiology studies associated with certain chemicals, physical agents processes or occupations so as to provide data that will result in reduction and/or elimination of workplace hazards.
- By FY 1989, assess the adequacy of the current asbestos standard.

PROGRAM DESCRIPTION:

Occupational lung diseases head NIOSH's list of the Ten Leading Work-Related Diseases and Injuries. These diseases, which include pneumoconiosis, emphysema, and chronic (industrial) bronchitis, are the primary complex of occupational diseases facing the nation today. Lung cancer, which is the most frequent cause of death from malignant disease in men, and the third most frequent cause in women, has also been linked to occupational exposures to inhaled carcinogens.

The lung is both a target organ and a portal of entry for toxic substances. The likelihood of toxic exposure is high; for example, an estimated 1.2 million workers each year are potentially exposed to silica dust alone. The American Journal of Industrial Medicine estimates that 18.8 million workers are exposed to potentially hazardous concentrations of asbestos, and millions more are exposed to fibrogenic, allergenic, and carcinogenic dusts in the mining, manufacturing, chemical, and agricultural industries. The recognition of occupational lung diseases may be difficult, since the latent period for such diseases may be long--as long as 15 years for silicosis and 30 years or more for asbestos-related diseases. Other factors, such as cigarette smoking, may also contribute significantly to the disease process and obscure the association between work place exposure and the disease.

Six important components of occupational lung diseases are described below. Each is preventable, although years of effective control measures will be required to eliminate diseases of long latency. Because of the rapid rate at which new potentially toxic agents are introduced into the workplace, vigorous pre-market toxicologic testing of agents and effective disease surveillance are essential if epidemics of occupational lung diseases are to be avoided.

The respiratory disease program within the Institute involves clinical, epidemiological, environmental, and laboratory-based research. The Division of Respiratory Disease Studies (DRDS) has primary responsibility for nonmalignant respiratory disease research. Lung cancer epidemiology studies are conducted by the Division of Surveillance, Hazard Evaluations, and Field Studies (DSHEFS), as well as the Division of Biomedical and Behavioral Science (DBBS). DBBS also conducts a research program in occupational asthma. The Division of Physical Sciences and Engineering (DPSE) investigates control technology for reducing exposures, and the Division of Standards Development and Technology Transfer (DSDTT) is responsible for disseminating information and developing criteria documents.

In addition to research, the NIOSH program in respiratory disease will continue to serve the public through its X-ray and autopsy program for coal workers in FY 1985. The Institute will continue to conduct health hazard evaluations, develop diagnostic criteria for occupational lung disease, and assist in recommending pertinent standards.

The National Institute for Occupational Safety and Health plans to continue its morbidity and mortality studies. These studies, which include environmental assessments, will develop dose-response information which can be of direct benefit to the worker. The morbidity and mortality studies conducted will focus on individuals working in coal-fired steam-generating plants, crushed-stone and Portland cement-workers, diesel engine mechanics, uranium mines (low radiation doses), and cohorts of coal workers from past morbidity studies, as well as vermiculite miners and workers exposed to crystalline silica in several industries. In FY 1985, cohorts of workers exposed to formaldehyde, beryllium, lead chromate paints, toluene diisocyanate, and mild steel welding fumes will be continued and the possible relationship between silica exposure and lung cancer studied in groups of miners.

The Division on Safety Research (DRS), tests and certifies respiratory protective devices utilized as one control method for reducing occupational lung exposures. DSR also conducts respirator research programs focused upon improving the performance of such devices. DSR is responsible for testing and certifying Coal Mine Dust Personal Sampler Units (CMDPSU) which are utilized by DRDS and MSHA to determine mine dust levels and compliance with the $2\text{mg}/\text{m}^3$ dust standard.

PROGRAM AREA CONCENTRATION

COAL WORKERS' PNEUMOCONIOSIS (CWP): The estimated prevalence of CWP among currently employed coal miners is about 4.5 percent. Approximately 0.2 percent of coal workers have been diagnosed as having progressive massive fibrosis, a potentially disabling form of CWP. In 1974, there were an estimated 19,400 cases of CWP. Industrial bronchitis, another medical condition associated with exposure to coal dust, may lead to decreased ventilatory capacity, but it is not well correlated with chest roentgenographic changes.

The National Coal Study (morbidity) will continue to provide data for an assessment of the 2mg/m³ dust standard during FY 1985, and will also assess the impact of conditions other than coal workers' pneumoconiosis on the work force. The third round of examinations conducted through the National Coal Study has been completed, and an analysis is now under way.

In FY 1985, the following research objectives will be addressed: 1) industrial hygiene characterization of diesel particulates in underground coal mines, 2) the prevalence of silicosis in the National Coal Workers' Autopsy Study will be determined in response to MSHA requests; 3) laboratory studies to determine the relative toxicity of mineral constituents in coal mine dust; and 4) a morbidity study of anthracite surface coal miners and bituminous high wall drillers.

ASBESTOSIS: Asbestosis is characterized by diffuse, extensive scarring of the lung and progressive shortness of breath. Once established, the disease progresses even after exposure ends, and there is no specific treatment. The latent period is 10 to 20 years. Longitudinal studies of groups of asbestos insulation workers and shipyard workers have revealed that 10 to 18 percent may be expected to die of asbestosis.

The pulmonary effects of asbestos fibers less than five micrometers in length were investigated by DBBS. An 18-month inhalation study showed no evidence of pulmonary fibrosis or other form of lung disease. DSDTT is preparing to publish a Criteria Document on Asbestos which will recommend a specific standard to MSHA, and is assisting OSHA in their rulemaking efforts related to controlling asbestosis.

In FY 1985, three studies will be initiated. The research objectives of the first will assess the diagnostic accuracy of X-rays in diagnosing pleural plaques; the second project will examine the relationship between pleural plaques and the risk of death from lung cancer and mesothelioma; and the third will examine the relationship between the type, size, and numbers of asbestos fibers in the lungs of asbestos textile millers and the severity of asbestosis.

BYSSINOSIS: This condition, characterized by both acute and chronic lung disease, is associated with inhalation of the dusts of cotton, flax, or hemp. Symptoms include "chest tightness," cough, and obstruction of the small airways. Severely impaired lung function has disabled an estimated 35,000 current and retired textile workers. The specific causal agent(s) in the various dusts have not been identified.

DRDS, in cooperation with the U.S. Department of Agriculture, is continuing studies to evaluate the effects of the use of "washed" cotton upon workers. This research will determine whether its use in processing might represent a means of reducing the incidence of cotton dust-associated respiratory ailments. In conjunction with this study, dust samples from a cotton processing environment are being examined for the presence of endotoxin-producing gram-negative bacteria, to assess whether relationships between endotoxin levels and observed respiratory responses due to induced biological changes may exist. During FY 1985, DBBS, using a primate model, will assess the relative potency of suspect etiologic agents of byssinosis. Ultimately, by FY 1986, NIOSH wants to establish the etiology of byssinosis.

Data from a washed cotton study indicate that washing has a highly beneficial effect in reducing the decrements in pulmonary function observed with unwashed cotton. In addition, a highly significant correlation between endotoxin concentration and acute pulmonary function decrements has been demonstrated.

During FY 1985, DRDS will initiate a byssinosis inhalation study in order to identify the mechanisms responsible for the disease. DRDS will also develop a research proposal for consideration by the government of India to study Indian workers exposed to cotton, jute and coir dust under the PL 480 program.

During FY 1984, DBBS completed the development of an animal model in monkeys. In this model, dose response relationships of the acute byssinotic response were examined by pulmonary function, bronchoprovocation, serum and lavage analyses. Subchronic responses were shown to differ from acute reactivity by the development of hyper-reactivity or tolerance in individual animals. Using this primate model, the relative importance of suspected etiologic agents and mechanisms are being assessed.

SILICOSIS: Although the ill effects of exposure to free crystalline silica have been known for centuries, the prevalence of disabling silicosis remains high in certain groups of workers. Nearly 60,000 currently exposed workers in mines and foundries, in abrasive blasting operations, and in stone, clay, and glass manufacturing industries may be expected to suffer some degree of silicosis.

DRDS, in cooperation with the United Arab Republic (UAR - Egypt), has been conducting a study of workers exposed to high levels of silica. More than 4,000 workers have been examined medically and exposures in eight plants have been characterized. During FY 1985 and FY 1986, analysis of the data will be completed. During FY 1985, laboratory studies will be initiated to determine the mechanisms of silica toxicity and to explore ways in which the surface structure of the silica particles can be modified to reduce toxicity. An epidemiologic study to determine the relationship between silicosis and lung cancer will be initiated by DRDS in FY 1985.

In conjunction with the North Carolina State Health Department, DRDS will analyze surveillance data on workers employed in the "dusty trades" since 1935. The primary objectives will be to develop dose response data for silica in order to assess the adequacy of the current standard, and to investigate the association between silica, silicosis, and lung cancer.

DSHEFS has recently completed two studies of worker populations that had been exposed to silica dust. These studies were of underground gold mine workers and granite cutters. In each of these studies, which examined mortality associated with past exposures, the risk of death from silicosis was high and related to the amount of exposure to silica. Another DSHEFS study being conducted under contract by the United Automobile Workers (UAW) has examined mortality among workers in a ferrous foundry where there has been exposure to silica dust.

DBBS is conducting research to identify and evaluate materials which can be used as safer substitutes for substances in the workplace which are known to induce occupational lung diseases. In the past several years, this research has involved in vivo evaluation of the fibrogenic potentials of coal and mineral slags which are used as substitutes for silica sand in abrasive blasting operations. To date, a coal slag has been found to be moderately fibrogenic and the mineral slags non-fibrogenic as compared to quartz. Another study investigating the fibrogenic potential of four coal slags is scheduled for completion in FY 1985. In FY 1985, DBBS will begin in vivo evaluation of asbestos substitutes. Two modified chrysotile (asbestos) preparations will be tested in vivo in rats using intrapleural implantations. The incidence of mesotheliomas induced will be compared with that produced by unmodified chrysotile.

DPSE research on control technologies of bagging operations has identified methods for reducing dust levels as a result of filling bags used in the transportation of the material. The development of self-sealing bags has proven to be effective. Other control techniques include the use of a fine water vapor spray to reduce dust, push-pull ventilation to improve the removal of dust, and the development of improved respirators.

The Conference of State and Territorial Epidemiologists has agreed to make silicosis a reportable disease. NIOSH has the charge to develop a common definition in cooperation with the American Thoracic Society. This is the first time a non-infectious disease will be voluntarily reported.

LUNG CANCER: The single most important known cause of lung cancer is tobacco smoke. However, numerous occupational agents are associated with lung cancer, including arsenic, asbestos, chloroethers, chromates, nickel, polynuclear aromatic hydrocarbon compounds, and ionizing radiation. Tobacco smoke may interact synergistically with some of these agents to sharply increase the risk.

A study completed by DSHEFS of underground gold miners indicated that exposure to a non-commercial form of amphibole whose fibers were primarily short in length (less than five microns), was not associated with an excess risk from lung cancer mortality. Other DSHEFS studies of workers exposed to fibers (attapulgite, fibrous glass) will contribute additional information to the question of the carcinogenicity of fibers.

Recently it has been speculated that exposure to silica may be associated with an excess risk of lung cancer. Two DSHEFS studies have addressed this hypothesis, the study of underground gold mine workers and granite cutters. In neither of these studies does silica appear to act as a carcinogen.

In FY 1984, DSHEFS completed an update and re-analysis of an epidemiologic study involving workers exposed to cadmium. The results of this study demonstrated an association between cadmium exposure and excess lung cancer mortality but not mortality from prostatic cancer. These data will be vital for future risk assessments of cadmium. Also, in FY 1984, DSHEFS presented the results of a study of workers in the phosphate fertilizer industry. This study confirmed that the original cluster of lung deaths, upon which the study was initiated, was excessive.

DSHEFS will continue the study of uranium miners which remains an important area of research for NIOSH. In collaboration with the National Cancer Institute, this cohort of workers will be further analyzed to study the effects from low doses of radiation and to evaluate the predictive value of sputum cytology as a screening technique.

There are several other large mortality studies that are being conducted by DSHEFS which are designed to investigate occupational exposure and the risk of respiratory cancer mortality, including investigations of workers exposed to formaldehyde, beryllium, lead chromate paints, and toluene diisocyanate (TDI). A study of welders (not exposed to asbestos) is also being conducted.

In FY 1984, DRDS completed a study of primary lung cancer in coal workers in the National Coal Workers' Autopsy Study. The findings indicate that the pathological types of lung cancer in coal miners are similar to those observed in the general male population and that coal mine dust exposure does not increase the risk of lung cancer.

In FY 1984, lung cancer studies comparing the relative carcinogenic potential of four common foundry mold pyrolysis effluents were completed. DBBS has completed a chronic inhalation study of four geometrically different glass fibers in rats and monkeys. This study was designed to evaluate effects on mortality, pulmonary function, and the hematopoietic and ophthalmologic systems. During FY 1985, DBBS will initiate a long-term inhalation study of vanadium pentoxide to assess chronic toxicologic and carcinogenic effects. Acute studies designed to compare the pulmonary effects of vanadium pentoxide and vanadium trioxide will be conducted. Comparative inhalation toxicity tests of lead oxide and lead sulfide will be performed to provide data for mining standards development.

OCCUPATIONAL ASTHMA: Hypersensitivity reactions to a wide variety of occupational organic and inorganic agents can cause asthma and hypersensitivity pneumonitis. The prevalence of occupational asthma varies from 10 percent to nearly 100 percent of workers in certain occupations. Many agents are incriminated as etiologic for occupational asthma, including grain dusts, flour, metals, inorganic chemicals, isocyanates, enzymes, and fungi. The list of agents associated with hypersensitivity pneumonitis is also long. If exposure continues, these conditions may result in progressive, irreversible pulmonary fibrosis. The DRDS program for laboratory-based research includes the physiological significance of worker exposure to aerosols. Research will be conducted on hypersensitivity pneumonitis, industrial bronchitis, allergic asthma (due to grain dusts), and the effect of various challenge agents upon lung mechanics and pulmonary function.

The challenge agents can vary from grain dusts to a variety of industrial chemicals and biological products found and inhaled in the workplace. These studies will address not only the mechanisms of disease production, but also (if applicable) a dose-response relationship. In FY 1985, DRDS will initiate a study to investigate the basic mechanisms whereby asthma-associated agents exert their effect on airway smooth muscle.

DBBS is identifying and evaluating workplace agents which may induce immune and non-immune hypersensitive pulmonary reactions. A study of the asthmatic potential of platinum demonstrated persistent and reproducible airway obstruction in monkeys when bronchially challenged; the incidence of responders was greater with concurrent ozone exposure. This suggests that pulmonary irritants may exacerbate pulmonary hypersensitivity. Platinum was shown to be implicated in precious metal refiners' asthma through the use of a human-to-monkey passive transfer technique. Studies on the asthmagenic potential of vanadium pentoxide are continuing. A delayed airway inflammatory response in the absence of allergic induction has been shown. During FY 1985, the chronology, host factors, exposure regimen, and reversibility of phthalic anhydride asthma will be characterized in the primate animal model.

EVALUATE WORK-RELATED DISEASES AND INJURIES

***** OCCUPATIONAL LUNG DISEASES *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. BIOMONITORING OF EXPOSURE TO COAL TAR PITCH
PROJECT OFFICER: WILLIAM P TOLOS (FTS-684-8339) START DT: 10/83 END DT: 09/86
OBJECTIVE: DEVELOP SUITABLE BIOLOGICAL MONITORING METHODS TO EVALUATE WORKERS'
EXPOSURE TO COAL TAR PITCH.
2. DIAGNOSTIC AND RESEARCH PATHOLOGY
PROJECT OFFICER: JAG B LAL (FTS-684-8360) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE GROSS AND MICROSCOPIC EXAMINATION AND DIAGNOSIS AND
CONSULTATIVE SERVICES FOR NIOSH PROGRAMS.
3. EVALUATION OF MESOTHELIOMA PRODUCTION BY ASBESTOS SUBSTITUTES
PROJECT OFFICER: STANLEY F PLATEK (FTS-684-8337) START DT: 10/84 END DT: 09/88
OBJECTIVE: THIS PROJECT WILL EVALUATE THE MESOTHELIOMA PRODUCTION POTENTIAL OF
TWO ASBESTOS-SUBSTITUTE MATERIALS IN RATS BY INTRAPLEURAL IMPLANTATION.
4. CHRONIC INHALATION TOXICITY OF VANADIUM PENTOXIDE
PROJECT OFFICER: WILLIAM J MOORMAN (FTS-684-8275) START DT: 10/83 END DT: 09/88
OBJECTIVE: TO ASSESS CHRONIC DOSE-RESPONSE TOXICITY OF VANADIUM PENTOXIDE
(CARDIAC, PULMONARY, MUTAGENIC AND CARCINOGENIC).
5. PULMONARY HYPERSENSITIVITY OF INDUSTRIAL AGENTS
PROJECT OFFICER: EDWIN A KNECHT (FTS-684-8274) START DT: 10/78 END DT: 09/87
OBJECTIVE: TO IDENTIFY AND EVALUATE OCCUPATIONAL AGENTS SUSPECTED TO BE
RESPONSIBLE FOR THE INDUCTION OF OCCUPATIONAL ASTHMA.
6. PARTICULATE AND TISSUE ANALYSIS SERVICE AND RESEARCH
PROJECT OFFICER: LLOYD E STETTLER (FTS-684-8337) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE PARTICULATE PHYSICAL AND CHEMICAL ANALYSIS SERVICE TO NIOSH
RESEARCH PROGRAMS.

7. FIBROGENICITY OF COAL SLAGS
PROJECT OFFICER: LLOYD E STETTLER (FTS-684-8337) START DT: 10/82 END DT: 09/85
OBJECTIVE: TO ASSESS THE FIBROGENIC POTENTIALS OF FOUR COAL SLAGS IN RATS BY
INTRATRACHEAL INSTILLATION.

8. ANIMAL HUSBANDRY SERVICES
PROJECT OFFICER: JAG B LAL (FTS-684-8360) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE ANIMAL HUSBANDRY, VETERINARY MEDICINE AND ANIMAL CLINICAL
DIAGNOSTIC SUPPORT FOR DBBS RESEARCH PROGRAMS.

DIVISION OF PHYSICAL SCIENCES AND ENGINEERING

9. QUALITY ASSURANCE--EXTERNAL
PROJECT OFFICER: MARTIN T ABELL (FTS-684-4266) START DT: 10/83 END DT: C
OBJECTIVE: A CONTINUING PROGRAM TO ENSURE IMPROVED ACCURACY OF INDUSTRIAL HYGIENE
MEASUREMENTS AND RESULTING DATA BEING GENERATED IN THE UNITED STATES.

10. IMPROVED METHOD FOR SAMPLING AND ANALYSIS OF SILICA
PROJECT OFFICER: THOMAS P CARSEY (FTS-684-4272) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO DEVELOP A NEW OR IMPROVED METHOD FOR SAMPLING AND ANALYSIS OF
SILICA.

DIVISION OF RESPIRATORY DISEASE STUDIES

11. MORBIDITY/MORTALITY STUDY OF INDUSTRIAL SAND INDUSTRY
PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/83 END DT: 09/86
OBJECTIVE: DETERMINE THE DOSE-RESPONSE RELATION FOR SILICOSIS AND CAUSE-SPECIFIC
MORTALITY IN THE INDUSTRIAL SAND INDUSTRY.

12. ENVIRONMENTAL/MORBIDITY/MORTALITY STUDY OF VERMICULITE WORKERS
PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO ASSESS EFFECTS OF VERMICULITE AND TREMOLITE ASBESTOS ON MORBIDITY
AND MORTALITY AND TO ESTIMATE THE DOSE-RESPONSE ASSOCIATION.

13. MORBIDITY IH STUDY ANTHRACITE SURFACE MINERS/BITUMINOUS HIGH. DRILLERS
PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/83 END DT: 09/88
OBJECTIVE: TO ASSESS PREVALENCE AND INCIDENCE OF PNEUMOCONIOSIS IN THE ANTHRACITE
SURFACE COAL MINE INDUSTRY IN RELATION TO COAL MINE DUST EXPOSURE.

14. MORTALITY STUDY OF CEMENT WORKERS
 PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/79 END DT: 12/85
 OBJECTIVE: TO ASSESS RISK OF PREMATURE DEATH AMONG CEMENT PLANT WORKERS AND THEIR
 CAUSE SPECIFIC MORTALITY.
15. ANALYSIS OF RECEIVING CENTER DATA
 PROJECT OFFICER: ROCHELLE B ALTHOUSE (FTS-923-4476) START DT: 10/83 END DT: 03/87
 OBJECTIVE: TO ASSESS THE EFFECTIVENESS OF THE 2 MG DUST STANDARD AND DETERMINE
 SUCCESS OF TRANSFER OPTION PROGRAM.
16. FOLLOW-UP AND DETERMINATION OF VITAL STATUS, MARION COUNTY, WV
 PROJECT OFFICER: JOSEPH COSTELLO (FTS-923-4476) START DT: 10/82 END DT: 09/85
 OBJECTIVE: DETERMINE CAUSE SPECIFIC MORTALITY OF MINERS AND LOCAL CONTROLS WITH
 LINKAGE TO PAST PULMONARY AND CARDIOVASCULAR MORBIDITY DATA.
17. THE NATIONAL COAL STUDY AND RELATED RESEARCH
 PROJECT OFFICER: MICHAEL D ATTFIELD (FTS-923-4501) START DT: 10/83 END DT: 09/88
 OBJECTIVE: DETERMINE PREVALENCE/PROGRESSION OF LUNG DISEASE IN RELATIONSHIP TO
 DUST EXPOSURE; COLLECT INFORMATION ON DUST LEVELS/COMPOSITION.
18. CASE CONTROL STUDY OF SILICA, SILICOSIS, AND LUNG CANCER
 PROJECT OFFICER: JOHN F GAMBLE (FTS-923-4476) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO DETERMINE THE RELATION. BETWEEN SILICA, SILICOSIS AND LUNG CANCER.
19. NC DUSTY TRADES FILE
 PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/84 END DT: 09/87
 OBJECTIVE: ESTIMATE DOSE-RESPONSE CURVE FOR SILICA AND CHRYSOTILE ASBESTOS
 RELATED DISEASES.
20. EFFECTS OF FORMALDEHYDE ON THE RESPIRATORY SYSTEM
 PROJECT OFFICER: JOHN F GAMBLE (FTS-923-4476) START DT: 10/84 END DT: 09/87
 OBJECTIVE: THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE EFFECTS OF GASEOUS
 FORMALDEHYDE ON ACUTE SYMPTOMS AND PULMONARY FUNCTION.
21. MEDICAL FIELD TEAM TECHNICAL SUPPORT
 PROJECT OFFICER: GREGORY C SPRANSY (FTS-923-4387) START DT: 10/83 END DT: C
 OBJECTIVE: TO PROVIDE FIELD TEAM TECHNICAL SUPPORT TO DRDS; FIELD TESTING
 EQUIPMENT OPERATIONS AND MAINTENANCE.

22. EVALUATION OF HUMAN VENTILATORY EFFECTS OF WASHED COTTON--USDA
 PROJECT OFFICER: ROBERT M CASTELLAN (FTS-923-4223) START DT: 10/81 END DT: 09/86
 OBJECTIVE: TO SUPPORT TRIPARTITE RESEARCH ON COTTON DUST TO DEVELOP WASHED COTTON
 AS POTENTIAL MEANS TO PREVENT COTTON DUST ORD.
23. ANALYSIS OF DATA FROM AN EGYPTIAN SILICA STUDY
 PROJECT OFFICER: JOHN L HANKINSON (FTS-923-4755) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO PROVIDE IMPORTANT PREVALENCE AND DOSE-RESPONSE DATA ON SILICOSIS IN
 A CROSS-SECTION OF EGYPTIAN INDUSTRIES.
24. REPRODUCIBILITY IN TESTS OF PULMONARY FUNCTION
 PROJECT OFFICER: THOMAS K HODOUS (FTS-923-4755) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO DETERMINE THE REPRODUCIBILITY OF SEVERAL NON-SPIROMETRIC PULMONARY
 FUNCTION TESTS, TO ACCESS THEIR USEFULNESS.
25. ANALYSIS OF CWP COMPENSATION DATA
 PROJECT OFFICER: THOMAS K HODOUS (FTS-923-4223) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO DETERMINE THE MAJOR CAUSES OF CWP DISABILITY AND DEVELOP PREVENTION
 STRATEGIES BASED ON THESE RESULTS
26. MEDICAL TECHNICAL SUPPORT
 PROJECT OFFICER: JOHN L HANKINSON (FTS-923-4755) START DT: 10/84 END DT: C
 OBJECTIVE: TO PROVIDE MEDICAL TECHNICAL SUPPORT TO DRDS
27. EPIDEMIOLOGICAL REVIEW OF COTTON MILL SURVEILLANCE DATA
 PROJECT OFFICER: ANDREW J GHIO (FTS-923-4755) START DT: 10/84 END DT: 09/86
 OBJECTIVE: TO REVIEW SURVEILLANCE DATA FROM SELECTED TEXTILE MILLS FOR EVIDENCE
 TO SUPPORT THE ENDOTOXIN HYPOTHESIS OF BYSSINOSIS CAUSATION.
28. OCC. LUNG DISEASE ASSOC. WITH EXPOSURE TO DIESEL EMISSIONS
 PROJECT OFFICER: MICHAEL A MCCAWLEY (FTS-923-4421) START DT: 10/81 END DT: 09/86
 OBJECTIVE: TO STUDY THE EFFECTS OF DIESEL EMISSIONS ON THE RESPIRATORY SYSTEM,
 ESPECIALLY IN COMBINATION WITH COAL DUST EXPOSURE.
29. CROSS-SECTIONAL AND IH STUDY OF MILD STEEL WELDERS
 PROJECT OFFICER: PAUL HEWETT (FTS-923-4421) START DT: 10/83 END DT: 10/91
 OBJECTIVE: TO DETERMINE IF EXPOSURE TO MILD STEEL WELDING FUMES AND GASES CAUSES
 RESPIRATORY IMPAIRMENT AND DESCRIBE THE DOSE/RESPONSE RELATIONSHIP.

30. INDUSTRIAL HYGIENE TECHNICAL SUPPORT
 PROJECT OFFICER: JERRY L CLERE (FTS-923-4205) START DT: 05/82 END DT: C
 OBJECTIVE: PROVIDE CALIBRATED SAMPLING TRAINS, SAMPLING HEADS/MEDIA, AND LIMITED ANALYTICAL SUPPORT TO RESEARCH PROJECTS AND HHEs PERFORMED BY DRDS.
31. MICROORGANISMS IN HVAC SYSTEMS
 PROJECT OFFICER: PHILLIP R MOREY (FTS-923-4421) START DT: 10/84 END DT: 09/87
 OBJECTIVE: DEVELOP PREVENTATIVE AND REMEDIAL MEASURES TO REDUCE LEVELS OF MICROORGANISMS ASSOCIATED WITH HVAC SYSTEMS.
32. X-RAY/PATHOLOGY MORPHOMETRIC STUDIES OF CWP
 PROJECT OFFICER: FRANCIS H GREEN (FTS-923-4581) START DT: 10/83 END DT: 09/86
 OBJECTIVE: DETERMINE THE RELATIONSHIP BETWEEN X-RAY CATEGORY OF PNEUMOCONIOSIS AND PATHOLOGIC APPEARANCE OF EXCISED COAL WORKERS' LUNGS.
33. SILICOSIS IN COAL WORKERS
 PROJECT OFFICER: FRANCIS H GREEN (FTS-923-4581) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO DETERMINE THE PREVALENCE OF SILICOSIS IN COAL WORKERS AND THE RELATIONSHIP BETWEEN TISSUE RESPONSE AND MINERALOGIC PROFILES.
34. COMPARATIVE RESEARCH IN ANALYTICAL PATHOLOGY
 PROJECT OFFICER: FRANCIS H GREEN (FTS-923-4581) START DT: 10/71 END DT: C
 OBJECTIVE: TO ADMINISTER THE NATIONAL COAL WORKERS' AUTOPSY STUDY AND DISASTER PLAN AND CONDUCT MICROANALYTICAL STUDIES ON LUNG SAMPLES.
35. STUDIES OF COTTON, JUTE, TOBACCO AND COIR DUST EXPOSED WORKERS
 PROJECT OFFICER: VAL VALLYATHAN (FTS-923-4581) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO CONDUCT EPIDEMIOLOGIC AND PATHOLOGIC STUDIES ON (ASIAN) INDIAN WORKERS EXPOSED TO ORGANIC DUSTS UNDER THE PL480 PROGRAM.
36. PATHOLOGY STANDARDS FOR SILICOSIS
 PROJECT OFFICER: FRANCIS H GREEN (FTS-923-4581) START DT: 03/85 END DT: 09/86
 OBJECTIVE: DEVELOP PATHOLOGIC STANDARDS FOR THE UNIFORM DIAGNOSIS OF SILICA INDUCED LUNG DISEASES.
37. IMPACT OF COAL DUST IN GASTRIC CANCER AND DEFENSE MECHANISMS
 PROJECT OFFICER: TONG-MAN ONG (FTS-923-4516) START DT: 10/83 END DT: 09/86
 OBJECTIVE: INVESTIGATE RISK FACTORS CONTRIBUTING TO GASTRIC CARCINOGENESIS IN COAL MINERS AND THE EFFECT OF COAL DUST ON DEFENSE MECHANISMS.

38. SILICOSIS--INHALATION STUDIES
 PROJECT OFFICER: KENNETH C WEBER (FTS-923-4561) START DT: 10/83 END DT: 09/87
 OBJECTIVE: TO DEVELOP AN APPROPRIATE ANIMAL MODEL OF ACUTE SILICOSIS AND TO
 DETERMINE THE MECHANISM(S) OF LUNG RESPONSE TO INHALED SILICA.
39. BYSSINOSIS--INHALATION STUDIES
 PROJECT OFFICER: KENNETH C WEBER (FTS-923-4561) START DT: 10/83 END DT: 09/87
 OBJECTIVE: TO DEVELOP AN APPROPRIATE ANIMAL MODEL OF BYSSINOSIS USING THE DRDS
 INHALATION FACILITY.
40. IDENTIFICATION OF POSSIBLE CAUSATIVE AGENTS IN BYSSINOSIS
 PROJECT OFFICER: KENNETH C WEBER (FTS-923-4561) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO DETERMINE IF COTTON MILL DUST IS METABOLIZED, DEFINE THE ROLE OF
 PAF IN BYSSINOSIS, AND DEFINE AIRWAY SMOOTH MUSCLE RESPONSES.
41. NRC POSTDOCTORAL ASSOCIATESHIPS PROGRAM
 PROJECT OFFICER: KENNETH C WEBER (FTS-923-4561) START DT: 07/81 END DT: C
 OBJECTIVE: TO PERFORM RESEARCH TO INCREASE OUR KNOWLEDGE AND UNDERSTANDING OF THE
 ETIOLOGY OF OCCUPATIONAL DISEASES.
42. OCCUPATIONAL ASTHMA--ETIOLOGIC AGENT(S) AND DISEASE MECHANISM(S)
 PROJECT OFFICER: JEFFREY S FEDAN (FTS-923-4561) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO DEFINE SELECTED HOST RISK FACTORS, CAUSAL AGENT(S), DISEASE
 MECHANISMS AND DIAGNOSTIC TESTS FOR OCCUPATIONAL ASTHMA.
43. ROLE OF ALVEOLAR CELL INTERACTIONS IN THE PATHOGENESIS OF SILICOSIS
 PROJECT OFFICER: VINCENT CASTRANOVA (FTS-923-4591) START DT: 10/83 END DT: 09/87
 OBJECTIVE: TO EVALUATE COMPLEX INTERACTIONS AMONG LUNG CELLS EXPOSED TO SILICA
 USING MORPHOLOGICAL AND CELL CO-CULTURE TECHNIQUES.
44. IMMUNOTOXICITY OF OCCUPATIONAL (ORGANIC) DUSTS
 PROJECT OFFICER: STEPHEN A OLENCHOCK (FTS-923-4256) START DT: 10/82 END DT: 09/85
 OBJECTIVE: ISOLATE, IDENTIFY COMPONENTS WHICH INTERACT WITH OR ALTER THE IMMUNE
 SYSTEM; DEFINE MECHANISMS OF DISEASE PRODUCTION.
45. ENDOTOXINS IN COTTON
 PROJECT OFFICER: STEPHEN A OLENCHOCK (FTS-923-4256) START DT: 10/82 END DT: 09/86
 OBJECTIVE: TO QUANTIFY AIRBORNE ENDOTOXINS IN COTTON DUSTS FROM INDUSTRIAL
 SITUATIONS AND EXPERIMENTAL SOURCES.

46. ANIMAL AND EXPOSURE FACILITY SUPPORT FOR DRDS
 PROJECT OFFICER: PERVIS C MAJOR (FTS-923-4518) START DT: 10/80 END DT: C
 OBJECTIVE: PROVIDE DRDS AND COLLABORATING UNITS WITH EXPERIMENTAL ANIMAL RESEARCH SERVICES, INCLUDING HUSBANDRY, TECHNICAL, AND CONTROLLED EXPOSURE(S).
47. EFFECTIVE SILICA INDICES OF RESPIRABLE MINERAL DUSTS
 PROJECT OFFICER: WILLIAM E WALLACE (FTS-923-4136) START DT: 10/84 END DT: 09/88
 OBJECTIVE: DEVELOP AN EFFECTIVE SILICA INDEX FOR RESPIRABLE MINERAL DUSTS BASED ON ACTIVITY.
48. OCCUPATIONAL HEALTH STUDIES EMERGING ENERGY INDUSTRIES
 PROJECT OFFICER: WILLIAM E WALLACE (FTS-923-4136) START DT: 10/82 END DT: 09/85
 OBJECTIVE: IDENTIFY AND PREVENT OCCUPATIONAL DISEASE IN NEW ENERGY INDUSTRIES PRIOR TO THEIR WIDESPREAD DEPLOYMENT.
49. ENVIRONMENTAL MINING SURVEILLANCE
 PROJECT OFFICER: ALWIN L DIEFFENBACH (FTS-923-4496) START DT: 10/81 END DT: C
 OBJECTIVE: TO CONDUCT ENVIRONMENTAL TARGET INVESTIGATIONS RELATED TO THE NIOSH 1990 OBJECTIVES.
50. PILOT DEMONSTRATIONS--HEALTH PROMOTION STRATEGIES FOR CWP EXAMINATIONS
 PROJECT OFFICER: ROBERT B REGER (FTS-923-4476) START DT: 10/84 END DT: 09/86
 OBJECTIVE: TO DECREASE RISK OF ADVANCED CWP THROUGH GREATER PARTICIPATION IN PREVENTION AND TRANSFER PROGRAMS--NCS AND SURVEILLANCE ADJUNCT.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

51. BERYLLIUM RETROSPECTIVE COHORT INVESTIGATION
 PROJECT OFFICER: ANDREA H OKUN (FTS-684-4411) START DT: 10/81 END DT: 09/87
 OBJECTIVE: TO INVESTIGATE THE MORTALITY EXPERIENCE OF WORKERS EXPOSED TO BERYLLIUM.
52. URANIUM MINERS--LOW DOSE INVESTIGATION
 PROJECT OFFICER: ROBERT J ROSCOE (FTS-684-4411) START DT: 10/82 END DT: 06/86
 OBJECTIVE: UPDATE EXPOSURE DATA AND DETERMINE WHETHER EXCESS LUNG CANCER RISK EXTENDS TO MINERS WHO RECEIVED LOW EXPOSURES TO RADON DAUGHTERS.

53. MORTALITY AND INDUSTRIAL HYGIENE STUDY OF FORMALDEHYDE
 PROJECT OFFICER: LESLIE T STAYNER (FTS-684-4481) START DT: 10/80 END DT: 12/86
 OBJECTIVE: TO DETERMINE WHETHER EXPOSURE TO FORMALDEHYDE IS ASSOCIATED WITH AN
 EXCESS RISK OF CANCER, AND TO DOCUMENT LEVELS OF EXPOSURE IN INDUSTRY.
54. COHORT MORTALITY STUDY OF ANTIMONY SMELTER WORKERS
 PROJECT OFFICER: TERESA M SCHNORR (FTS-684-4481) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO DETERMINE IF WORKERS EXPOSED TO ANTIMONY HAVE INCREASED CANCER
 MORTALITY, PARTICULARLY LUNG CANCER MORTALITY.
55. MORTALITY STUDY OF WORKERS EXPOSED TO TOLUENE DIISOCYANATE
 PROJECT OFFICER: TERESA M SCHNORR (FTS-684-4481) START DT: 06/83 END DT: 09/86
 OBJECTIVE: TO DETERMINE IF WORKERS EXPOSED TO TOLUENE DIISOCYANATE (TDI) HAVE
 INCREASED CANCER MORTALITY, PARTICULARLY LUNG CANCER.
56. CASE-CONTROL STUDY OF LUNG CANCER IN TEAMSTERS UNION
 PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 10/83 END DT: 06/86
 OBJECTIVE: TO DETERMINE IF SPECIFIC JOB CATEGORIES IN THE TEAMSTERS UNION INVOLVE
 EXCESS RISK OF LUNG CANCER.
57. RETROSPECTIVE COHORT INVESTIGATION OF NON-ASBESTOS WELDERS
 PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 10/84 END DT: 06/87
 OBJECTIVE: TO DETERMINE LUNG CANCER RISK FOR WELDERS WORKING WITH MILD STEEL.
58. MORTALITY AND IH STUDY OF WORKERS EXPOSED TO LEAD CHROMATE PAINTS
 PROJECT OFFICER: DENNIS R ROBERTS (FTS-684-4314) START DT: 10/82 END DT: 06/87
 OBJECTIVE: TO EVALUATE THE LONG-TERM HEALTH EFFECTS OF CHRONIC EXPOSURES TO LEAD
 CHROMATE PIGMENTS.

MUSCULOSKELETAL INJURIES

PROGRAM AREA GOAL:

Evaluate musculoskeletal injuries and occupational hazards so as to understand their causes and detect their vulnerabilities to prevention.

PROGRAM OBJECTIVE:

- By FY 1986, elucidate job-risk factors leading to certain disorders of the upper and lower extremities (carpal tunnel syndrome), furnish "how-to" manuals as aids in recognizing such conditions, and demonstrate control techniques for reducing these problems as well as lifting hazards in selected high-risk occupations.

PROGRAM DESCRIPTION:

The magnitude of this problem is indicated by the following: Musculoskeletal disorders (MSD) rank first among health problems in frequency of occurrence. These disorders are the leading cause of disability of people in their working years, afflicting 19 million (USNHS, 1971). Nearly one-half of the nation's work force are affected at some time during their working life. Musculoskeletal disorders represent a significant accessory factor in a large number of reported traumatic injuries. The cost of these disorders, based on lost earnings and worker compensation payments, exceeds that of any single health disorder. Back problems alone cost American industry an estimated one billion dollars each year. MSD, such as inflamed joints, sprains, and strains account for one-third of the annual worker compensation claims. The latter category is the most prevalent, with the back accounting for almost 50 percent of the disorders, followed by disorders of the ankle, knee, and shoulder. The frequency and impact of musculoskeletal conditions on the work force is expected to increase over the next several decades as the average age of the work force increases.

In 1982, musculoskeletal injuries accounted for 580,000 (18 percent) of the estimated 3.2 million emergency-room-treated occupational injuries in the United States. Based upon the 1980 BLS Annual Survey, NIOSH estimated 2,539,900 lost workday cases were associated with back injuries. In 1980, the National Safety Council estimated back injuries cost \$15 billion. BLS-SDS data for 1980, extrapolated to a national scale, suggest that 79% of back injuries are temporarily disabling, 9% are permanent-partial disabling, and approximately 0.2% are totally disabling. Physical demands of many jobs make the musculoskeletal system highly vulnerable to a variety of occupational injuries and illnesses. Estimates from 1980 BLS-SDS data suggest that 56% of back injuries are due to lifting/lowering, 14% to pulling/pushing, and 12% to throwing. The physical demands of many jobs make the musculoskeletal system highly vulnerable to a variety of occupational injuries and illnesses. Manual handling of materials, repetitive motions, and vibration are especially important etiologic factors in the development of musculoskeletal disorders.

The largest single subset of musculoskeletal injuries are low back injuries. These injuries are often due to improper manual handling of materials. The Bureau of Labor Statistics recently reported that approximately one million workers sustained back injuries in 1980, and that back injuries account for one of every five injuries and illnesses in the workplace. Approximately one-fourth of all workers' compensation indemnity expenditures in eight States were for back injuries.

Studies show that repetitive motion can cause "cumulative trauma disorders." These disorders include carpal tunnel syndrome, tendonitis, ganglionitis, tenosynovitis, bursitis, and epicondylitis. The disorders may be caused or aggravated by repeated twisting or awkward postures, particularly when combined with high force. The population at risk includes persons employed in such industries or occupations as construction, food preparation, clerical work, product fabrication, and mining. Data from the National Occupational Hazard Survey suggest that 15 to 20 percent of workers in these jobs are potentially at risk of cumulative trauma disorders. Data from the Bureau of Labor Statistics indicate that in 1980, approximately 23,000 occupational injuries were associated with repeated trauma.

An estimated seven million workers in such occupations as vehicle operation are intermittently exposed to whole-body vibration which significantly stresses the musculoskeletal system. Although the effects are poorly understood, preliminary data suggest that low back pain, vertebrogenic pain, and degenerative disk disease may be associated with whole-body vibration.

An estimated 1.2 million workers are exposed to "segmental" vibration, i.e., vibration principally of a part or parts of the body, of which the principal sources are handheld power tools, such as chain saws and jackhammers. Vibration syndrome may affect up to 90 percent of workers in such occupations as chipping, grinding, and chain sawing.

A five-year program has been drafted with four main purposes: (1) the identification of high risk occupations where disorders and injuries arise from excessive biomechanical demands posed by current work methods, (2) the evaluation of work tasks/equipment/operations that contribute to such health and safety risks, (3) the development and testing of effective intervention strategies for reducing these types of hazards, including design changes in work methods and tools, and (4) the development of effective dissemination procedures for reaching practitioner/user groups.

The Division of Biomedical and Behavioral Science coordinates the Institute's efforts for preventing occupationally-related musculoskeletal disorders. These efforts include: (1) developing and applying methods for identifying job/task elements presenting biomechanical hazards for use in worksite surveillance/hazard control programs, (2) clarifying causal/risk factors in the development of occupationally-related musculoskeletal problems, and (3) formulating and demonstrating control techniques for reducing biomechanical hazards and musculoskeletal disorders in high-risk jobs/occupations. Ongoing research focuses on four problem areas which include lifting and low back disorders, repetitive motion and arm wrist disorders, chronic kneeling and leg/joint disorders, and overexertion/fatigue from excessive workload.

The musculoskeletal research program in the Division of Safety Research focuses primarily on the injury/health effects from acute encounters with physical hazards of a traumatic nature. Thus, DSR's program complements the Institute's musculoskeletal research program bearing on cumulative trauma disorders. DSR's supporting role is accomplished by performing a variety of research to fill knowledge gaps which include: 1) conducting injury-related surveillance studies using specialized data bases for assessing the incidence rates of musculoskeletal injuries, 2) the identification and analysis of injury risk factors using statistical survey techniques for predicting incidence of musculoskeletal disorders, and 3) laboratory evaluations of hazardous work conditions and mechanisms underlying musculotendinous injuries.

PROGRAM AREA CONCENTRATION

LOW BACK INJURIES: Data defining postural-load stresses on the spinal column were collected and used to develop a computer model to evaluate effects of asymmetrical-lifting postures, container design parameters, and load interactions. The aim of this work and future efforts is to assess the applicability of the NIOSH Work Practices Guide for manual materials handling tasks, not covered by current NIOSH recommendations, and to develop permissible limits in extending the Guide's utility. Related work includes the development of a diagnostic program to identify traumatic events that precipitate acute low-back injuries.

REPETITIVE-MOTION INJURIES: Nine different jobs and approximately 400 workers were evaluated via a contract study to define and quantify the traumatogenic factors associated with the development of upper extremity cumulative trauma disorders. Anatomical data were also collected on 60 symptomatic and 60 asymptomatic workers to determine the role of hand/wrist structures in the etiology of carpal tunnel syndrome. The combination of findings from the study of anatomical structures and the biomechanical stress factors are being used to formulate needed job and tool modifications. These modifications are now being tested at select worksites to assess their effectiveness in alleviating sources of biomechanical trauma. A manual specifying guidelines for identifying, evaluating, and controlling repetitive motion injuries of the upper extremities will also be distributed and evaluated during FY 1985. The research program on repetitive motion injuries is also being extended to encompass the identification of biomechanical stressors affecting the lower extremities, such as those found in jobs requiring frequent kneeling, squatting, and prolonged standing. Musculoskeletal stresses associated with static postures found among VDT users and those workers engaged in other visually-demanding tasks e.g., microscopy, are also being evaluated. Recommendations will be developed and disseminated during the next two years.

VIBRATION-ASSOCIATED INJURIES: The effects of whole-body vibration are being assessed to identify fatigue factors among bus drivers that increase the risk of adverse health and safety outcomes. Studies are also underway involving three-dimensional simulations of whole-body vibration to determine morbidity in the human spine. Recent accomplishments include the publication of findings defining risk factors, and recommendations for control of segmental vibration from the use of vibrating tools. The findings indicate that the prevalence of vibration syndromes ranged from 19 percent in shipyards to 47 percent in foundries. Several new prototype antivibration-tool designs and protective equipment, such as work gloves, are being evaluated as to their potential for attenuating sources of vibration.

***** MUSCULOSKELETAL INJURIES *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. TRAUMATOGENIC FACTORS IN OCCUPATIONAL WRIST DISORDERS
PROJECT OFFICER: DANIEL J HABES (FTS-684-8286) START DT: 10/80 END DT: 09/86
OBJECTIVE: CHARACTERIZE JOB TASK AND PERSONAL FACTORS IN THE DEVELOPMENT OF UPPER
EXTREMITY MUSCULOSKELETAL DISORDERS.
2. LOWER EXTREMITY DISORDERS OF OCCUPATIONAL ORIGIN
PROJECT OFFICER: DANIEL J HABES (FTS-684-8286) START DT: 10/83 END DT: 12/87
OBJECTIVE: ELABORATION OF BIOMECHANICAL RISK FACTORS IN JOB TASKS POSING LOWER
EXTREMITY MUSCULOSKELETAL PROBLEMS.
3. FATIGUE EFFECTS OF EXTENDED WORKDAYS AND WORKLOAD
PROJECT OFFICER: MICHAEL J COLLIGAN (FTS-684-8291) START DT: 10/82 END DT: 09/86
OBJECTIVE: DEVELOP GUIDELINES FOR FATIGUE ALLOWANCE AS A FUNCTION OF TASK
CHARACTERISTICS AND LENGTH OF WORK PERIOD.
4. LAB STUDY OF MUSCULOSKELETAL AND PSYCHOMOTOR EFFECTS OF WHOLE-BODY VIBR.
PROJECT OFFICER: ALAN H PURDY (FTS-684-8281) START DT: 10/83 END DT: 09/86
OBJECTIVE: INVESTIGATE THE RELATIONSHIP OF WHOLE-BODY VIBRATION ON SPINAL
DEFORMATION AND STRENGTH, AS WELL AS PSYCHOMOTOR DECREMENT.
5. FIELD MEASUREMENTS OF WORKERS EXPOSED TO WHOLE-BODY VIBRATION
PROJECT OFFICER: THOMAS E DOYLE (FTS-684-8282) START DT: 10/83 END DT: 09/86
OBJECTIVE: CHARACTERIZE ENVIRONMENTAL WHOLE-BODY VIBRATION AND NOISE IMPINGING ON
VEHICULAR OPERATORS.
6. WORKSITE STUDY OF ERGONOMIC ASPECTS OF INDUSTRIAL MICROSCOPE USE
PROJECT OFFICER: CRAIG L ANDERSON (FTS-684-8383) START DT: 10/84 END DT: 09/86
OBJECTIVE: IDENTIFY POTENTIAL MUSCULOSKELETAL AND VISUAL HAZARDS OF INDUSTRIAL
MICROSCOPE USE, AND DEFINE AN ERGONOMIC BASIS FOR CONTROL MEASURES.
7. APPRAISAL/EXPANSION OF MANUAL MATERIAL HANDLING TASK LIMITS
PROJECT OFFICER: DONALD W BADGER (FTS-684-8286) START DT: 10/84 END DT: 09/87
OBJECTIVE: EVALUATION OF OVEREXERTION RISK IN OTHER THAN SAGITTAL LIFTING TASKS;
RECOMMEND PERMISSIBLE LIMITS FOR THESE ACTIVITIES.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

8. CARPET LAYERS KNEE
PROJECT OFFICER: SHIRO TANAKA (FTS-684-4481) START DT: 03/83 END DT: 03/85
OBJECTIVE: TO EVALUATE THE CHRONIC HEALTH EFFECTS OF KNEELING AND KNEE KICKING ON
THE KNEE JOINT IN FLOORLAYERS, BRICKLAYERS AND MILLWRIGHTS.

DIVISION OF SAFETY RESEARCH

9. MUSCULOTENDINOUS INJURIES RELATED TO MUSCLE FATIGUE
PROJECT OFFICER: ROGER M NELSON (FTS-923-4810) START DT: 10/82 END DT: 09/86
OBJECTIVE: TO RELATE LOW LEVELS OF MUSCLE CONTRACTION HELD TO FATIGUE TO
MUSCULOTENDINOUS INJURIES IN THE WORKPLACE.
10. OBJECTIVE EVALUATION OF LOW BACK INJURIES
PROJECT OFFICER: ROGER M NELSON (FTS-923-4810) START DT: 10/83 END DT: C
OBJECTIVE: TO DEVELOP A STANDARDIZED METHOD TO EVALUATE INDUSTRIALLY RELATED LOW
BACK INJURIES FOCUSING ON THE MOVEMENT DYSFUNCTION SYNDROME.
11. STUDY OF FALLS INVOLVED WITH PUSHING AND PULLING TASKS
PROJECT OFFICER: TIMOTHY J PIZATELLA (FTS-923-4807) START DT: 10/80 END DT: 09/85
OBJECTIVE: TO REDUCE THE RISK OF MUSCULOSKELETAL INJURIES DUE TO FALLS AND
OVEREXERTIONS BY MINIMIZING STRESS DURING PUSHING AND PULLING TASKS.
12. IDENTIFICATION OF MUSCULOSKELETAL STRESS DURING ASYMMETRIC LIFTING
PROJECT OFFICER: TIMOTHY J PIZATELLA (FTS-923-4807) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO PREVENT MUSCULOSKELETAL INJURIES TO MANUAL MATERIALS HANDLING BY
IDENTIFYING STRESS DURING ASYMMETRIC LIFTING TASKS.
13. DEV. OF JOB AND SURV. TOOLS TO EVAL. AND CONTROL UPPER EXTREM. INJURIES
PROJECT OFFICER: JAMES D MCGLOTHLIN (FTS-923-4808) START DT: 10/84 END DT: 09/85
OBJECTIVE: TO DEVELOP JOB ANALYSIS AND EPIDEMIOLOGIC SURVEILLANCE INSTRUMENTS TO
REDUCE MICRO AND MACRO TRAUMA INJURIES IN THE WORKPLACE.
14. HEALTH CARE INDUSTRY--LOW BACK EPIDEMIOLOGIC STUDY
PROJECT OFFICER: ROGER C JENSEN (FTS-923-4809) START DT: 10/84 END DT: 09/87
OBJECTIVE: IDENTIFY HOSPITAL TASKS WITH HIGH RISK OF BACK INJURY AND DEMONSTRATE
BIOMECHANICAL TECHNIQUES FOR DETERMINING SAFEST WORK METHOD.

OCCUPATIONAL CANCERS

PROGRAM AREA GOAL:

Evaluate occupational cancers and occupational hazards so as to understand their causes and detect their vulnerabilities to prevention.

PROGRAM OBJECTIVES:

- By 1986, develop direct approaches for control systems which prevent premature mortality and reduce unnecessary morbidity among workers.
- By 1987, verify the efficacy of behavioral methods and job redesign to reduce workers' exposure to carcinogens in roofing operations.
- By 1988, identify and develop indicator systems which can predict potential carcinogenic hazards of organic chemicals.
- By 1988, complete 70 cancer epidemiology studies associated with certain chemicals, physical agents, processes, or occupations to provide data that will result in reduction and/or elimination of workplace hazards.
- By 1990, identify and evaluate the carcinogenic and cocarcinogenic/promoting interaction potential of complex occupational environments encountered by workers.

PROGRAM DESCRIPTION:

Cancer kills approximately 430,000 people annually, and is the second leading cause of death. The American Cancer Society estimates that some form of cancer will ultimately develop in one-fourth of Americans. It is now recognized that a high proportion of all cancers are caused by "environmental," i. e., extragenetic factors. "Environmental" includes such factors as diet, alcohol, drugs, reproductive activities, and tobacco usage, in addition to occupational exposures and exposures to environmental pollutants. The relationship between cancer and environmental factors has been developed through toxicological, clinical, and epidemiological studies.

That malignant disease may be occupational in origin has been long-recognized. Sir Percivall Pott observed an unusually high frequency of scrotal cancer among London chimney sweeps in 1775. Since that time numerous industrial agents or processes have been associated with the development of cancer. In addition, there are numerous agents or processes for which human carcinogenic potential is suspected. The role of these agents in cancer causation is currently under investigation.

Although there is general agreement concerning the total number of cancers, there is considerable controversy surrounding the number of cancers that are related to the workplace. Numerous factors contribute to the difficulty in making such estimates:

1. Latent period. Occupational cancer becomes evident only after a period of years following exposure to the carcinogen; this interval may vary from five years to more than 40.
2. Multiple exposures. Workers may be exposed to multiple carcinogenic agents on the job; interaction among agents may alter the risk of carcinogenesis.
3. Lifestyle factors. Smoking, alcohol consumption, and probably diet also play a role in carcinogenesis in the workplace. Cigarette smoking is well known to interact with physical and chemical agents found in the workplace and alter the risk of carcinogenesis; the interaction of asbestos and cigarette smoking is just one important example.
4. Exposure assessments. Historically, measurements of actual levels or durations of exposures have not generally been obtained; this paucity of exposure information makes delineation of dose-response relationships very difficult which is especially critical in assessing exposure related to diseases with long latencies. Even with this information, it is difficult to predict the number of cancers which will occur as a result of a given exposure.
5. Frequency of cancer type. Establishing an occupational etiology for a very rare cancer (e.g., hemangiosarcoma of the liver due to vinyl chloride exposure) is much easier than for a more common tumor type (e.g., lung cancer due to chromate exposure).
6. Misdiagnosis. Unusual neoplasms may be misdiagnosed; moreover, they may not be precisely categorized in the International Classification of Disease (ICD); such is the case for mesothelioma.
7. Dilution. Changes in cancer rates among small subgroups of the population must be very large to affect the overall cancer rate in the general population and thus be epidemiologically detectable.

Various estimates of the proportion of cancers which are occupationally related have been made. These estimates range from one to three percent of all cases of cancer to as much as 20 percent or more. While the exact number of occupationally related cancers may be in doubt, it is clear that a significant relationship between occupation and cancer exists.

Regardless of the impact of occupational cancer in the general population, in specific groups of workers with exposure to carcinogens the percentage of all workers in these groups who will develop occupational cancer may be quite high. Up to 11 percent of workers exposed to asbestos may ultimately develop mesothelial disease; 100 percent of a group of workers distilling benzidine and beta-naphthylamine later developed bladder tumors.

Given the increased volume and diversity of synthetic chemical manufacture since World War II, a major unresolved issue is whether or not there will be increased rates of occupational cancer in the future. This issue should be resolvable in the near future as latency periods ripen. Future research must include continued surveillance efforts for identification of suspected carcinogenic agents, toxicologic studies in animals, epidemiologic studies of these specific agents, and programs for prevention.

Over the last several years, approximately 50 percent of NIOSH's occupational cancer research was supported through an interagency agreement (IAG) with the National Cancer Institute. Since the inception of the IAG, the National Cancer Institute (NCI) has provided NIOSH with approximately \$20 million to conduct as many as 80 research projects dealing with a broad spectrum of topics related to cancer in the workplace. Approximately 15 projects are currently ongoing. NIOSH has worked closely with NCI under the IAG and has participated in three collaborative workshops with NCI and EPA; the third workshop was held in FY 1984. At the FY 1981 workshop which was held in Washington, D.C., NIOSH investigators presented the results or status of 14 studies. Future collaboration between NCI and NIOSH will continue through joint project officers and interagency projects.

The following methodologies (laboratory and epidemiology) are utilized in NIOSH to conduct cancer research.

Epidemiology

The epidemiologic approach by which cancer research is conducted in the Division of Surveillance, Hazard Evaluations, and Field Studies (DSHEFS) involves several levels of study. Under DSHEFS' surveillance activities, cancer risk among occupational groups is assessed using existing record systems such as tumor registries, State and federal vital statistics, and data from the Social Security Administration. As described in National Standardized Mortality data sets, cancer will be one of several causes of death studied. The information generated from this surveillance effort will be assessed for further study by groups outside of NIOSH, as well as by researchers in DSHEFS.

Within the DSHEFS' industrywide studies program, investigations are conducted to determine whether or not specific occupational exposures or work within certain occupational groups in general are associated with an increased risk of developing cancer. The ultimate objective of these studies is to identify whether or not certain industrial chemicals are cancer-causing agents. The research involves the identification of worker populations that lend themselves to epidemiologic research. In addition, detailed industrial hygiene surveys are usually conducted to describe the actual levels of exposure experience by the study population. Industrywide epidemiologic/industrial hygiene studies of this type have been instrumental in achieving lower exposures to certain chemicals in the workplace and in providing additional information regarding the etiology of certain types of cancer.

In the past, DSHEFS has conducted numerous retrospective cohort mortality studies to assess the cancer risk among workers exposed to various agents (e.g., vinyl chloride, asbestos, bis-chloromethyl ether, polychlorinated biphenyls, benzene, talc, radiation, etc.). Several of the ongoing and proposed new studies will be designed using this methodology.

In addition, because there is a need to examine an increasing number of cancer clusters brought to our attention by unions, industries, individual workers, the media, and other government agencies, we have vigorously developed the use of other approaches to better target more comprehensive cohort mortality studies. These methods include proportionate mortality, case-control, and sample cohort studies. The case-control study within a cohort mortality study is an approach that is used in an attempt to isolate an area or job at high risk within a large plant, so that potential carcinogenic occupational exposure can be identified. Other methods of analysis such as direct standardization and logistic regression are used in an effort to achieve the most valid conclusions. Past studies which were completed but produced no definitive conclusions because of inadequate latency will be updated and reanalyzed during the next few years.

Laboratory/Toxicology

The Division of Biomedical and Behavioral Science's occupational carcinogenesis program has as its goals: to identify and evaluate the cocarcinogenic/promoting interaction potentials of complex factors in the occupational environments encountered by workers; to reduce occupational cancer risk by controlling cancer hazards through job redesign and by promoting worker awareness of hazards; and to disseminate information on the identification, evaluation, and control of occupational cancer risk in selected populations. Progress toward these goals is being made through a number of ongoing projects and activities. The program is linked to other NIOSH activities dealing with working populations at increased cancer risk through participation on the NIOSH genotoxicology team, the NIOSH Working Group on Control of Occupational Cancers and the National Toxicology Program (NTP) for the Testing of Potential Carcinogens. These activities will address the likely etiologies associated with increased cancer risks in various occupational settings.

In vitro screening methods are being developed and used to evaluate initiating/cocarcinogenic/promoting activity of field samples. Three contracts were awarded in FY 1983 and completed in FY 1984 to assess interlaboratory variation in the performance of the V-79 metabolic cooperation system and establish the utility of using this assay for assessing promoting/cocarcinogenic activity of industrial chemicals. Twenty-five chemicals, jointly selected by NTP and NIOSH, were tested in this effort. Two additional contracts were awarded in FY 1984 to further refine the technique and to test 67 additional occupationally related chemicals (and mixtures) over a three-year period.

The Division of Respiratory Disease Studies' effort in this area has been in the development of suitable assay systems for the detection of potential carcinogens in the workplace environment; in the determination, via short-term mutagenesis assay systems, of the potential carcinogenic hazards of chemicals and complex mixtures to the exposed workers; and in the determination of the relationship between cancer incidence and the results of mutagenic studies in selected occupational settings.

PROGRAM AREA CONCENTRATION

AROMATIC AMINES (TOXICOLOGY): Investigations will commence in FY 1985 to develop more sensitive biological monitoring methods for measuring DNA-adduct levels in aromatic amine exposed populations in order to assess past exposures and to quantify the associated risks.

ASPHALT FUMES (TOXICOLOGY): A contract, funded through the NCI Interagency Agreement, was awarded by DBBS in FY 1983 and will continue through FY 1987 to assess the cocarcinogenic/promoting activity of asphalt fumes and its major chemical components in the mouse dermal application model.

Recommendations by DBBS on the use of asphalt in roofing operations compared to coal tar pitch were made during FY 1984 in a publication, "A Comparison of the Skin Carcinogenicity of Condensed Roofing Asphalt and Coal Tar Pitch Fumes."

BETA-NAPHTHYLAMINE (EPIDEMIOLOGY): A retrospective cohort mortality study was conducted among workers employed at the last facility in the United States that manufactured beta-naphthylamine (BNA), a recognized human bladder carcinogen. This study was conducted in conjunction with a pilot project in which workers were notified of the health risks associated with exposures to BNA. Two deaths from bladder cancer were observed while 0.7 such deaths were expected. Due to the use of this potent carcinogen, it was anticipated that more bladder cancer deaths would have been found in this population. The reasons for the small number of bladder cancer deaths could have resulted from the low percentage of the work force exposed to BNA, an inadequate latency period, and/or the high survival rate for bladder cancer. In fact, a recently conducted notification and medical screening project on this same population found an additional 11 bladder cancer cases. This suggests that mortality may not always be an adequate indicator of disease risk.

CUTTING FLUIDS (TOXICOLOGY): Recommendations limiting the use of nitrite in synthetic cutting fluids and subsequent reduction in exposure to diethanolnitrosamines were begun in FY 1984 and will continue in FY 1985.

FOUNDRY STUDIES (TOXICOLOGY): In FY 1984, a contract study that evaluated the cocarcinogenic activity of silica sand and other foundry aggregates in the hamster intratracheal lung model was completed and published by DBBS, "Cocarcinogenicity of Foundry Particulates in Hamsters."

Options for reducing cancer risks are being explored in a number of DBBS projects. With regard to the foundry environment, one project evaluated the effluents from different binding materials, and another investigated relative activity of foundry aggregates.

GENERAL (EPIDEMIOLOGY): The epidemiologic studies of occupational cancer (other than lung) can be classified by agent or by industry. Some of the ongoing studies are listed below.

Agent Studies: Antimony; ethylene oxide; sulfuric acid; Halowax; MOCA; toluene; toluene diisocyanate; methylene dianiline; radiation; dioxin; PCB; perchloroethylene; pesticides; styrene-butadiene; benzene.

Industry Studies: Truck drivers; chemical industry; newsprint industry; leather industry; wood die and model makers; automobile industry; nuclear shipyards.

HALOGENATED ETHANES (TOXICOLOGY): Investigations which evaluate the influence of various drugs on the carcinogenicity of halogenated ethanes will be completed during 1985.

MUTAGENICITY TESTING: The results of laboratory studies from DRDS with mutagen-coated particles, vapors, gases, side-stream cigarette smoke and diesel emissions indicate that the in situ mutagenesis assay system recently developed in their laboratory is potentially useful for monitoring of mutagens in the workplace. A urine mutagenesis assay has also been developed, and guidelines for the collection of urine samples from workers are being prepared.

Research is also being conducted by DRDS into the mechanisms of gastric carcinogenesis in coal miners. DRDS has found that solvent extracts of coal dust can be nitrosated in the acidic (stomach) environment to form potent mutagens. It has been found that coal dust extract can potentiate the mutagenic activity of tobacco snuff which is being used by many workers in coal mines.

Beginning in FY 1983 and continued into FY 1984, efforts were coordinated between DBBS and DRDS to assimilate strategies for assessing the tumor initiating activity of field samples.

NEWSPRINT INK (TOXICOLOGY and EPIDEMIOLOGY): Efforts by DPSE, DBBS, DSHEFS, and NTP are continuing to assess the carcinogenic components of newsprint ink.

NUCLEAR SHIPYARD WORKERS (EPIDEMIOLOGY): A matched case-control study was conducted of 53 cases of leukemia and of 212 controls within a previously studied cohort at a nuclear shipyard. The study sought to ascertain whether there was an association in this population between leukemia and exposure to either ionizing radiation or organic solvents. To obtain information on individual exposures, radiation dose histories and detailed work histories by job and shop were evaluated for each subject. When the entire population of cases was examined, no statistically significant associations were found between ionizing radiation or solvent exposure and myelogenous or lymphatic leukemia. However, when specific job titles and shops were examined, occupations that were associated with leukemia included electrician and welder occupations. The odds ratio for the electrician occupation was significantly elevated for all leukemia, and particularly for lymphatic leukemia. The odds ratio for welders was not significantly elevated for all leukemia, but was elevated for myelogenous leukemia.

PLYWOOD INDUSTRY (EPIDEMIOLOGY): A cohort of 2,233 plywood mill workers employed for at least one year between 1945 and 1955 was traced through March 31, 1977. The 570 deaths observed were only 74% of the number expected based on comparable U.S. mortality rates. A statistically nonsignificant excess of deaths was observed for the category "other lymphatic cancer." Within this category, three deaths due to multiple myeloma occurred, versus 0.9 deaths expected. This observation is unique, although a previous proportionate mortality study observed a threefold increased PMR for plywood workers in the 1950s, but not in later years. When analyses for duration of employment and time since first employment (latency) were conducted, the excess mortality due to other lymphatic cancer was highest after 20 years duration of employment, but appeared to be independent of latency. Based on walk-through environmental surveys in the plywood mills, no etiologic agents were distinguishable. Plywood workers were potentially exposed to formaldehyde around the gluing operations in the mill. However, no deaths due to nasal cancer, which has been associated with exposure to formaldehyde in laboratory animals, were observed in this cohort (0.4 deaths had been expected).

SKIN (TOXICOLOGY): Another effort by DBBS to begin in FY 1985 is to determine whether chronic physical trauma to the skin will promote arsenic-induced skin cancer in mice. In-house efforts continue in the development of in vitro methods to determine the relative sensitivity, reactivity and predictability of different mouse strains to known promoters/cocarcinogens.

During FY 1984, studies were completed by DBBS, and evidence supplied to OSHA, on the expected body burden of benzene due to absorption of rubber solvent through the skin during tire building operations.

STYRENE (EPIDEMIOLOGY): In order to test the hypothesis that leukemia and lymphoma may be associated with exposure to styrene, cause of death patterns were studied at two reinforced plastic boatbuilding facilities. There were 176 deaths observed among the total cohort, in comparison to 195.3 deaths expected (SMR=90). Among the high styrene exposure group, 47 deaths were observed in comparison to 41.5 deaths expected (SMR=113). No leukemia or lymphoma deaths were observed in either the high exposure group or the total cohort. An excess of accidental deaths among the high exposure group (18 observed vs. 12.4 expected) did not appear to be due to styrene's acute central nervous system effects, since none of the individuals were employed at the facilities at the time of their deaths.

While leukemia and lymphoma did not appear to be related to styrene exposure, the study had little statistical power to detect excesses of these diseases, due to the short length of observation and the young age of most cohort members. It was concluded that the cohort should provide increasingly useful information on chronic styrene toxicity as the population ages and the observation period increases.

STYRENE (EXPOSURE REDUCTIONS): DBBS projects are aimed at promoting worker awareness of occupational cancer hazards and adherence to safeguards designed to reduce such risks. One consists of developing a set of guidelines for composing messages and booklets which assure effective communication of occupationally associated cancer risks to workers. The guidelines were drafted in FY 1984 and field testing will commence in FY 1985. Another DBBS project seeks to establish the utility of behavioral approaches and job design factors for furthering efforts at controlling cancer hazards at the workplace. A first effort demonstrating the effectiveness of work practices for reducing exposure risk was addressed in a project completed in FY 1981 involving styrene workers. Follow-up work in FY 1984 found such prototypes to have durability at the worksites used in the original effort. This model is being extended beginning in FY 1984 to include roofing workers. The first phase will establish biological monitoring techniques for measuring worker exposure which will be completed in FY 1986. Future efforts will explore the nature of work practices and job design changes needed to minimize exposure risk and how they can best be instituted in a roofing work force.

TETRA ETHYL LEAD (EPIDEMIOLOGY): The cause-specific mortality of 2510 males employed at an east Texas chemical plant was examined in a historical prospective study to evaluate a suspected increase in deaths from multiple myeloma and brain cancer. Potential exposures from chemicals either used in manufacturing processes or produced during the study period 1952-1977 included the fuel additive tetraethyl lead (TEL), ethylene dibromide and dichloride, inorganic lead, and vinyl chloride monomer. Overall mortality for all workers (156 observed vs. 211.14 expected) and for workers first employed between 1952 and 1959 (131 observed vs. 167.33 expected) when TEL was the single major product was lower than expected when compared to the United States general population. There were no significant increases in mortality from malignancies or other causes of death. The deficits may be due to the small number of total deaths, difficulties in detecting excess risk of mortality from multiple myeloma brain cancer or other rare causes of death, lack of complete workplace exposure data for production workers, and the absence of historical measurements on the extent of environmental exposure to TEL and other chemicals.

***** OCCUPATIONAL CANCERS (OTHER THAN LUNG) *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. DICHLOROETHANE DRUG INTERACTIONS--NCI
PROJECT OFFICER: KENNETH L CHEEVER (FTS-684-8487) START DT: 10/80 END DT: 09/85
OBJECTIVE: DETERMINE IF THE TOXIC INTERACTIONS BETWEEN 1,2-DIBROMOETHANE AND
DISULFIRAM IN RATS CAN BE EXTENDED TO OTHER HALOETHANES AND DRUGS.
2. BLADDER CANCER ASSOC WITH OCCUP EXPOSURE: APPROPRIATE ANIMAL MODELS
PROJECT OFFICER: FRANCIS B DANIEL (FTS-684-8496) START DT: 10/84 END DT: 09/86
OBJECTIVE: EVALUATE DNA DAMAGE/REPAIR PROCESSES IN HUMAN AND LABORATORY ANIMALS
UROTHELIA TO FACILITATE THE SELECTION OF ANIMAL MODELS.
3. BIOMONITORING FOR POPULATIONS OCCUPATIONALLY EXPOSED TO AROMATIC AMINES
PROJECT OFFICER: FRANCIS B DANIEL (FTS-684-8496) START DT: 10/84 END DT: 09/87
OBJECTIVE: DEVELOP BIOMONITORING TECHNIQUES FOR QUANTITATING CHEMICAL-DNA
ADDUCTS IN WORKERS OCCUPATIONALLY EXPOSED TO AROMATIC AMINES.
4. ASSESSMENT OF COCARCINOGENIC ACTIVITY OF ASPHALT FUMES
PROJECT OFFICER: RICHARD W NIEMEIER (FTS-684-8394) START DT: 10/82 END DT: 09/88
OBJECTIVE: IDENTIFY ACTIVE COMPONENTS OF ASPHALT FUMES AND DEVELOP INDICATORS FOR
ASSESSING EXPOSURE AND ULTIMATELY REDUCING THE CARCINOGENIC RISK.
5. IN VITRO TESTS FOR WORKPLACE COCARCINOGENS
PROJECT OFFICER: JEFFREY S BOHRMAN (FTS-684-8357) START DT: 10/80 END DT: 09/88
OBJECTIVE: IDENTIFY AND VALIDATE RAPID AND RELIABLE IN VITRO METHODS AS SCREENING
TECHNIQUES IN THE ASSESSMENT OF WORKPLACE COCARCINOGENS.

DIVISION OF PHYSICAL SCIENCES AND ENGINEERING

6. CHEMICAL CHARACTERIZATION OF ROOFING ASPHALT FUMES
PROJECT OFFICER: ROBERT A LUNSFORD (FTS-684-4258) START DT: 01/83 END DT: 03/85
OBJECTIVE: IDENTIFY ORGANIC COMPOUNDS IN PETROLEUM ASPHALT FUMES IN SUPPORT OF
OTHER PROJECTS ADDRESSING THE ETIOLOGY OF ITS CARCINOGENICITY.

DIVISION OF RESPIRATORY DISEASE STUDIES

7. MUTAGENIC MONITORING OF WORKPLACE AND WORKERS
PROJECT OFFICER: TONG-MAN ONG (FTS-923-4516) START DT: 10/79 END DT: 09/86
OBJECTIVE: DEVELOP MUTAGENESIS ASSAY SYSTEMS AND PERFORM STUDIES FOR DETERMINING
POTENTIAL HAZARD OF CHEMICALS AND COMPLEX MIXTURES TO EXPOSED WORKERS.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

8. INDUSTRIAL HYGIENE CHARACTERIZATION OF 1,3-BUTADIENE EXPOSED WORKERS
PROJECT OFFICER: JOHN M FAJEN (FTS-684-4363) START DT: 10/84 END DT: 09/86
OBJECTIVE: CHARACTERIZE THE EXTENT OF EXPOSURE OF PRODUCERS, FORMULATORS AND
USERS OF THE 1,3-BUTADIENE MONOMER.
9. MEDICAL, BIOMETRIC AND IH STUDY OF EMERGING PROBLEMS
PROJECT OFFICER: WILLIAM E HALPERIN (FTS-684-4207) START DT: 10/79 END DT: C
OBJECTIVE: TO EVALUATE THE FEASIBILITY OF CONDUCTING STUDIES ON POTENTIAL
WORKPLACE HAZARDS AS THEY ARE IDENTIFIED.
10. MORTALITY AND INDUSTRIAL HYGIENE STUDY OF WORKERS EXPOSED TO TOLUENE
PROJECT OFFICER: FRANK B STERN (FTS-684-4411) START DT: 10/79 END DT: 09/85
OBJECTIVE: TO DETERMINE IF EXPOSURE TO TOLUENE HAS A POTENTIAL FOR LONG-TERM
HEALTH EFFECTS. LEUKEMIA IS OF A PRIORITY CONCERN.
11. MORTALITY AND INDUSTRIAL HYGIENE STUDY OF LEATHER INDUSTRY WORKERS
PROJECT OFFICER: FRANK B STERN (FTS-684-4411) START DT: 10/78 END DT: 09/85
OBJECTIVE: TO DETERMINE IF LEATHER TANNING AND FINISHING INDUSTRY WORKERS HAVE AN
INCREASED RISK OF MORTALITY.
12. COMPILATION OF BLUE COLLAR MORTALITY RATES
PROJECT OFFICER: ROBERT J ROSCOE (FTS-684-4411) START DT: 10/84 END DT: 03/86
OBJECTIVE: TO DEVELOP MORTALITY RATES FOR BLUE COLLAR WORKERS WHICH ARE MORE
APPROPRIATE FOR COMPARISON WITH OCCUPATIONAL COHORTS.
13. MORTALITY STUDY OF WORKERS EXPOSED TO HALOWAX
PROJECT OFFICER: ELIZABETH M WARD (FTS-684-4481) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO DETERMINE WHETHER HALOWAX EXPOSURE IS ASSOCIATED WITH AN EXCESS
RISK OF SOFT TISSUE SARCOMA, LYMPHOMA OR LIVER CANCER.

14. MORTALITY AND IH STUDY OF AUTOMOTIVE WOOD DIE AND MODEL MAKERS
 PROJECT OFFICER: ROBERT J ROSCOE (FTS-684-4411) START DT: 10/80 END DT: 06/85
 OBJECTIVE: DETERMINE THE EXCESS MORTALITY RISKS AMONG AUTOMOTIVE WOOD DIE AND
 MODEL MAKERS.
15. INVESTIGATION OF WORKERS EXPOSED TO MOCA
 PROJECT OFFICER: ELIZABETH M WARD (FTS-684-4481) START DT: 10/82 END DT: 09/86
 OBJECTIVE: TO EVALUATE THE LONG-TERM HEALTH EFFECTS OF EXPOSURE TO 4,4'
 METHYLENEBIS (2-CHLORO ANILINE) IN HUMANS.
16. ETHYLENE OXIDE MORTALITY STUDY
 PROJECT OFFICER: LESLIE T STAYNER (FTS-684-4481) START DT: 10/82 END DT: 06/88
 OBJECTIVE: TO DETERMINE IF EXPOSURE TO ETHYLENE OXIDE IS ASSOCIATED WITH EXCESS
 MORTALITY FROM ANY CAUSE, PARTICULARLY LEUKEMIA.
17. INDUSTRYWIDE STUDY OF WORKERS EXPOSED TO 4,4'-METHYLENE DIANILINE
 PROJECT OFFICER: MARK F BOENIGER (FTS-684-4363) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO CHARACTERIZE WORKPLACE EXPOSURES TO 4,4'-METHYLENE DIANILINE AND
 PERFORM, IF FEASIBLE, AN EPIDEMIOLOGICAL MORTALITY STUDY.
18. CASE-CONTROL STUDY OF BLADDER CANCER IN HAMILTON COUNTY
 PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 10/82 END DT: 07/85
 OBJECTIVE: TO DETERMINE OCCUPATIONAL ASSOCIATION WITH DEATH FROM BLADDER CANCER
 IN HAMILTON COUNTY USING CITY DIRECTORIES AND DEATH CERTIFICATES.
19. INDUSTRIAL HYGIENE CHARACTERIZ. OF ETO EXPOSURE IN HOSPITAL WORKERS
 PROJECT OFFICER: LARRY J ELLIOTT (FTS-684-4363) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO CHARACTERIZE THE EXPOSURE OF HOSPITAL WORKERS TO ETHYLENE OXIDE
 DURING STERILIZATION PROCEDURES.
20. REGISTRY OF DIOXIN WORKERS AND MORTALITY STUDY
 PROJECT OFFICER: MARILYN A FINGERHUT (FTS-684-4411) START DT: 10/79 END DT: 12/86
 OBJECTIVE: TO EXAMINE THE MORTALITY OUTCOMES OF U.S. PRODUCTION WORKERS EXPOSED
 TO DIOXIN.
21. O-DIANISIDINE AND O-TOLIDINE DYE WORKERS EXPOSURE STUDY
 PROJECT OFFICER: BRUCE W HILLS (FTS-684-4314) START DT: 10/82 END DT: 09/86
 OBJECTIVE: TO CHARACTERIZE LEVELS OF EXPOSURE OF WORKERS TO THESE DYES, TEST THE
 URINE FOR DYE METABOLITES AND MUTAGENICITY.

22. LARYNGEAL CANCER INCIDENCE IN WORKERS EXPOSED TO SULFURIC ACID
 PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 09/83 END DT: 09/87
 OBJECTIVE: TO DETERMINE IF OCCUPATIONAL EXPOSURE TO SULFURIC ACID IN PICKLING
 OPERATIONS IN STEEL MILLS IS ASSOCIATED WITH LARYNGEAL CANCER.
23. EPIDEMIOLOGIC AND INDUSTRIAL HYGIENE SUPPORT OF TSCA-EPA
 PROJECT OFFICER: DAVID P BROWN (FTS-684-4203) START DT: 10/81 END DT: C
 OBJECTIVE: TO SUPPLEMENT EPAs AVAILABLE IN-HOUSE EPIDEMIOLOGIC AND INDUSTRIAL
 HYGIENE CAPABILITIES ON STUDIES OF MUTUAL INTEREST TO NIOSH AND EPA.
24. MORTALITY STUDY OF CHEMICAL PLANTS IN KANAWHA VALLEY, WEST VIRGINIA
 PROJECT OFFICER: ROBERT A RINSKY (FTS-684-4386) START DT: 10/79 END DT: 09/86
 OBJECTIVE: TO DETERMINE THE MORTALITY EXPERIENCE OF EMPLOYEES ENGAGED IN THE
 PRODUCTION OF PETROCHEMICAL PRODUCTS.
25. UPDATE OF COMPLETED COHORT MORTALITY STUDIES
 PROJECT OFFICER: DAVID P BROWN (FTS-684-4203) START DT: 10/82 END DT: C
 OBJECTIVE: TO UPDATE VITAL STATUS INFORMATION ON COHORT MORTALITY STUDIES THAT
 WERE CONSIDERED INCONCLUSIVE.
26. MEDICAL SCREENING IN THE WORKPLACE--A SYMPOSIUM
 PROJECT OFFICER: WILLIAM E HALPERIN (FTS-684-4203) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO ADDRESS THE CURRENT STATE-OF-THE-ART SCREENING PROGRAMS IN THE
 OCCUPATIONAL SETTING AND MAKE RECOMMENDATIONS FOR FUTURE NEEDS.
27. INVENTORY OF UNION RECORDS SYSTEMS
 PROJECT OFFICER: JOHN J WHALEN (FTS-684-4207) START DT: 04/83 END DT: 09/86
 OBJECTIVE: TO DEVELOP INVENTORY OF UNION INSURANCE AND BENEFIT PLANS FOR USE BY
 NIOSH AND OTHERS INTERESTED IN OCCUPATIONAL EPIDEMIOLOGY.
28. EPIDEMIOLOGIC METHODS DEVELOPMENT
 PROJECT OFFICER: DAVID P BROWN (FTS-684-4203) START DT: 10/84 END DT: C
 OBJECTIVE: TO DEVELOP AND MODIFY ANALYTICAL COMPUTER PROGRAMS NECESSARY TO
 SUPPORT OCCUPATIONAL EPIDEMIOLOGY RESEARCH.

SEVERE OCCUPATIONAL TRAUMATIC INJURIES

PROGRAM AREA GOAL:

Evaluate severe occupational traumatic injuries so as to understand their causes and to detect their vulnerabilities to prevention.

PROGRAM OBJECTIVE:

- By FY 1986, assess the dimensions and seriousness of these problems and make recommendations to others for more effective traumatic injury and fatality preventions.

PROGRAM DESCRIPTION:

Severe occupational traumatic injuries usually occur suddenly on the job and are either fatal or require immediate medical care. Data on these events are available from several different sources, including the National Electronic Injury Surveillance System (NEISS) of the Consumer Product Safety Commission; the Supplementary Data System (SDS) of the Bureau of Labor Statistics (BLS); the Annual Survey of Occupational Injuries and Illnesses conducted by the BLS; and the National Safety Council. The National Safety Council and the Annual Survey of the BLS estimate occupational traumatic deaths.

These sources report different aspects of the problem because of differences in the scope of events that each system tries to reflect. NEISS reports cases of occupational trauma from a representative sample of U.S. hospital emergency rooms. SDS records information from Workers' Compensation claims filed in 33 States. As required by the Occupational Safety and Health Administration, the Annual Survey of the BLS reports traumatic events occurring in the private sector; thus, it does not include traumatic events in the public sector, on farms with ten or fewer employees, nor in firms regulated by other federal health and safety laws. The National Safety Council reports data from the National Health Survey (based on 41,000 annual interviews with heads of households) and data from several participating public and private organizations. The definition of "recordable injury" varies considerably among these systems.

Because of these differences, it is not easy to achieve a reliable national composite of severe occupational traumatic injuries. Within the limitations of these data sources, NIOSH estimates that at least 10,000,000 persons suffer traumatic injuries on the job each year. About 30% (at least 3,000,000) of these injuries are severe, and at least 10,000 are fatal.

The economic impact of such workplace accidents is reflected in data from Social Security Disability files which indicate the cost of Workers' Compensation payments to be roughly \$11.9 billion (\$3.5 billion for medical and hospitalization costs, and \$8.4 billion for wage compensation). The 1982 indirect costs from such accidents were \$14.7 billion. The total cost figure for workplace injuries in 1982 was \$31.4 billion, an enormous toll on our nation's human and economic resources. NIOSH's strategy in preventing these injuries and fatalities is based on a multidisciplinary scientific approach utilizing epidemiologic methods to identify and define problems, and engineering control technology to help solve them.

For amputations, fractures, and eye losses, the need for research is supported by estimates of these injuries from hospital emergency room reports received from the National Electronic Injury Surveillance System (NEISS). Projected 1982 frequencies are 21,000 amputations, 400,000 fractures, 900,000 eye injuries, and 2,250,000 lacerations, based on NEISS figures for 1982. The NEISS surveillance system suggests that about 30% of the 3.2 million emergency room-treated occupational injuries were severe in nature. NIOSH has targeted electrocutions, confined spaces, construction fatalities, and amputations as part of its effort, and has appointed a Working Group on Traumatic Injuries to develop a national strategy for controlling them.

DSR is the focal point of the Institute's traumatic injury and fatality prevention programs, with the mission of decreasing the number and severity of work-related injuries and deaths. Functionally, the program is comprised of injury surveillance and epidemiology, injury prevention research, and equipment certification. Primary responsibilities of the Division include:

1. Using national and State data bases to provide descriptive epidemiology of work-related injuries and fatalities, including the identification of high-risk worker populations and priorities for research.
2. Designing and conducting scientific and engineering studies to establish specific risk factors in causation, and to develop/evaluate specific proposals for prevention and mitigation of injuries to workers.
3. Developing technical guidelines and criteria for recommended safety standards.
4. Conducting accident investigations and technical consultations with industry.
5. Developing performance criteria for respirators and other types of personal protective equipment.

PROGRAM AREA CONCENTRATION

TRAUMATIC DEATHS: Each year an estimated 10,000 persons are killed on the job. The major causes of these deaths are (1) highway motor-vehicle incidents, over the road vehicles (27%); (2) falls (12%); (3) heart attacks (10%); (4) industrial vehicles or equipment (10%); (5) injuries of physical impact (7%); and (6) electrocutions (6%). Industries with the highest estimated rates of fatal traumatic injury are (1) mining and quarrying, (2) agriculture (including forestry and fishing), and (3) construction.

AMPUTATIONS: Although amputations account for less than one percent of estimated injuries, they often impair a worker's skills. An estimated 21,000 workers suffered amputations in 1982. Based on NEISS data, approximately 93% of these amputations were of fingers, and four percent of hands and toes. Amputations of fingers most frequently resulted from fingers being caught in machines or hand tools (11%), or cut by moving objects, such as saws or slicers (10%). Other important sources of amputations included presses (6%), belts (5%), powered hand tools (2%), and doors or gates (2%). Other specific sources accounted for less than two percent each of occupational amputations.

According to SDS data, amputations occurred in a wide range of industries and occupations. The largest proportion of amputations (2%) occurred in the manufacture of miscellaneous plastic products, and machine operators had the largest proportion of occupational amputations (8%).

FRACTURES: Falls and blows from falling objects produce many types of injuries, the less severe forms being contusions, abrasions, and sprains. During 1982, an estimated 400,000 work-related fractures occurred. SDS data for 1980 included approximately 208,000 compensation claims for fractures. The most frequently listed sources of fractures included floors (13%), the ground (10%), and metal items (7%), suggesting falls as the main cause of such injuries. Specifically, falls to a working surface accounted for 15% of the fractures; blows from unspecified or falling objects accounted for 31%. Fractures occurred most frequently among truck drivers (5%); miscellaneous laborers (4%), and construction laborers (3%).

EYE LOSS: Although it is difficult to measure the extent of eye loss or blindness among workers, NIOSH estimates indicate that approximately 900,000 occupational eye injuries occurred in 1982. For 84% of these, the trauma was minor, caused mostly by foreign bodies (e.g., pieces of metal, wood, or glass) in the eyes. Burns and avulsions, 44% of which were caused by chemicals or acids, accounted for nearly 15% of the estimated occupational injuries.

LACERATIONS: An estimated 2,250,000 work-related lacerations occurred in 1982, representing 24% of all job-related injuries treated in hospital emergency rooms. Data from compensation claims reported by SDS indicate that the parts of the body most likely to be seriously lacerated were the fingers (48%), arms (24%), legs (13%), and the head and neck (9%). These lacerations resulted primarily from being struck by an object (32%), or from striking against a stationary object (25%). The major sources of lacerations were knives (13%), other sharp metal items (13%), saws (6%), glass items (5%), nails (5%), and machines (3%). The settings in which workers incurred the largest proportion of lacerations were eating establishments (7%), grocery stores (4%), general building construction (2%), and meat packing (2%).

TABLE 4. Distribution of occupational traumatic deaths, by cause - United States, 1981-1982.*

Cause	Percentage
Over the road vehicles	27
Falls	12
Heart attacks	10
Industrial vehicles or equipment	10
Injuries of physical impact	7
Electrocutions	6
Struck by object	6
Caught in, under, or between	6
Aircraft crashes	4
Fires	3
Plant machinery operations	3
Explosions	2
Gas inhalation	2
All others**	3

*Adapted from Bureau of Labor Statistics: Occupational Injuries and Illnesses in the U.S. by Industry, 1982. U.S. Dept. of Labor Bulletin 2196, April 1984. These revised statistics pertain to private-sector establishments (excluding nonmetal mining and railroads) with 11 or more employees.
 **Because of rounding, percentages do not add to 100.

TABLE 5. Occupational traumatic death rates per 100,000 workers, by industry--United States, 1982.*

Industry	Rate
Mining and quarrying	55
Agriculture**	52
Construction	40
Transportation and public affairs	26
Government	10
Services	6
Manufacturing	5
Trade	5

*Adapted from 1983 Accident Facts, National Safety Council.
 **Excludes deaths for persons under 14 years of age.

In FY 1985, program emphasis will focus on the following major activities as a means of developing intervention tools to reduce the huge toll of traumatic injuries and fatalities which occur in the workplace.

1. Surveillance activities will continue to utilize State and national data bases from a wide range of sources, but will seek to add traumatic injury and fatality cost factors to the prioritization of sub-populations at excessive risks.
2. Injury and fatality epidemiologic studies will expand utilizing the case-comparison approach to identify underlying causal factors which may contribute to traumatic events.
3. Studies will specifically focus on electrocutions, confined space fatalities, and the construction industry.
4. Activities in the area of machine guarding will be expanded. In FY 1985, emphasis will be on emerging technologies, with particular emphasis on robots. By the end of FY 1986, DSR plans to develop a robotics safe machine maintenance practices guideline.
5. An attempt will be made to interest a container manufacturer in marketing new containers which are designed based upon results of the DSR asymmetrical lifting project completed in FY 1984. These handle design changes reduce biomechanical stresses in lifting tasks while increasing worker productivity.
6. DSR, in cooperation with DSDTT, will publish documents on the Pre-Cast Concrete Products Industry, Fabricated Structural Metals Product Industry, and a Personal Protective Equipment Selection Guideline for Hazardous Materials Incidents (e.g., spills).
7. DSR will continue to test and certify respiratory protective devices and coal mine dust personal samplers while conducting related research activities focusing on the field effectiveness of such devices.

***** SEVERE OCCUPATIONAL TRAUMATIC INJURIES *****

DIVISION OF SAFETY RESEARCH

1. PRESS OPERATOR HAND MOVEMENT STUDY
PROJECT OFFICER: TIMOTHY J PIZATELLA (FTS-923-4807) START DT: 10/82 END DT: 09/85
OBJECTIVE: TO PREVENT AMPUTATIONS BY DETERMINING THE SAFE DISTANCE BETWEEN
TWO-HAND ACTUATORS AND THE POINT OF OPERATION ON POWER PRESSES.
2. SYSTEM SAFETY ANALYSIS OF HIGH RISK CONSTRUCTION ACTIVITIES
PROJECT OFFICER: JAMES W COLLINS (FTS-923-4807) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO DETERMINE METHODS FOR REDUCING INJURIES AND FATALITIES ASSOCIATED
WITH HIGH RISK TASKS IN THE ROOFING INDUSTRY.
3. ASSESSMENT OF METHODS FOR SAFE MACHINE MAINTENANCE
PROJECT OFFICER: JOHN R ETHELTON (FTS-923-4454) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO DEVELOP GUIDELINES TO PREVENT FATALITIES AND TRAUMATIC INJURIES
DURING THE MAINTENANCE OF AUTOMATED MACHINES.
4. EPIDEMIOLOGICAL INVESTIGATIONS OF FALLS FROM LADDERS
PROJECT OFFICER: THEODORE A PETTIT (FTS-923-4010) START DT: 10/80 END DT: 09/85
OBJECTIVE: TO DETERMINE, THROUGH EPIDEMIOLOGICAL METHODS, THE CAUSES AND
INTERVENTION STRATEGIES FOR REDUCING LADDER FALL ACCIDENTS.
5. CONSTRUCTION RESEARCH COORDINATION AND TECHNICAL ASSISTANCE
PROJECT OFFICER: RONALD L STANEVICH (FTS-923-4574) START DT: 10/84 END DT: 09/87
OBJECTIVE: DEVELOP CONCEPT MEMOS FOR POTENTIAL DSR RESEARCH PROJECTS RELATED TO
HIGH-RISK CONSTRUCTION OCCUPATIONS.
6. RAPID TURNAROUND INJURY INVESTIGATIONS
PROJECT OFFICER: ROBERT M BRACKBILL (FTS-923-4812) START DT: 10/84 END DT: 09/86
OBJECTIVE: PROVIDE RAPID ACCESS TO INJURY INVESTIGATION/REPORTS ON A TASK ORDER
BASIS. BUILD CAPABILITY TO CONDUCT SHORT STUDIES IN PRIORITY AREAS.
7. ENCODE OSHA FATALITY INVESTIGATIONS
PROJECT OFFICER: PATRICIA M CUTLIP (FTS-923-4411) START DT: 08/84 END DT: 09/86
OBJECTIVE: ABSTRACT AND ENCODE OSHA FATALITY INVESTIGATION INFORMATION IN A
COMPUTER DATA BASE FOR IDENT. OF HIGH RISK OCCUPATIONS AND INDUSTRIES.

8. EVALUATION OF CONSTRUCTION FATAL ACCIDENT CIRCUMSTANCES
PROJECT OFFICER: RONALD L STANEVICH (FTS-923-4574) START DT: 10/84 END DT: 09/85
OBJECTIVE: CORRELATE FATAL CIRCUMSTANCES TO WORKER ACTIVITIES.
9. HIGH RISK CONSTRUCTION WORKER ACTIVITIES
PROJECT OFFICER: RONALD L STANEVICH (FTS-923-4574) START DT: 10/84 END DT: 09/85
OBJECTIVE: IDENTIFY SPECIFIC OCCUPATION HIGH RISK WORK ACTIVITIES.
10. STATE ENERGY CONTROL STUDY
PROJECT OFFICER: MICHAEL B MOLL (FTS-923-4805) START DT: 10/84 END DT: 09/85
OBJECTIVE: TO ESTIMATE THE EFFECTIVENESS OF SPECIFIC HAZARDOUS ENERGY CONTROL
PROCEDURES (LOCKOUT, TAGOUT, ETC.) IN VARIOUS INDUSTRIES.

CARDIOVASCULAR DISEASES

PROGRAM AREA GOAL:

Evaluate cardiovascular diseases and occupational hazards so as to understand their causes and to detect their vulnerabilities to prevention.

PROGRAM OBJECTIVES:

- By FY 1986, screen suspected toxins for the effects of contractility of blood vessels using the cardiovascular smooth muscle system.
- By FY 1987, develop test methods to identify cardiotoxic substances and evaluate at least three such substances each fiscal year.
- By FY 1988, expand (over FY 1983 levels) the epidemiology study of cardiovascular workplace hazards and determine the risks associated with certain chemicals, physical agents, or occupations so as to provide data that will result in the reduction and/or elimination of these hazards.

PROGRAM DESCRIPTION:

Cardiovascular diseases (CVD), including ischemic heart, hypertensive, cerebrovascular, and peripheral vascular diseases, are responsible for more deaths each year in the United States than any other category of disease.¹ In 1980, CVD claimed over 960,000 lives, with coronary heart disease responsible for over 565,000 of these deaths.² Although there has been a gradual decline in the rates of deaths due to CVD over the last decade, coronary heart disease has been the single leading cause of death in the United States since 1940, and continues to be the number one cause of death among the adult population of the United States.

Data are sparse on the role occupation plays in CVD morbidity and mortality.³ Most investigators consider personal risk factors, such as cigarette smoking, hypertension, diet, and obesity, more important in the pathogenesis of CVD than environmental factors.⁴ As indicated by one source, however, even the best combination of traditional risk factors would still fail to predict most new cases of CVD.⁵ Moreover, because of the magnitude of the prevalence of cardiovascular disease in the United States, any effect of the workplace, however small, that increases the incidence of these diseases may involve large numbers of persons.

Several chemical agents found in the workplace affect the cardiovascular status of exposed workers and deserve consideration as possible risk factors for CVD. Also, stress plays an important role as a risk factor:

Carbon Disulfide: Carbon disulfide, a widely used solvent, has been shown to increase the risk of cardiovascular disorders, including coronary artery disease and hypertension, in both epidemiologic and experimental studies. It also has been shown to pose a significant risk for coronary death. The atherogenic potential of carbon disulfide involves both cerebrovascular and cardiovascular systems.

Carbon Monoxide: Carbon monoxide decreases the oxygen-carrying capacity of hemoglobin and thus reduces the oxygen supply available to heart muscle and other tissues. Occupational exposures to carbon monoxide may precipitate cardiovascular events in persons with pre-existing coronary artery disease. One study has shown that short-term exposure to carbon monoxide within the current OSHA standard of 50 ppm evoked decreased exercise tolerance and accelerated electrocardiographic evidence of myocardial ischemia when carboxyhemoglobin (COHb) concentrations ranged from 2.5 to 4.5 percent. In another study, the prevalence of angina pectoris among Finnish foundry workers with occupational exposure to carbon monoxide was increased for all exposed workers, but was highest among smokers. In a study of COHb levels in British steelworkers, the investigators found a 4.9 percent end-of-shift COHb saturation in non-smoking blast furnace workers, compared to a 1.5 percent saturation in non-smoking unexposed controls. For heavy cigarette smokers the levels were 7.4 percent for blast furnace workers and 4.0 percent for smoking unexposed controls.

Nitroglycerin and Nitrates: Workers exposed during explosives manufacture experience increased risk for acute pain, myocardial infarction, and sudden death, the so-called Monday morning syndrome, which is thought to be a consequence of withdrawal from exposure.

Halogenated Hydrocarbons: Acute exposures to many common industrial solvents (e.g., benzene, chloroform, trichloroethylene) and fluorocarbon aerosol propellants have precipitated sudden death, probably due to cardiac arrhythmias in workers exposed at high levels. Other common aerosols or solvents may be arrhythmogenic at concentrations permitted by current occupational exposure standards. A recent study of hospital pathology residents exposed to monochlorodifluoromethane, a fluorocarbon aerosol propellant, showed an increased incidence of palpitations at levels of exposure far below the recommended standard.

Metals, Dusts, Trace Elements: The development of congestive heart disease (cor pulmonale) as a result of restrictive lung disease has been observed in occupational respiratory disease studies, e.g., in beryllium lung disease and in silicosis. A number of other metals, such as arsenic and lead, have been implicated as possible causes of CVD; one case of cobalt cardiomyopathy resulting from occupational exposure has been reported.

Psychosocial Stress: That social and psychological stress may adversely affect the cardiovascular system has long been recognized. Support for a relationship between psychological factors and cardiovascular disease can be derived from Type A/B personality correlates with such disorders. An assessment of data in 1976 suggested relationships between work overload, role conflict, thwarted career goals, and evidence of cardiovascular problems. In a prospective evaluation of health changes among air traffic controllers completed in 1978, increased cases of hypertension developed in the subject population which were attributed to their critical job demands and negative attitudes toward their working conditions. An updated analysis

of the Framingham heart study in 1980 indicated that coronary heart disease rates were increased nearly two-fold among women employed in clerical jobs compared to housewives. Significant predictors of coronary heart disease risk included having a non-supportive supervisor and decreased job mobility. Men married to women who worked in white collar jobs experienced heart disease at a rate three times greater than men married to clerical workers, blue collar workers, or to housewives. Non-supportive supervisors and fewer job promotions among higher educated working wives appeared to affect cardiovascular risk among their husbands. These results suggest that the ability to adjust to conflicting job demands and familial roles may be a factor in cardiovascular disease risk. Recent evaluations of data from a large random sample of the male working Swedish population and of data taken earlier from the Quality of Work Life Survey and the National Health Survey also suggest that working conditions affording little decision making or job control to workers, coupled with heavy workloads, bear a strong association with clinical indicators of coronary heart disease. Definitive studies to clarify the etiology of cardiovascular disorders with respect to these and other job stress factors are needed. In this regard, physical stressors, such as noise, vibration, and heat, also merit investigation as possible contributors to coronary heart disease risk.

Summary: Some occupational exposures play a role in increased morbidity and mortality from cardiovascular disease. Further epidemiologic research is needed to define the scope of the problem, identify additional cardiotoxins, clarify dose-response relationships, and establish etiologic mechanisms. In addition, the etiologic role of job stress factors and physical stressors must be evaluated more closely. Since cardiovascular diseases represent the largest cause of mortality in the United States, even a small occupational contribution towards increased rates has profound public health consequences.

The observation that cardiovascular disease mortality has declined dramatically in recent years suggests the preventable nature of these diseases. The workplace is important in cardiovascular disease prevention for two reasons: the adverse health effects which workplace exposures and occupational psychosocial factors may represent for cardiovascular disease risk, and the health promotion potential of worksite-based intervention programs.

Cardiotoxins: DBBS is establishing a scientific basis for identification and evaluation of chemicals in the workplace that increase an individual's risk for cardiovascular disease. In FY 1983, subchronic inhalation studies assessing the potential myocardial effects of selected aliphatic amines of industrial importance were completed, and will be published in FY 1984 (Lynch et al., 1984). These studies showed that rats exposed to 80 ppm allylamine showed evidence of cardiac necrosis and fibrosis. In contrast, none of the rats exposed to ethyl-substitute amines (monomethyl, diethyl, or triethyl) for up to six months showed evidence of cardiotoxicity. During FY 1983 and FY 1984, methods were developed for obtaining electrocardiograms of rat fetuses exposed in utero to ethylene glycol monomethyl ether (EGME). EGME was found to cause intraventricular conduction delays in rat fetuses (Toraason and Stringer, 1984). Also during FY 1984, the role of endocrine dysfunction in the etiology of atherosclerotic lesions produced by carbon disulfide exposure is being evaluated in experimental animals. In FY 1985, methods for assessing cardiovascular function in neonates and young animals exposed in utero will be developed, as will methods for evaluating the effects of cardiotoxins on cellular bioenergetics. In FY 1986, DBBS intends to develop cell culture techniques for the identification and evaluation of cardiotoxins. DSHEFS has investigated the

potential effects of occupational exposure on the cardiovascular system by examining the mortality of several large populations exposed to (1) carbon monoxide, (2) carbon disulfide, and (3) nitroglycerine. In each of these studies there was an a priori hypothesis that exposure may be associated with adverse effects on the cardiovascular system. There are two studies of carbon monoxide exposure. One study, completed in FY 1980, involved motor vehicle examiners exposed to low levels of carbon monoxide (below the current OSHA standard) while the second study involved bridge and tunnel workers exposed to higher levels (near the current OSHA standard). The latter study will be completed during FY 1985. The study of nitroglycerine-exposed workers was completed in FY 1983; however, additional questions which remain unanswered are being investigated further. The study of workers exposed to carbon disulfide has been completed and was disseminated in FY 1984.

During FY 1984, DSHEFS organized a study group to review the literature regarding occupationally related cardiovascular disease. This group will define what is known and identify gaps and opportunities for meaningful epidemiologic research and possible intervention.

Stress: DBBS is also developing and evaluating methods for assessing the contribution of heat, noise, and job stress factors in the workplace to cardiovascular diseases. In FY 1985, a personal heat monitor will be developed for use in epidemiological studies.

DSHEFS initiated a new study in FY 1984 entitled "Sudden Death at Work." This study is designed to examine the association between sudden deaths due to coronary heart disease and occupation or industry.

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***** CARDIOVASCULAR DISEASES *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. OCCUPATIONAL CARDIAC TOXICITY

PROJECT OFFICER: DENNIS W LYNCH (FTS-684-8274)

START DT: 10/80

END DT: 06/86

OBJECTIVE: TO IDENTIFY INDUSTRIALLY IMPORTANT CARDIOTOXIC CHEMICALS AND EVALUATE THEIR TOXICITY SO AS TO REDUCE THE INCIDENCE OF CARDIOVASCULAR DISEASE.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

2. MORTALITY AND IH STUDY OF WORKERS EXPOSED TO CARBON MONOXIDE

PROJECT OFFICER: FRANK B STERN (FTS-684-4411)

START DT: 10/79

END DT: 09/85

OBJECTIVE: TO DETERMINE IF WORKERS EXPOSED TO CARBON MONOXIDE AT OR ABOUT THE OSHA STANDARD OF 50 PPM HAVE AN INCREASED RISK OF CVD MORTALITY.

3. STUDY OF SUDDEN DEATH AT WORK IN ALLEGHENY COUNTY, PENNSYLVANIA

PROJECT OFFICER: CYNTHIA C ROBINSON (FTS-684-4481)

START DT: 10/84

END DT: 03/86

OBJECTIVE: TO IDENTIFY OCCUPATIONS OR INDUSTRIES WHICH MAY PLACE SUSCEPTIBLE WORKERS AT RISK OF CATASTROPHIC MEDICAL EVENTS.

4. COHORT AND CASE-CONTROL STUDY OF NITROGLYCERIN-EXPOSED WORKERS

PROJECT OFFICER: LESLIE T STAYNER (FTS-684-4481)

START DT: 10/84

END DT: 09/86

OBJECTIVE: TO ASSESS THE RISK OF CARDIOVASCULAR DISEASE MORTALITY AMONG WORKERS EXPOSED TO NITROGLYCERIN.

DISORDERS OF REPRODUCTION

PROGRAM AREA GOAL:

Evaluate disorders of reproduction and occupational hazards so as to understand their causes and to detect their vulnerabilities to prevention.

PROGRAM OBJECTIVES:

- By FY 1986, complete the initial steps in developing a surveillance network for reproductive effects. This network would link the CDC birth defects registry, the NOES, and State surveillance systems.
- By FY 1987, identify the major priorities for field and laboratory studies.
- By FY 1988, expand the epidemiology study of workplace hazards and determine the risks associated with certain chemicals and physical agents so as to provide data that will result in the reduction and/or elimination of these hazards.

PROGRAM DESCRIPTION:

Recent research data have highlighted the fact that the occupational setting can be the source of disorders of reproduction as well as of the more commonly acknowledged effects such as lung dysfunction, cancer, and dermatitis. This research includes information on effects such as male sterility in dibromochloropropane workers, impotence in workers exposed to a neurotoxin, increased birth defects among children born to women pharmaceutical workers, concern about adverse effects from glycol ethers on the reproductive system of both males and females, and excessive spontaneous abortions among medical laboratory and office workers, and hospital and dental personnel exposed to anesthetic gases. These facts have shown the need for a better means to identify and evaluate hazardous chemicals and populations at risk, and to determine whether an occupational cluster of adverse reproductive effects is actually a result of occupation. To accomplish this, a formal initiative regarding disorders of reproduction was established within NIOSH in FY 1980. This initiative is being implemented in three ways: first, through laboratory methods aimed at identifying teratogens and mutagens that may be used in the workplace; second, by surveillance studies that use record systems to identify possible associations between parental employment and reproductive loss; and third, by means of epidemiologic studies of high-risk groups of workers. Important to this research is the development of new laboratory and field methodologies for evaluating disorders of reproduction.

Activities for the program include:

1. Examination of the adverse reproductive effects (e.g., infertility, spontaneous abortion, fetal death, low birth weight, altered sex ratio, birth defects, developmental defects, and childhood cancer) that may be caused by occupational exposures to certain biological, chemical, and physical agents through two epidemiologic approaches; case-control studies of reproductive failure, and parental exposure cohort studies.
2. Research to increase the sum of scientific knowledge regarding the reproductive toxicity of significant industrial risk factors through toxicologic studies.
3. Studies to improve the sensitivity, accuracy, and utilization of mutagenic monitoring of chromosomal changes and sperm changes in animal and human studies as they relate to genotoxicity.

PROGRAM AREA CONCENTRATION

SPONTANEOUS ABORTIONS AND FETAL MORTALITY: Reproductive hazard investigations that fall into DSHEFS' industrywide studies program are generally conducted using the parental-exposure cohort concept. The analytical tools necessary to conduct these investigations have been developed over the last few years. This effort has yielded a detailed reproductive-history questionnaire that has been tested in the field as well as computer-based masterfile formats and analytical programs. Several field studies (wives of male lead workers, wives of male workers exposed to carbon disulfide, and female pharmaceutical workers) which use this methodology have been completed. A study to examine a reported congenital abnormality cluster among the offspring of workers exposed to the herbicide oryzalium, was completed in FY 1984. The feasibility of studying the adverse reproductive effects from exposure to ethylene oxide, dioxin, and organotin was assessed during FY 1984. In addition, the feasibility of studying the reproductive effects from the use of video display terminals (VDTs) was assessed. Several of these studies were determined feasible and will begin in FY 1985. Surveillance activities utilize existing data to identify and monitor association between parental employment and adverse reproductive outcomes. Analyses are based on variants of the traditional case comparison study design.

A contract between NIOSH and Columbia University supported an analysis of the relationship between spontaneous abortion and parental employment characteristics. Two associations remained after control for potential confounding variables--maternal employment in cleaning service occupations with (chromosomally) normal abortions, and paternal employment in hospital/nursing. The report is under NIOSH review and will be published as a NIOSH Technical Report.

TERATOGENICITY, INFERTILITY, AND REPRODUCTIVE PHYSIOLOGY: Objective, reproducible techniques for semen analysis, including methods of evaluating the viability and motility of fresh sperm in NIOSH field studies, has been a goal of DBBS. A Concept Review Panel of outside experts reviewed the progress of this project. As a result of recommendations made by the panel, a contract will be developed in FY 1985 under which a major longitudinal study of human semen quality, variability, and baseline characteristics will be undertaken. Techniques established via this effort in DBBS for a comprehensive battery of semen quality indices were applied to two field studies conducted jointly by DBBS and DSHEFS personnel in FY 1984. Close collaboration between the two divisions with continued refinement of techniques is planned in FY 1985.

DBBS' activity in the National Toxicology Program (NTP) and its Reproductive and Developmental Toxicology Program continued in FY 1984. These cooperative activities involved evaluation of numerous chemicals in a variety of test systems by each of the NTP research agencies. Contract studies were completed under which 30 chemicals were tested in a new short-term reproductive toxicity assay, with the intent of identifying those chemicals warranting the highest priority for conventional reproductive toxicity testing. A new contract is being developed for similar evaluation of 24 chemicals in FY 1985. Use of a short-term reproductive toxicity test recently developed by EPA scientists (Chernoff and Kavlock, J., *Toxicol Environ Health* 10:541, 1982) is continuing in collaboration with other NTP agencies. This test system is being used to establish priorities for large numbers of chemicals that are otherwise untested for reproductive toxicity and which have been recommended for conventional testing protocols. The advantages of this test are: the simple protocol does not require highly trained professional personnel; the cost is relatively low, the test duration is short, and it will detect treatment-related impairment of fetal organ function that might be undetectable in conventional teratology tests.

Also, in response to an HHE/Technical Assistance request, DBBS conducted a series of reproductive toxicity studies of a widely used insect repellent, N,N-diethyl-m-toluamide (mDET). No adverse reproductive effects were detected in these animal studies, but neurologic effects were noted as an incidental observation. Follow-up studies of mDET may be planned in FY 1985 to investigate its neurotoxicity in laboratory animals and in field studies of workers whose employment requires extensive use of this insect repellent.

Development of techniques for monitoring cardiovascular function continued in FY 1984 and tests were conducted to investigate the effects on late fetal EKGs of in utero exposure to ethylene glycol monomethyl ether (EGME). EGME, a member of the glycol ether family, is a known teratogen that produces numerous cardiovascular defects in treated fetuses. At doses that produced few structural defects in the heart, a variety of EKG abnormalities were detected. Developmental work will continue in FY 1985 to further characterize the normal late fetal and neonatal EKG in rats, and to establish additional tests of the functional integrity of the cardiovascular system of fetal or neonatal rats. These techniques will be evaluated for their contribution to the detection of functional deficits under conditions of exposure that do not produce structural teratogenic effects.

Development of an "in vitro" teratogen screening test using the fruit fly Drosophila melanogaster continued in FY 1984, with the system continuing to show promise as a potential low-cost, short-term, submammalian test. A detailed protocol has been developed for conducting this test and for systematic scoring of flies for treatment-induced morphologic defects. An Interagency Agreement will be established in FY 1985 for extensive testing at Brookhaven National Laboratories to confirm the observations made to date by DBBS personnel, to determine whether consistent results can be obtained in a second laboratory, and to expand the base of known mammalian teratogens and nonteratogens tested using this system.

MUTAGENICITY AND CHROMOSOMAL CHANGES: Another area of research which is related to the study of disorders of reproduction as well as the study of occupational cancers is that of the evaluation of chromosomal changes (sister chromatid exchange and aberrations) and mutagenicity. Several studies of chromosomal changes were initiated in FY 1983 by DSHEFS, including an examination of chromosomes among workers exposed to low levels of ethylene oxide. This study was completed in FY 1984. Other chromosome studies are underway (i.e., two populations exposed to ethylene dibromide) and will be completed during FY 1985. Another DSHEFS study involves mutagenicity testing of the urine from workers exposed to benzidine based dyes (o-dianisidine and o-tolidine).

DRDS's development and validation of systems and performance of mutagenicity assays for workplace chemicals and complex mixtures, and mutagenic monitoring for selected workplace environments and/or worker groups, serves several purposes: the detection of mutagens in the workplace; the determination of whether mutagenic compounds found in the workplace pose any genetic hazard to the workers; establishment of the relationship between the level of workplace mutagens, genetic alteration and health hazards (if any); and identification of worker population groups for epidemiologic and surveillance studies. The results of mutagenic monitoring may be used as an environmental or biological dosimeter for adverse health effects. Activities in this area include:

1. Development of suitable mutagenic monitoring systems (in situ assay system in particular) for the workplace environment.
2. Development and/or validation, or improvement of human mutagenic monitoring systems which include urine analysis and/or cytogenetic studies.
3. Performance, validation, or improvement of human mutagenic monitoring systems which include urine analysis and/or cytogenetic studies.
4. Performance of in vitro mutagenesis studies for health hazard evaluations and other related projects within the Institute, and identification of occupational groups for mutagenic monitoring and epidemiologic studies.

***** DISORDERS OF REPRODUCTION *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. BEHAVIORAL TERATOLOGY OF ALCOHOL SOLVENTS
PROJECT OFFICER: B K NELSON (FTS-684-8383) START DT: 10/82 END DT: 09/87
OBJECTIVE: EVALUATE THE REPRODUCTIVE HAZARD OF ALCOHOL SOLVENTS USING STANDARD
TERATOLOGICAL TECHNIQUES AND NEUROBEHAVIORAL INDICES OF TOXICITY.
2. EPIDEMIOLOGIC STUDY OF RF HEATER OPERATORS
PROJECT OFFICER: VIRGINIA J BEHRENS (FTS-684-8281) START DT: 10/84 END DT: 03/89
OBJECTIVE: DETERMINE IF EXPOSURE TO RADIO FREQUENCY (RF) RADIATION FROM RF HEATERS
IS ASSOCIATED WITH ADVERSE REPRODUCTIVE OUTCOMES IN WOMEN WORKERS.
3. REPRODUCTIVE EFFECTS OF LOW FREQUENCY RF RADIATION IN RATS
PROJECT OFFICER: JOSEPH M LARY (FTS-684-8482) START DT: 10/83 END DT: 09/88
OBJECTIVE: DETERMINE THE REPRODUCTIVE EFFECTS ON LABORATORY ANIMALS FROM EXPOSURE TO
FREQUENCY RF RADIATION.
4. BIOCHEMICAL INDICES OF MALE REPRODUCTIVE IMPAIRMENT
PROJECT OFFICER: KENNETH L CHEEVER (FTS-684-8487) START DT: 10/82 END DT: 12/85
OBJECTIVE: TO EVALUATE THE FEASIBILITY OF USING SERUM LDH-X LEVELS AS A SCREEN
FOR INDICATING PATHOLOGICAL DAMAGE TO THE TESTIS.
5. METABOLISM AND EXCRETION STUDIES ON BIS(2-METHOXYETHYL)ETHER (DIGLYME)
PROJECT OFFICER: DONALD E RICHARDS (FTS-684-8487) START DT: 10/84 END DT: 09/86
OBJECTIVE: TO CHARACTERIZE THE METABOLISM AND EXCRETION OF BIS(2-METHOXYETHYL)-
ETHER TO ELUCIDATE ITS MECHANISM OF TESTICULAR TOXICITY.
6. SEMEN ANALYSIS IN ANIMAL, LONGITUDINAL AND FIELD STUDIES
PROJECT OFFICER: STEVEN M SCHRADER (FTS-684-8357) START DT: 10/84 END DT: 09/88
OBJECTIVE: TO DEVELOP LONGITUDINAL BASELINE DATA ON THE HUMAN SEMEN PROFILE AND
TO EVALUATE OCCUPATIONAL EXPOSURE EFFECTS ON THE HUMAN SEMEN PROFILE.
7. INHALATION REPRODUCTIVE AND DEVELOPMENTAL TOXICITY TESTING
PROJECT OFFICER: BRYAN D HARDIN (FTS-684-8394) START DT: 10/84 END DT: 09/89
OBJECTIVE: DESIGN AND CONDUCT REPRODUCTIVE AND DEVELOPMENTAL TOXICITY ASSAYS FOR
SELECTED NIOSH/NTP CHEMICALS USING INHALATION AS THE ROUTE OF EXPOSURE.

8. CARDIOVASCULAR FETOTOXICITY AND FUNCTIONAL TERATOGENESIS
PROJECT OFFICER: MARK TORAASON (FTS-684-8357) START DT: 10/83 END DT: 09/86
OBJECTIVE: DEVELOP AND TEST METHODS THAT ASSESS CARDIOVASCULAR FUNCTION IN
ANIMALS EXPOSED IN UTERO TO SUSPECTED TERATOGENS.

9. PRIORITIZING CHEMICALS FOR REPRODUCTIVE TOXICITY TESTING
PROJECT OFFICER: BRYAN D HARDIN (FTS-684-8394) START DT: 10/80 END DT: 09/87
OBJECTIVE: EVALUATE SIGNIFICANT NIOSH/NTP CHEMICALS IN AN IN VIVO ASSAY AND
ESTABLISH RELATIVE PRIORITY FOR CONVENTIONAL REPRODUCTIVE TESTING.

10. EVALUATION OF DROSOPHILA FOR TERATOGEN SCREENING
PROJECT OFFICER: RONALD L SCHULER (FTS-684-8357) START DT: 10/81 END DT: 09/87
OBJECTIVE: ACCURACY DETERMINATION OF SHORT-TERM IN VITRO DROSOPHILA SCREENING
TEST FOR REPRODUCTIVE AND DEVELOPMENTAL TOXINS.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

11. REPRODUCTIVE AND CYTOGENETIC EFFECTS OF ETHYLENE DIBROMIDE
PROJECT OFFICER: JENNIFER M RATCLIFFE (FTS-684-4207) START DT: 10/83 END DT: 12/85
OBJECTIVE: TO ADDRESS ETHYLENE DIBROMIDE'S ABILITY TO PRODUCE CYTOGENETIC EFFECTS
AND TO INFLUENCE THE MALE REPRODUCTIVE SYSTEM IN EXPOSED WORKERS.

12. REPRODUCTIVE STUDY OF FEMALE VIDEO DISPLAY TERMINAL (VDT) OPERATORS
PROJECT OFFICER: TERESA M SCHNORR (FTS-684-4481) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO DETERMINE IF FEMALE VDT OPERATORS HAVE AN INCREASED RISK OF
SPONTANEOUS ABORTIONS OR BIRTH DEFECTS.

NEUROTOXIC DISORDERS

PROGRAM AREA GOAL:

Evaluate neurotoxic disorders and occupational hazards so as to understand their causes and to detect their vulnerabilities to prevention.

PROGRAM OBJECTIVES:

- By FY 1986, assess the adequacy of current workplace exposure limits for furnishing effective protection against industrial solvents and fumigants based on neurobehavioral measures, and develop new tests for neurotoxicity to rapidly screen would-be chemical hazards.
- By FY 1987, offer test strategies for use by occupational health practitioners in identifying neurotoxic effects from workplace exposures, and complete assessments of the neurotoxic effects of acute aliphatic hydrocarbon exposures and the behavioral teratologic effects of alcohol solvents, based on their structural features.
- By 1988, evaluate the adequacy of exposure limits for controlling neurobehavioral effects of three heavy metals.
- By 1989, complete two to four new epidemiologic studies that assess neurotoxic disorders among workers populations.

PROGRAM DESCRIPTION:

By placing neurotoxic disorders in its list of leading work-related diseases and injuries, NIOSH is recognizing the sensitivity of the nervous system to toxic insult and the critical role it plays in body function. More than one-fourth of the 575 major industrial chemicals identified by the American Conference of Governmental Industrial Hygienists as in need of Threshold Limit Values (TLVs) have been labeled neurotoxic at levels as low as or lower than other health effects (Anger, 1984). Several hundred other chemicals, representing every major chemical class, have also been identified as neurotoxic at various concentrations (Anger and Johnson, in press). The complexity of the problem is further increased by the combined exposures that characterize the real world of industry, and by the broad range of neurotoxic effects.

Industrial neurotoxins may produce effects ranging from mild to severe, and include motor changes (e.g., gait disorders, incoordination, and tremors), sensory changes (e.g., impaired vision, hearing, and touch), and cognitive changes (e.g., loss of alertness, lapses in judgment, and personality changes). Such effects take on an added dimension because of (1) the relative lack of capacity to replace lost functions, (2) the irreversibility of most central nervous system damage, and (3) the critical function of the nervous system in detecting and reacting to safety hazards.

The problem is larger than it appears because, by and large, the known neurotoxins have been identified by their conspicuous, severe symptoms rather than by the sophistication of the tests. An added difficulty is that the more insidious problems induced by chronic exposures to occupational neurotoxins may remain undetected because such effects can easily be ascribed to aging rather than to the cumulative effects of workplace exposure.

NIOSH goals in neurotoxicity research emphasize (1) implementation of a strategy to detect neurotoxic chemicals at the workplace, (2) evaluation of the impact of short term exposure hazards on nervous system integrity and related issues of safety, and (3) evaluation of neurotoxic illness attributable to extended exposure in the work environment. These goals respond to the HHS 1990 Health Objectives to establish exposure/disease relationships and to develop group standards for chemical classes posing occupational hazards. This will be accomplished through increased laboratory and epidemiologic research and an expansion of the large and small grants program to include basic and applied research and pre-/post-doctoral candidate support.

On the general subject of neurotoxicity having occupational relevance, four significant manuscripts were completed and/or published in 1984. Chapters reviewing laboratory and worksite research findings, methods, and procedures were accepted for 1985 publication in the first major handbook-type reference on Behavioral Toxicology. A critical review of worksite research which included a listing of 850 neurotoxic chemicals found in industry was published as a chapter in Neurotoxicity of Industrial and Commercial Chemicals (CRC Press). A manuscript highlighting the neurotoxicity data base for current recommended exposure standards for industrial chemicals was also published (Anger, 1984). Major work contemplated for FY 1985 will be consideration of strategies for improved neurotoxic testing for workers subjected to such risk from workplace chemicals. This is, in part, an outgrowth of a World Health Organization/NIOSH workshop on the subject. The proceedings of this workshop will be available in FY 1985.

PROGRAM AREA CONCENTRATION

SENSORY-MOTOR IMPAIRMENT: DBBS research in neurobehavioral toxicology is directed toward the identification and evaluation of chemical hazards as a means of determining safe exposure limits for the workplace and, where appropriate, recommending substitute chemicals or improved work practices to reduce or control occupational exposures. In FY 1984, a major report was completed which acknowledged losses in finger sensitivity, depth perception, and cognitive performance in fumigators exposed to methyl bromide. Another report, prepared under contract, described usage patterns and work practices employed in applying carbon tetrachloride/carbon disulfide fumigant mixtures in grain storage facilities. Poor work practices were noted but such fumigation activities were too limited to warrant more extensive study at this time.

Work in FY 1985 will continue a mix of animal and human laboratory and worksite neurotoxicity studies addressing problem areas of greatest concern. Exposures of animals will be conducted to evaluate hypothesized mechanisms of acute aliphatic hydrocarbon toxicity, and evaluations will begin in workers exposed to those heavy metals that have demonstrated effects in animal research and clinical reports, but which have not been studied at concentrations found in the workplace.

COGNITIVE IMPAIRMENT: DSHEFS' efforts, which involved cooperative work with DBBS in 1984, included follow-up HHEs in pesticide workers, implementation of solvent test batteries emphasizing cognitive impairment for routine use in HHEs, and consultation/protocol development on the industrywide dioxin study. In FY 1984, the first phase of a laboratory study of the neurobehavioral effects (attention, memory, reaction time) of two spray paint agents, toluene and MEK (found in combination in many HHE reports), was published. Little evidence of impairment was noted at exposure levels near the respective TLVs for these solvents. The second phase, a laboratory study of acetone/MEK mixtures, was begun following completion of extensive pilot work and instrumentation of a four-person exposure facility. In FY 1984, DSHEFS developed a protocol to conduct a cross-sectional medical study of workers exposed to dioxin. As part of this protocol, testing for certain neurological disorders will be evaluated. This study should begin in FY 1985.

BEHAVIORAL TERATOGENESIS: Behavioral teratology studies conducted in animals exposed to alcohol solvents began in FY 1983. Classical fetotoxicity evaluations have now been performed for eight alcohols in order to evaluate the hypothesis that the molecular chain length of this class of chemicals is inversely correlated with the changes observed in offspring of exposed animals. Short-chain alcohols have demonstrated structural teratogenic effects only at airborne concentrations well above the current PELs. In FY 1984, behavioral teratological effects were investigated following gestational ethanol exposures; this work will continue in FY 1985.

References:

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Anger, W.K. Worker Exposures. In: Behavioral Toxicology (Z. Annau, ed.) Baltimore, MD.: Johns Hopkins Univ. Press (scheduled 1985).

Anger, W.K. and Johnson, B.L. Chemicals Affecting Behavior. In: Neurotoxicity of Industrial and Commercial Chemicals. (J. O'Donoghue, ed.), Boca Raton, FL.: CRC Press (scheduled, 1984).

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***** NEUROTOXIC DISORDERS *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. NEUROBEHAVIORAL EFFECTS FROM SINGLE/MIXED SPRAY PAINT AGENTS
PROJECT OFFICER: ROBERT B DICK (FTS-684-8383) START DT: 10/78 END DT: 03/87
OBJECTIVE: EVALUATE THE NEUROBEHAVIORAL EFFECTS OF ACUTE AND CHRONIC EXPOSURES TO
SPRAY PAINT AGENTS.
2. METHODOLOGIES FOR WORKSITE NEUROTOXICITY EVALUATIONS
PROJECT OFFICER: W K ANGER (FTS-684-8383) START DT: 10/83 END DT: 03/86
OBJECTIVE: DEVELOPMENT, INSTRUMENTATION, AND EVALUATION OF TESTS/TEST BATTERIES
TO SCREEN WORKER POPULATIONS FOR NEUROTOXICITY.
3. NEUROTOXICITY OF ALIPHATIC CARBON SOLVENTS
PROJECT OFFICER: JOHN M RUSSO (FTS-684-8383) START DT: 10/83 END DT: 09/86
OBJECTIVE: DETERMINE RELATIONSHIP BETWEEN STRUCTURAL CHARACTERISTICS OF CARBON
SOLVENTS AND THEIR BEHAVIORAL EFFECTS AFTER ACUTE EXPOSURES.
4. NEUROTOXICITY FROM EXPOSURE TO HEAVY METALS
PROJECT OFFICER: W K ANGER (FTS-684-8383) START DT: 10/83 END DT: 12/88
OBJECTIVE: TO EVALUATE THE RELATION OF OCCUPATIONAL HEAVY METAL EXPOSURES TO
NEUROTOXICITY IN WORKERS.
5. NEUROTOXICITY EVALUATIONS OF FUMIGATORS
PROJECT OFFICER: W K ANGER (FTS-684-8383) START DT: 10/80 END DT: 09/86
OBJECTIVE: AN EVALUATION OF THE NEUROBEHAVIORAL EFFECTS IN HUMANS OF CHRONIC
EXPOSURES TO FUMIGANTS.
6. INHALATION TOXICOLOGY RESEARCH SUPPORT
PROJECT OFFICER: AMIR KHAN (FTS-684-8356) START DT: 10/84 END DT: C
OBJECTIVE: CONDUCT EXPOSURE STUDIES FOR DBBS ANIMAL INHALATION TOXICOLOGY PROGRAM.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

7. DIOXIN MORBIDITY AND REPRODUCTIVE STUDY OF U.S. CHEMICAL WORKERS
PROJECT OFFICER: PATRICIA L MOODY (FTS-684-4207) START DT: 10/84 END DT: 06/87
OBJECTIVE: TO ASSESS PERSISTENT MORBIDITY AND REPRODUCTIVE OUTCOMES IN WORKERS
EXPOSED IN THE PAST TO DIOXIN-CONTAMINATED CHEMICALS.

NOISE-INDUCED LOSS OF HEARING

PROGRAM AREA GOAL:

Evaluate noise-induced loss of hearing and occupational hazards so as to understand their causes and detect their vulnerabilities to prevention.

PROGRAM OBJECTIVE:

- By FY 1986, examine the hearing of workers who have been exposed to impulse noise, and determine if the patterns of loss are different from those expected for continuous noise-equivalent energy. Examine the acoustics of impulse noise at the worker's ear and the effectiveness of earplugs in reducing exposure. Monitor the history of hearing loss claims in the U.S. and determine regionally specific hearing threshold baselines.

PROGRAM DESCRIPTION:

NIOSH is contributing to these objectives through its Health Hazards Evaluation program, through research on the measurement and effects of noise, and by disseminating information on hearing protection and noise reduction. In recent years, NIOSH has published a compendium of noise reduction materials, criteria for occupational noise exposure, and has developed and recommended instrumentation and methods for continuous and impulse noise measurement. Protection from noise exposure and identification of the relative hearing hazards of continuous, impulsive, and impact noise will be the areas of primary research emphasis in FY 1985-1988.

In FY 1983, NIOSH developed a five-year program of noise research with three major goals:

- 1) Monitor the history of hearing loss claims in the U.S. to determine a baseline from which progress toward the reduction of occupationally induced hearing loss can be evaluated,
- 2) Determine the relative hazards from different types of noise and examine synergism between noise and other occupational hazards, and
- 3) Develop programs and behavioral methods to foster hearing conservation.

In FY 1984, a revised Compendium of Hearing Protection Devices was published. With the distribution of this report, the Institute will have a ready reference to advise on the proper way to select ear protectors. A study to evaluate a method to verify earplug effectiveness within workplace settings was continued in FY 1984.

To be responsive to the Objectives for the Nation for reducing occupational hearing loss, several efforts are being started which will better define rates of hearing deficiencies in different populations. In FY 1984, liaison was established with the National Center for Health Statistics to insure that relevant audiometric data would be acquired in HANES III. DBBS is also conducting industry specific studies of hearing in metal/non-metal mining and in fire fighters.

In FY 1984, a peer review was held of the study protocol in which hearing will be compared in workers exposed to continuous and to impulse noise. Work was started to examine the effects of sound diffraction about the head on impulse exposure.

PROGRAM AREA CONCENTRATION

LOSS OF HEARING: DBBS will undertake the development of surveillance systems which can provide data on hearing loss claims. Also, select work groups will be surveyed for the prevalence of hearing loss in high risk occupations. The results of FY 1984 research into Noise-Induced Loss of Hearing are available through eight reports:

1. The "Compendium of Hearing Protection Devices" was completed and submitted for publication. It appeared in the May 1984 issue of Sound and Vibration.
2. An analysis of "Problems and Solutions in Impulse Noise Dosimetry" appeared in the March 1984 issue of Sound and Vibration.
3. Calculation of "Impulse Contributions to Total Worker Noise Dose" was presented to the Acoustical Society of America and is being prepared for publication.
4. "An Analysis of the Effect of Relying on Hearing Protectors for Noise Reduction" is prepared for publication and has been presented at the meeting of the Acoustical Society of America "Guidelines for Noise Exposure 90 dBA vs. 100 dBA."
5. "A Comparison of Dose Calculations in Impulsive Noise Using 3 dB and 5 dB Exchange Rates" was presented at the Acoustical Society of America. This paper has the only available data on which this comparison can be made and is particularly useful for groups considering promulgating standards in the area.

6. Field experience relating to NIOSH studies of hearing protector effectiveness, "Field Investigations of Noise Reduction Afforded by Insert-Type Hearing Protectors" was published in the American Industrial Hygiene Association Journal.
7. In cooperation with colleagues in Great Britain and Poland, an analysis of "Hearing Loss Due to Impact Noise in the Drop-Forging Industry" in which data were analyzed from each of these two countries was presented at the Fourth International Congress on Noise as a Public Health Problem in Turin, Italy.
8. The British data will also be published in the Journal of the Acoustical Society of America as "Noise Levels and Hearing Thresholds in the Drop-Forging Industry."

***** NOISE-INDUCED LOSS OF HEARING *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. OCCUPATIONAL IMPULSE NOISE: EXPOSURE, EFFECT, AND CONTROL

PROJECT OFFICER: JOHN ERDREICH (FTS-684-8281)

START DT: 10/83

END DT: 09/86

OBJECTIVE: TO DETERMINE HEALTH EFFECTS OF IMPULSE NOISE AND METHODS FOR EXPOSURE CONTROL.

2. MONITORING OF INDUSTRIAL HEARING LOSS

PROJECT OFFICER: JOHN ERDREICH (FTS-684-8281)

START DT: 10/84

END DT: 09/87

OBJECTIVE: TO ESTABLISH BASELINE DATA FOR HEARING LOSS AND TO ESTABLISH SURVEILLANCE OF SAME.

DERMATOLOGIC CONDITIONS

PROGRAM AREA GOAL:

Evaluate dermatologic conditions and occupational hazards so as to understand their causes and to detect their vulnerabilities to prevention.

PROGRAM OBJECTIVES:

- By FY 1986, stabilize research grants support for dermatologic projects at academia and other eligible institutions.
- By FY 1986, develop NIOSH's intramural dermatology competence, including employing at least one board-certified dermatologist.
- By FY 1986, complete dermal absorption profiles for several volatile chemicals used as solvents.
- By FY 1986, identify worker groups and the extent of dermatologic disease produced by chronic mechanical trauma to the skin.
- By FY 1989, complete two to three new epidemiologic studies that assess dermatologic conditions among worker populations.

PROGRAM DESCRIPTION:

According to the BLS annual survey of occupational injuries and illnesses, skin diseases and disorders have accounted for 40 percent or more of all reported occupational diseases each year from 1972 through 1982. The average annual incidence of occupational skin disease for the private sector for 1972-1976 was 1.5 cases per 1,000 workers, and has decreased only slightly in 1982 to 0.6. Because of the serious under-reporting of occupational disease resulting from the inadequacy of reporting systems, the true incidence of skin disease could be 10 to 50 times greater than reported in the BLS data. Schwartz, Tulipan, and Birmingham have stated that approximately one percent of the work force may be affected by occupational skin disease at any given time.

Occupational skin diseases or disorders are unevenly distributed among industries. The 1982 BLS data show that skin diseases are most prevalent in agriculture and manufacturing. The agriculture industry, which employed about one percent of the private sector work force, had six percent all job-related skin disorders, while manufacturing, with 25 percent of the work force, accounted for 54 percent.

The annual cost of occupational skin disease can be estimated from the product of the total number of lost workdays attributable to job-related skin disorders and a representative pay rate for all manufacturing industries. In 1982, the total number of lost workdays from all job-related diseases and illnesses was 761,100. Assuming the percentage of lost workdays due to skin disease has remained essentially unchanged at 22.6 percent as reported in 1977 (the last year that this category of data was summarized), one could estimate that about 172,000 workdays were lost in 1982 because of job-related skin diseases and disorders. Assuming an average pay rate of \$8.00 per hour, this would represent a direct economic cost due to lost productivity of absent workers of approximately \$11 million. Adding the cost of a less efficient replacement workers, indemnity, medical costs, and insurance could easily increase this figure two to three times (i.e., to \$25-35 million annually). This estimate does not include the costs associated with the many skin injuries (cuts, lacerations, chemical and thermal burns) that result in lost workdays.

In addition to job-related skin diseases, there is a growing concern that toxic chemicals contacted in the work environment may be absorbed through the skin in sufficient quantities to cause adverse systemic effects. The potential significance of dermal absorption is often overlooked because of a false sense of security resulting from the use of respirators and engineering controls to limit the inhalation exposure of chemicals. Despite respiratory protection, dermal absorption of chemicals may be as important as, or more serious than, pulmonary exposures alone for chemicals such as aniline, dimethylformamide, ethylene glycol dinitrate, dibromochloropropane, and the glycol ethers. Occupational illnesses have been reported following the absorption of chemicals through the skin as the sole source of exposure or in conjunction with inhalation. Although RTECS lists more than 1400 chemicals with skin LD50s, probably many more are capable of being absorbed through the skin without any overt acute effects. For most chemicals used in industry, little or no quantitative information is available on their ability to penetrate the skin or their potential contribution to the overall body burden of workers due to chronic dermal exposure. This is of particular concern where exposures to chemical carcinogens, teratogens, and other systemic occupational poisons are present.

Key program objectives that were identified for FY 1985 and beyond are:

1. To evaluate new or existing methodologies for monitoring and controlling dermal exposures.
2. To evaluate the interaction and role of physical, chemical, and mechanical factors in the development of work-related skin diseases and disorders (e.g., contact dermatitis, cancer).
3. To identify chemicals posing significant risk due to dermal absorption.

The Division of Surveillance, Hazard Evaluations, and Field Studies (DSHEFS) contributes to the program by conducting Health Hazard Evaluations and is anticipating the initiation of epidemiologic investigations in the area of occupational dermatology. Approximately ten percent of the Health Hazard Evaluations performed by DSHEFS involve dermatologic complaints. The hiring of a board certified dermatologist to participate in

these activities and to provide input to future research directions remains a high priority. During FY 1983-1984, plans to recruit a dermatologist for NIOSH were initiated by the Industrywide Studies Branch of DSHEFS. The absence of an established program of clinical dermatology made the recruitment effort difficult. Later in FY 1984, DSHEFS established a collaborative arrangement with the University of Cincinnati, Department of Dermatology, to provide NIOSH recruits with a faculty appointment and opportunity to participate in clinical activities at the University. DSHEFS also established a two-year fellowship position in occupational dermatology within the CDC Epidemic Intelligence Service. In FY 1984, active recruiting has again resulted in several promising candidates for the EIS fellowship, as well as inquiries from a number of more senior occupational dermatologists concerning a possible staff position. The immediate goal is to recruit one dermatologist per year into the two-year EIS fellowship position, beginning in July 1985. These trainees will participate in health hazard evaluations involving occupational skin disease. They will also collaborate with epidemiologists in the industrywide studies program developing substantive research on occupational dermatoses, and will staff a clinic for evaluating occupational skin disease at the University of Cincinnati, College of Medicine. The dual goals of this effort are to fulfill the research and public health objectives of NIOSH, and to train competent occupational dermatologists.

The Division of Biomedical and Behavioral Science program in dermatologic problems focuses on the effects of chemical and mechanical exposures to the skin, and development of improved methods to evaluate the potential for chemicals to penetrate the skin. During FY 1983, an in vivo method for directly quantifying the percutaneous absorption of volatile liquids into hairless mice was developed and tested. In FY 1984, dermal absorption profiles were completed for benzene, toluene, carbon disulfide, ethyl benzene, aniline, and methylchloroform, and benzene when present as a contaminant in rubber solvent. The long range goal of this research is to identify chemicals which pose a significant health risk and to reduce occupational disease risk by preventing significant percutaneous absorption of chemicals from the work environment. Through its dermal absorption projects, DBBS is linked to four other areas of concern. These are occupational cancer, neurotoxic disorders, cardiovascular diseases, and disorders of reproduction.

The role of chronic repeated mechanical trauma (e.g., friction, pressure, micropuncture) to the skin as a contributing factor to occupational skin disease is also being evaluated by DBBS. Prior to September 1982, virtually no information or literature had been compiled on the role of repeated skin traumas. A report completed under contract for NIOSH summarized the scant information on the subject. The report identified populations and job categories at risk and provided projections about dollar costs and the number of workers potentially affected. Based on derived cost estimates, the report suggested that the yearly national economic impact of job-related microtraumas to the skin was minimally about \$15 million. In April 1983, a workshop attended by dermatologists and health professionals from seven countries met in Cincinnati to discuss this topic and to provide insight into future research needs. The workshop (the first such session to address this topic) proved to be very educational and was considered to be an important "seeding event" for new areas of research. The proceedings of the workshop are being prepared for publication in FY 1985.

Research grants provide a major contribution to the NIOSH dermatology program. The titles of studies ongoing or funded during FY 1984 included: (1) Role of Inflammatory Proteinases in Irritant Dermatitis, (2) Chloracne Mechanisms of Pathogenesis, (3) Accommodation and Tolerance in Humans and Guinea Pigs, (4) Factors in Uptake and Elimination of Chemicals in the Skin, (5) Measurements of Dermal Exposure to Chemical Hazards, (6) Epidermal Langerhans Cells: In Vitro Studies, (7) Mechanisms of Occupational Leukoderma, (8) Transdermal Kinetics After Multiple Cutaneous Exposure, (9) Protective Creams to Prevent Poison Oak/Ivy Dermatitis, (10) Bioassay for Dioxin; Work-Related Cutaneous Hazards, and (11) A Personal Dosimeter for Exposure to Ultraviolet Light.

PROGRAM AREA CONCENTRATION

DERMAL ABSORPTION: During FY 1985, DBBS will continue validating the hairless mouse model using relatively non-volatile chemicals such as the mosquito repellent N,N-diethyl-m-toluamide (m-DEET). Results will be compared to published data obtained from other animal species using different methodologies. Also during FY 1985, DBBS plans to modify the skin depot developed in FY 1983 to (1) permit the use of multiple application protocols, and (2) to evaluate the effects of other chemicals and skin conditions on the dermal absorption of selected chemicals. The proposed modifications will result in experimental protocols which more closely simulate worker exposures. Plans are also being formulated for NTP to sponsor a symposium/conference to highlight the role of dermal absorption in environmental and occupational diseases. The proposed conference would be held in FY 1986. DBBS will also begin a project in FY 1985 which will lead to evaluations of the efficacy of intervention strategies and the suitability of recommended work practices, protective clothing (e.g., gloves), barrier creams, and cleansing procedures.

SKIN CANCER: Skin cancers associated with arsenic exposure are found almost exclusively in areas of chronic mechanical friction and trauma, i.e., the palms of the hands and the soles of the feet. Presently, no animal model has been found which consistently demonstrates arsenic carcinogenicity. DBBS plans to test the apparent association of mechanical trauma and arsenic in the development of skin cancers by repeatedly abrading animals which have been chronically exposed to arsenic.

***** DERMATOLOGIC CONDITIONS *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. PERCUTANEOUS ABSORPTION CHARACTERISTICS OF OCCUPATIONAL CHEMICALS

PROJECT OFFICER: ALLAN S SUSTEN (FTS-684-8357)

START DT: 10/84

END DT: 09/89

OBJECTIVE: INVESTIGATE PERCUTANEOUS ABSORPTION OF VOLATILE CHEMICALS THROUGH
DAMAGED SKIN; HOLD SYMPOSIUM ON DERMAL ABSORPTION OF CHEMICALS.

PSYCHOLOGIC DISORDERS

PROGRAM AREA GOAL:

Evaluate psychologic disorders and occupational hazards so as to understand their causes and detect their vulnerabilities to prevention.

PROGRAM OBJECTIVE:

- By FY 1986, produce ergonomic guidelines for reducing stress and strain in video-display terminal-work operations and methodologies for diagnosing and reducing stress/health problems in high-technology office-type jobs.
- By FY 1987, establish a consensus methodology for defining stress load and related risk of psychological/stress disorders for major categories of worker activity/occupations.
- By FY 1987, develop a rationale and data bases for defining the prevalence of psychological/stress disorders by occupation.
- By FY 1985, a workplace stress management manual will be developed, and by FY 1988, it will be tested for its efficacy based on user evaluations.

PROGRAM DESCRIPTION:

We can attribute a number of psychologic disorders, as exemplified by various emotional/behavioral disturbances and different forms of mental and psychosomatic illness, to stress-producing jobs and work environments. Job stress may exist to a degree in all work situations, unlike exposures to chemical or physical agents, which are specific to certain work environs. Thus, there is virtually unlimited exposure potential to such problems.

An increasing body of knowledge links different aspects of work to stress and psychologic impairment (Cooper and Marshall, 1976; Kasl, 1978; Smith, 1981). The New York Life Institute reports an epidemic-like increase in signs of psychologic stress in working-age populations (Chase, 1971), and this trend has been increasing to the present (NIMH, 1982). Bearing on the latter, there have been substantial increases in workers' compensation for acute and chronic psychologic/psychiatric disorders (Lubin, 1980; MacLeod, 1981). The annual productivity losses due to stress-related mental illness have been estimated to be over \$17 billion (Yates, 1979).

Given the above indicators and other considerations, NIOSH has recognized psychologic disorders as one of the leading work-related diseases and injuries. Our purpose in this program on psychologic disorders is to define workplace contributions to mental health disorders and identify methods to reduce their extent and severity. Once identified, the causes of job stress may be controlled or eliminated through ergonomic, job, or organizational redesign approaches (Smith, 1981). When such remedies are unfeasible, alternative techniques such as worker stress-management training may be used. The advent of automation and new technology have resulted in major changes in job tasks and organizational structure with the potential for worker stress increasing due to the loss of task control, greater performance monitoring, increased isolation, and added information processing demands. These problems, as well as the job pressures peculiar to growing service as distinct from manufacturing jobs, prompt greater concern for psychologic health issues at the workplace.

NIOSH's five-year goals for its program in this area are two-fold: (1) to establish a scientific base for defining and evaluating working conditions that produce psychologic stress and related emotional and physical disorders; and (2) to develop and apply empirically-tested strategies for preventing and/or controlling occupational stress/psychologic disorders. Bearing on these two goals, objectives for FY 1985-1990 include elaboration of stressful aspects of video display terminal (VDT) computer jobs and means for their reduction via ergonomic measures, and preparation of a worksite stress management manual capitalizing on the results of a number of field trials and experiences. In addition, efforts will be made to establish the prevalence of psychological disorders by occupation using existing data banks of work related morbidity and to shape a sounder methodology for rating job stress and strain. These program plans are in accord with the HHS 1990 Objectives calling for an enlargement of the knowledge base for understanding stress and its health consequences, promoting improved methods for characterizing stress loads at work, and stimulating wide-scale adoption of stress control programs at the workplace.

PROGRAM AREA CONCENTRATION

EMOTIONAL DISTURBANCES/HEALTH COMPLAINTS: Stress research in DBBS is aimed at defining working conditions which produce psychologic disorders and related physical problems, and at developing and evaluating the efficacy of stress-control measures. DBBS research into stressful factors in machine-paced work environs and computerized office work systems has shown acute emotional disturbances and physical health complaints which have been related to high workload, loss of control over job tasks, feelings of work pressure, increased performance monitoring, and fears of job loss. Information on these effects was widely distributed to user groups through reports and presentations at various conferences and training sessions in 1983. Summaries are found in two recently published texts representing proceedings from major NIOSH-supported conferences. These are Machine-Pacing and Occupational Stress (Salvendy and Smith, 1982), and Human Aspects in Office Automation (Cohen, 1984).

Studies of ergonomic factors in VDT work station design started during FY 1982 and continued during FY 1983 and FY 1984. Productivity gains, along with reductions in physical discomfort/complaint indices, were found upon introducing various interventions such as glare control, furniture adjustment, and work/rest regimens. During FY 1984, visual/ocular measures for different VDT viewing loads were taken without any significant changes being noted. In FY 1985, DBBS will complete its evaluations of postural factors in VDT operations using electromyographic means to characterize muscle tension.

DBBS has undertaken survey studies of various worker groups believed to be at high risk to stress related problems. A report on job stress in police work was completed in FY 1983 which indicated that lack of participation in job decisions, frustration with court leniency, and repetitious duties were major sources of stress. Job factors showing the most significant associations with negative health and emotional states in police officers were job insecurity and role conflict (Hurrell, Pate, and Kliesmet, 1983). In 1984, DBBS completed its analyses of job stress and strain in postal workers engaged in machine-paced letter sorting operations. In comparison to postal workers having non-paced jobs, the mail sorters reported greater levels of health complaints, especially visual discomfort and assorted strains of the arms, wrists, hands, and neck. Higher concentration and memory demands for this group were also noted as related to increased stress levels. It was proposed that ergonomic evaluations of machine-paced letter sorting operations be undertaken to define options for relieving the aforementioned complaints. FY 1985 plans involve surveys of stress-producing factors in secretarial/clerical jobs.

DBBS appraised occupational stress management programs utilizing data collected from its own field trials plus that accessed from other sources (Murphy, 1983, 1984a, 1984b). Overall, the findings suggested that such programs were helping workers better cope with stress and exert control over undue physiological arousal. DBBS, together with DSDTT, are collaborating in developing a worksite stress management manual capitalizing on these empirical findings. The manual should be completed in FY 1985.

PSYCHOPHYSIOLOGICAL STRAIN: Current laboratory and field studies are focusing on VDT operations and automated office work with respect to job design, work station, and environmental features as they influence worker health. Field studies of VDT operations have found that visual and muscular problems are more prominent in VDT operators than non-operators (Sauter et al, 1983). These studies also demonstrated that job stress related to VDTs may be due to job demands apart from the VDT itself. Job stress research related to new technology has begun to examine information processing jobs and robotics. During FY 1984, psychometric and psychophysiologic tests were developed to rate cognitive demands in terms of their stress significance. Also in FY 1984, human factor issues in robotics technology were addressed, based on site visits, to facilitate using such technology, relevant reports, and inputs from experts. Concerns about the robot/person interface, environmental hazards, and job loss were also noted.

More concerted efforts to improve stress/strain measurement procedures will be the thrust of NIOSH research in the immediate future. Toward this end, DBBS met with NIMH stress researchers to plan a jointly sponsored workshop on methodological issues. This meeting is to take place in late spring, 1985, and will attempt to sort out the most promising psychometric, physiological, performance, and biochemical measures for rating job stress and strain.

STRESS MORBIDITY: DBBS with DSHEFS' assistance is exploring the utility of Social Security disability files and health interview survey data for furnishing a prevalence index of stress disorders by occupation. This work began in FY 1984, and will continue through FY 1986. Such determinations will furnish a basis for targeting high stress risk jobs for stress intervention.

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***** PSYCHOLOGIC DISORDERS *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. OCCUPATIONAL INCIDENCE OF STRESS DISORDERS
PROJECT OFFICER: LAWRENCE R MURPHY (FTS-684-8293) START DT: 10/83 END DT: 09/87
OBJECTIVE: TO RANK ORDER OCCUPATIONS ACCORDING TO THE INCIDENCE OF STRESS
DISORDERS USING NATIONAL HEALTH DATA BASES.
2. STRESS IN INFORMATION PROCESSING
PROJECT OFFICER: JOSEPH J HURRELL (FTS-684-8386) START DT: 10/81 END DT: 06/86
OBJECTIVE: TO OFFER CONCEPTS OF COGNITIVE TASK DEMAND CAPABLE OF BEING MEASURED
AND EVALUATED IN TERMS OF STRESS/STRAIN OUTCOMES.
3. REDUCING VDT STRESS BY ERGONOMIC MEASURES
PROJECT OFFICER: ROGER R ROSA (FTS-684-8386) START DT: 10/80 END DT: 09/85
OBJECTIVE: APPLICATION OF ERGONOMIC PRINCIPLES TO VDT TASKS SO AS TO CONTROL
VISUAL AND MUSCULOSKELETAL STRAIN.
4. METHODS FOR RATING JOB STRESS/STRAIN
PROJECT OFFICER: JOSEPH J HURRELL (FTS-684-8386) START DT: 10/83 END DT: 03/88
OBJECTIVE: EVALUATE CURRENT METHODS FOR MEASURING STRESS/STRAIN (PSYCHOLOGICAL,
BEHAVIORAL, PHYSIOLOGICAL) AND DEVELOP NEW METHODS IF NECESSARY.
5. JOB STRESS IN SECRETARIAL/CLERICAL WORKERS
PROJECT OFFICER: BARBARA G COHEN (FTS-684-8386) START DT: 10/80 END DT: 09/86
OBJECTIVE: TO EXPLORE AND DEFINE SOURCES OF JOB STRESS IN CLERICAL TYPE
OCCUPATIONS THAT AFFECT THE HEALTH AND WELL-BEING OF OFFICE WORKERS.
6. JOB STRESS IN VIDEO DISPLAY TERMINAL (VDT) WORK
PROJECT OFFICER: LAWRENCE M SCHLEIFER (FTS-684-8293) START DT: 10/78 END DT: 10/87
OBJECTIVE: IDENTIFY AND EVALUATE JOB TASK AND ERGONOMIC FACTORS THAT ARE RELATED
TO PSYCHOLOGICAL AND PHYSICAL STRAIN IN VDT WORK.

CONTROL WORK-RELATED DISEASES AND INJURIES

NIOSH's goal, to control work-related diseases and injuries through discovering, assessing, and improving measures to reduce occupational hazards especially through control technology, protective equipment, work practices, and hazard detection devices, is the heart of its prevention program. Under this goal, NIOSH assesses solutions to new and emerging problems through the disciplines of engineering, ergonomics, industrial hygiene, and safety. NIOSH investigators recommend systems to control occupational hazards, such as engineering design, protective equipment, and work practices, as well as environmental and medical monitoring to detect failure in the control systems.

NIOSH, recognizing the importance of control, has established working groups for five of NIOSH's Ten Leading Work-Related Diseases and Injuries to focus on controlling diseases and injuries related to the workplace. We began with occupational lung diseases, and have established four more working groups, one each, for musculoskeletal injuries, for occupational cancers, for amputations, fractures, eye loss, lacerations, and traumatic death and cardiovascular diseases. This will be a three-year effort in which each working group is to develop control strategies for specific work-related diseases and injuries. As we develop strategies, priorities will be established.

PROGRAM AREAS: Respirators
Control Systems
Other Personal Protective Equipment
Sampling Analysis
Instrument/Methods Development

RESPIRATORS

PROGRAM AREA GOAL:

Control work-related diseases through discovering, assessing, and improving measures to reduce occupational hazards, especially through respirators.

PROGRAM OBJECTIVES:

- By FY 1986, increase the quality and efficiency of the respirator testing and certification program.
- By FY 1986, revise and update the respirator performance standards contained in 30 CFR 11.
- By FY 1986, expand the respirator audit-testing program to more accurately evaluate the quality control of respirator manufacturers.
- By FY 1987, promulgate revised regulations (30 CFR 11) to focus upon actual field performance of respirators.

PROGRAM DESCRIPTION:

In recent years interest in workplace respiratory protection has increased significantly, in large part due to increased knowledge and awareness of the existence of toxic agents in workplace environments. As the interest in respiratory protection has increased, so has the demand for an improvement in the quantity, quality, and types of respirators. NIOSH has attempted to respond to this demand by improving the quality and efficiency of the respirator testing and certification program of DSR. Further, NIOSH has expanded its research activities to better evaluate respirator performance and improve respirator performance standards and criteria.

NIOSH intends to propose revisions to the respirator certification regulations embodied within 30 CFR 11 to focus upon working environment respirator performance in contrast to laboratory performance, and to stimulate respirator innovation. At the end of FY 1983, NIOSH had issued a total of 822 respirator certification numbers covering 2,978 respiratory protective devices.

PROGRAM AREA CONCENTRATION

OCCUPATIONAL LUNG DISEASES: The primary goal of the testing and certification program is increased worker protection from airborne contaminants. This goal can best be achieved through the approval of safer and more reliable respirators. The five-year program activities are:

1. To increase worker protection through the availability of improved respirators certified under updated regulations,
2. To improve the quality of approved respirators through increased audits of "off-the-shelf" respirators,
3. To improve efficacy and quality of the certification program, and
4. To increase user knowledge of respirators.

NIOSH is responsible for the MSHA/NIOSH respirator approval program. In cooperation with industry, labor, universities, and respirator manufacturers, NIOSH conducts complaint investigations as well as laboratory and field investigations.

Included are activities related to development of new testing methods, evaluations of factors related to the selection and performance of respirator cartridges and filters, as well as studies related to the use and selection of other protective devices and protective clothing.

The goal of the DSR respirator research program is to conduct research which contributes to improved respiratory protective equipment. This research also includes studies to establish relationships between laboratory performance tests and field performance of respirators. The five-year program activities are:

1. To revise and update the respirator performance standards in 30 CFR 11, to improve the quality of certified respirators, to advance the state of respirator technology, and to stimulate respirator product innovation by the private sector,
2. To correlate the laboratory, field, and quantitative respirator research activities to permit NIOSH to more accurately evaluate respirator performance, and
3. To ensure the quality of the research program.

Currently, research studies are being conducted to establish the technical basis for improved criteria and standards. Scientific studies are underway to evaluate:

1. Aerosol particulate filter efficiency as a function of particle size and humidity,
2. The SCBA "use test" performance requirements which link the man to the duration of SCBA devices,
3. The effect of respirator sampling probe location and geometry on derived protection factors,
4. The applicability of a predicting model in the performance evaluation of organic vapor cartridges as a means of predicting sorbent life,
5. The effect of lung deposition during exhalation on the measurement of protection factors,
6. Comparison of field, quantitative fit, and laboratory protection factors, and
7. An evaluation of respirator filter performance against fibrous aerosol challenges under varying conditions of flow rate, filter characteristics, and humidity.

Technical support for the proposed revisions of respirator regulations (30 CFR 11) is being provided by DSR in addition to maintaining routine coordination with MSHA on daily certification activities.

A project is under way to seek out, record, investigate, and resolve complaints/problems with respirators and to develop the necessary systems for compiling and tracking them. The project is aimed at providing data on which to base respirator field research activities and off-the-shelf audit testing that will lead to improved respirator protection for workers.

Projects involving field research include:

1. A comparison of the protection afforded by respirators in actual field environments versus the protection provided during a controlled quantitative fit test, and
2. Collection and analysis of data regarding the protection afforded by a respirator for a variety of occupations and respirator programs, including those involved in hazardous waste cleanup sites.

During FY 1984, the respirator approval program issued more than 300 respirator approvals, denials, stop sales, and recalls; published an updated certified equipment list; and conducted more than 70 respirator audits. A draft revision to the respirator regulations (30 CFR 11) was prepared and submitted through the Director, NIOSH, to MSHA.

Further, NIOSH in-house research laboratories were completed in FY 1984 for conducting research in the areas of organic vapor and gas performance and breakthrough characterization, aerosol filter efficiency monitoring, and physiological factors assessment related to protective equipment usage.

Research into effects of respirator wear on users is currently underway. A collaborative effort involving DRDS and DSR is aimed at study of the effects of respirator and protective clothing during various levels of work, including use under conditions of high metabolic demand. This research will be useful in further defining criteria for safe respirator wear.

In FY 1985, an updated certified equipment list will be published. In addition, in cooperation with DSDTT and the NIOSH Respirator Working Group, a revised Respirator Selection Decision Logic will be published. Based upon the revised decision logic, two previously-published documents, Guide to Industrial Respiratory Protection, and An Employee's Guide to Respiratory Protection, will be revised and published.

DSR, in cooperation with the Environmental Protection Agency (EPA), will develop a special respirator decision logic. It will be used by the EPA to identify and recommend respiratory protective devices to manufacturers submitting requests under the Pre-Manufacturing Notification regulations pursuant to the Toxic Substances Control Act.

CONTROL WORK-RELATED DISEASES AND INJURIES

***** RESPIRATORS *****

DIVISION OF PHYSICAL SCIENCES AND ENGINEERING

1. IN-RESPIRATOR MASK MONITORING METHODS

PROJECT OFFICER: DAVID J HUEBENER (FTS-684-4266)

START DT: 10/83

END DT: 09/86

OBJECTIVE: TO DEMONSTRATE THE EFFICACY OF IN-RESPIRATOR MASK MONITORING FOR INPUT
TO PERFORMANCE STANDARDS FOR RESPIRATORS.

DIVISION OF RESPIRATORY DISEASE STUDIES

2. EFFECTS OF RESPIRATOR USE IN THE WORKPLACE: FITNESS GUIDELINES

PROJECT OFFICER: THOMAS K HODOUS (FTS-923-4755)

START DT: 10/81

END DT: 12/86

OBJECTIVE: TO INVESTIGATE RESPONSES TO RESPIRATOR WEAR UNDER STRENUOUS CONDITIONS
AND DEVELOP FITNESS GUIDELINES.

DIVISION OF SAFETY RESEARCH

3. ATMOSPHERE SUPPLIED RESPIRATOR TESTING

PROJECT OFFICER: SAMUEL L TERRY (FTS-923-4333)

START DT: 05/72

END DT: C

OBJECTIVE: THE ATMOSPHERE SUPPLIED RESPIRATOR PROJECT EVALUATES AND CERTIFIES
RESPIRATORS AS MANDATED BY TITLE 30 CODE OF FEDERAL REGS PART 11.

4. EVALUATION, CERTIFICATION, AND COORDINATION ACTIVITIES

PROJECT OFFICER: NANCY J BOLLINGER (FTS-923-4331)

START DT: 05/72

END DT: C

OBJECTIVE: COORDINATE, REVIEW AND SUPPORT EVALUATION, CERTIFICATION AND AUDITING OF
PERSONAL PROTECTIVE EQUIPMENT AND HAZARD MEASURING INSTRUMENTS.

5. AIR-PURIFYING RESPIRATOR TESTING

PROJECT OFFICER: CHRISTOPHER C COFFEY (FTS-923-4334)

START DT: 05/72

END DT: C

OBJECTIVE: THE AIR-PURIFYING RESPIRATOR PROJECT EVALUATES AND CERTIFIES
RESPIRATORS AS MANDATED BY 30 CFR PART 11.

6. QA DOCUMENTATION CONTROL, AIR-PURIFYING REVIEWS, IN-PLANT AUDITS
 PROJECT OFFICER: ROBERT G JUSTISS, JR (FTS-923-4577) START DT: 05/72 END DT: C
 OBJECTIVE: THE QA DOCUMENTATION PROJECT TRACKS, EVALUATES, AND AUDITS RESPIRATOR
 CERTIFICATIONS AS MANDATED BY TITLE 30 CFR PART 11.

7. RESPIRATOR TECHNICAL ASSISTANCE PROJECT
 PROJECT OFFICER: GARY P NOONAN (FTS-923-4362) START DT: 10/84 END DT: C
 OBJECTIVE: PROVIDE FIELD SUPPORT TO THOSE IN NEED OF TECHNICAL AND INFORMATIONAL
 ASSISTANCE REGARDING SELECTION AND USE OF RESPIRATORS.

8. RESEARCH STUDIES ON RESPIRATOR PROTECTION FACTORS
 PROJECT OFFICER: WARREN R MYERS (FTS-923-4361) START DT: 10/82 END DT: 09/88
 OBJECTIVE: STUDY VARIABLES AFFECTING IN-FACEPIECE SAMPLING ACCURACY, MEASURE
 WORKPLACE PROTECTION FACTORS AND EVALUATE METHODS FOR PREDICTING THEM.

9. RESP. RESEARCH AND EVAL. FOR HAZARDOUS WASTE DUMP CLEAN-UP
 PROJECT OFFICER: STEVEN W LENHART (FTS-923-4361) START DT: 01/83 END DT: 09/85
 OBJECTIVE: ASSESS THE EFFECTIVENESS OF ORGANIC VAPOR RESPIRATORS TO PROTECT
 WORKERS AT HAZARDOUS WASTE CLEAN-UP SITES.

10. TECHNICAL ADVISOR TO A NIOSH RESEARCH GRANT
 PROJECT OFFICER: STEVEN W LENHART (FTS-923-4361) START DT: 10/84 END DT: 09/85
 OBJECTIVE: SERVE AS TECHNICAL ADVISOR TO THE INVESTIGATORS OF THE PROJECT
 ENTITLED "ASSESSMENT OF RESPIRATORS AMONG AGRICULTURAL WORKERS".

11. AEROSOL PARTICULATE FILTER EFFICIENCY
 PROJECT OFFICER: ERNEST S MOYER (FTS-923-4335) START DT: 10/84 END DT: 09/86
 OBJECTIVE: TO DETERMINE THE OPTIMUM AEROSOL PARTICLE SIZE AS A FUNCTION OF FLOW
 RATE AND RELATIVE HUMIDITY PRECONDITIONING FOR USE IN 30 CFR 11.

12. APPLICABILITY OF JONA'S KINETIC MODEL FOR PREDICTING ORGANIC VAPOR
 PROJECT OFFICER: ERNEST S MOYER (FTS-923-4335) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO EVALUATE THE JONA'S KINETIC MODEL TO PREDICT ORGANIC VAPOR FILTER
 BREAKTHROUGH TIMES.

13. FIBROUS AEROSOL RESEARCH
 PROJECT OFFICER: GREGORY A STEVENS (FTS-923-4335) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO RECOMMEND A RESEARCH APPROACH TO DETERMINE THE EFFECT FIBROUS
 AEROSOLS HAVE ON THE PERFORMANCE OF AIR PURIFYING RESPIRATORS.

14. SCBA "USE TEST" PERFORMANCE REQUIREMENTS
PROJECT OFFICER: DONALD F KNOWLES (FTS-923-4803) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO RECOMMEND MODERNIZED PERFORMANCE REQUIREMENTS AND TEST METHODS FOR
SELF-CONTAINED BREATHING APPARATUS "USE TESTS" USED IN 30 CFR 11.
15. ANALYTICAL AND ANALOG MODELING OF AIR-PURIFYING RESPIRATORS
PROJECT OFFICER: BARRY G PALLAY (FTS-923-4336) START DT: 10/82 END DT: 09/85
OBJECTIVE: DEVELOP ANALYTICAL MODELS TO CHARACTERIZE PERFORMANCE OF AIR-PURIFYING
RESPIRATORS TO ASSIST IN TESTING, CERTIFYING AND PROBLEM INVESTIGATION.
16. EFFECT OF LUNG DEPOSITION ON MEASUREMENT OF PROTECTION FACTORS II
PROJECT OFFICER: DONALD L CAMPBELL (FTS-923-4802) START DT: 10/83 END DT: 12/85
OBJECTIVE: INFORM RESPIRATOR RESEARCHERS OF A METHOD TO CORRECT FOR THE EFFECT OF
LUNG DEPOSITION ON MEASUREMENT OF RESPIRATOR PROTECTION FACTORS.
17. CHARACTERIZING RESPIRATOR FACE FIT
PROJECT OFFICER: DONALD L CAMPBELL (FTS-923-4802) START DT: 04/85 END DT: 03/86
OBJECTIVE: INVESTIGATE THE CHARACTERIZATION OF RESPIRATOR FACE FIT BY DIRECT
MEASUREMENT OF VOLUMETRIC FLOWRATE.

CONTROL SYSTEMS

PROGRAM AREA GOAL:

Prevent work-related diseases and injuries through identifying, assessing, developing, and disseminating measures to reduce occupational hazards, especially through engineering, work practices, and hazard-detection devices.

PROGRAM OBJECTIVES:

- By FY 1986, improve monitoring technology to routinely provide workers exposure measurements taken in work environments directly related to them.
- By FY 1986, develop new push-pull ventilation design guidelines which will be part of recognized engineering manuals.

PROGRAM DESCRIPTION:

Many incurable workplace diseases are preventable by proper workplace design and work practices. Effective control of occupational hazards usually requires a system of measures which interact to provide adequate protection under any foreseeable conditions. Engineering controls and work practices are the essential mainstays of an effective control system, but in the absence of engineering control, personal protection is used. Workplace environment monitoring provides feedback on the effectiveness and state of this control system, allowing appropriate corrections to be made.

Control strategies can be expressed as a hierarchy of elements. These elements, in order of preference, are:

1. Prevent or contain hazardous workplace emissions at their source.
2. Remove emissions from the pathway between the source and the worker.
3. Control exposure with barriers between the worker and the hazardous work environment.

Desirable characteristics of a hazard control system are:

- o It must provide adequate and reliable protection for workers when functioning as designed.
- o Potential modes of failure should be anticipated and backup control measures should be available to provide continued worker protection in the event that failures occur.

- o The dependence on human intervention as a first step in control should be minimized. Where possible, mechanical or electronic pacing or warning devices should be used to supplement human intervention steps.
- o The effectiveness of protection for each individual worker must be determinable.
- o Provision for regular or continuous monitoring of critical process, hazard, exposure, and control parameters should be included.
- o The control system must encompass all routes of entry into workers' bodies and should not exacerbate existing health or safety problems or create any additional ones.

NIOSH conducts control technology assessments, research, and demonstrations under this hierarchy and the results are directed to industrial and labor health professionals, educational institutions, small businesses, insurance loss control programs, and federal and State regulatory health and safety programs. Major areas studied include chemical processing technology, solid materials handling, manufacturing processes such as tire building and electroplating, service industries such as dry cleaning and asbestos removal, hazardous materials such as silica flour and ethylene oxide, and control techniques such as air recirculation and push-pull local exhaust ventilation. NIOSH is working with the ACGIH to establish a data base of effective control techniques. Past and ongoing control technology studies should provide a number of entries for this data base. In many situations, behavioral, motivational, and ergonomic considerations are needed for successful control of worker exposure. DBBS, in conjunction with DPSE, has helped evaluate the work practices and motivational aspects in several of these studies.

The engineering control research program investigates the applicability of innovative control methods which are not currently in general use and demonstrates their effectiveness in actual workplace environments through cooperative demonstration projects with industry. In FY 1984, laboratory research was completed on the evaluation of portable brass grinder controls, various applications of push jets to enhance exhaust ventilation (push-pull ventilation), the use of tracer gases to evaluate ventilation system efficiency, and the development of controls to reduce wood dust emissions from belt sanders. Three of these four laboratory evaluations were followed by successful demonstrations of the laboratory research in the workplace. In the case of the belt sander control, workplace emissions of wood dust were reduced by 70 percent. In addition, a wide variety of controls were demonstrated in the scrap lead reprocessing industry.

Currently, work is in process to develop a general protocol to evaluate building ventilation systems, a general guide for industry on how a hazard control plan can be developed, a torch cutting and gouging demonstration (foundry industry), laboratory research on reducing emissions from shapers (wood working industry), and improved dust control using charged water foggers (applicable to a wide variety of processes). In FY 1985, a new control research project will develop design criteria for exhaust hoods.

Control monitoring instruments and techniques provide information on the operational status of control systems, provide warnings to plant personnel, and corrective actions in the case of control failure. Monitoring systems can be an integral part of the control system and, in many cases, can be used to obtain estimates of long-term worker exposure data.

Laboratory research was completed on the evaluation of particulate sensors (light scattering sensors) and these instruments are undergoing a field test to demonstrate their capability to monitor an air recirculation system in a foundry. The frequent failure of the filters in the foundry air recirculation system during the demonstration clearly identified the usefulness of these types of monitors. The evaluation of semiconductor sensors has started and the evaluation of the Fourier transform infrared spectrometer (FTIR) as a control monitor for various solvents will start in FY 1985.

Work in progress includes the development of a prototype in-respirator monitor for Hg, the evaluation of portable Gas Chromatographs, the evaluation of particle density effects on particle size measurements, and a joint evaluation with the National Swedish Testing Institute on personal sampling pumps.

In FY 1985, monitoring research will investigate a variety of new techniques for gas and vapor monitoring such as room temperature phosphorescence and tunable infrared (IR) lasers to improve personal and instantaneous area sampling. Often, Personal Protective Equipment is a necessary requirement in the workplace. DSR is responsible for the testing and certification of respirators (30 CFR 11), conduct of extensive respirator research aimed at improving the effectiveness of respirators, and for other personal protective equipment research including Chemical Protective Clothing (CPC).

Institute efforts at controlling workplace hazards are also directed toward the education and professional development of engineers. New graduate engineers are replacing the current engineering work force at an estimated rate of three to five percent per year. NIOSH efforts are aimed at creating an awareness of the need for health and safety in the design, operation, and maintenance of plants and processes among these graduating engineers. As these engineers enter and influence the workplace, this awareness should ultimately have a positive effect on both day-to-day and long-term health and safety policy decisions that are made within companies. DTMD, DPSE, DSR, DBBS and several consultants from universities worked jointly in FY 1984 to develop an Institute plan for educating engineers in health and safety. One major suggestion contained in the plan was to incorporate health and safety concepts into basic engineering curricula and texts. DPSE and DTMD activities in FY 1985 will involve implementing this plan by working with textbook authors, publishers, and professional societies to incorporate occupational health and safety issues into numerous courses in major engineering curricula.

In addition to the primary emphasis on educating graduating engineers, the data generated by NIOSH assessment, research, and demonstration activities also relate to several of the ten leading work-related diseases and injuries and the PHS 1990 Objectives for the Nation, i.e., controlling dermatitis, silicosis, asbestosis, heavy metal poisoning, occupational cancer, reproductive problems, neurotoxic illness, developing hazard control plans, and informing managers about methods for controlling workplace exposures.

PROGRAM AREA CONCENTRATION

OCCUPATIONAL LUNG DISEASES: Improved monitoring technology should routinely provide worker exposure measurements taken on work environments directly related to them. Engineers should begin to design workplace controls into original equipment. The textile and primary metals industries are now redesigning their physical plants, making this an opportune time to design out health risks.

Demonstrations on the control of lead in the secondary lead smelting industry, assessment of dust control during production of oral contraceptives in the pharmaceutical industry, and formaldehyde control in the wood veneering industry were completed in FY 1984.

Three demonstrations of push-pull ventilation are complete. The demonstrations covered solvent tank emission control, chromic acid mist control and fume control in a torch cutting operations. Criteria for the controls will be submitted to the Ventilation Committee of the ACGIH for consideration.

Research projects and assessments of controls for a number of hazardous operations involving dusty, toxic materials were completed in FY 1984. These included bag filling, debagging, quality control sampling, and the application of particulate monitors to evaluate air cleaning and recirculation systems. Journal articles outlining controls for these operations were prepared. Work for FY 1985 involves an evaluation of controls for manual weighing, batching of dusty materials, and electrostatic control of dusts. As already acknowledged, one way of controlling exposures to known toxic substances found in industrial processes is to substitute less hazardous materials. DBBS has an ongoing program comparing the toxic properties of proposed substitutes for silica sand in abrasive blasting operations and for asbestos applications. Animal studies performed so far have found one coal slag substitute for silica to have a more moderate fibrogenic potential, while five mineral slag substitutes gave no evidence of a fibrogenic response. A third study is in progress assessing the fibrogenic potential of four other coal slags. In FY 1985, DBBS will begin investigating the toxic properties of certain asbestos substitutes. Acid-washed chrysotiles and phosphorylated chrysotile materials will be initially tested for their ability to induce mesotheliomas.

Technology assessment work will continue, and will be directed toward areas which are particularly relevant to the industrial and educational communities. Studies will focus on unit processes associated with dusty, toxic materials or with chemical processing; toward new or growing processing technology; and toward new or growing material applications which may cause or solve occupational health problems. Outputs from these studies will include journal articles and technical presentations addressed to practicing health professionals. Both the data and the staff expertise generated by these studies should also prove helpful in the inclusion of topical materials in engineering courses and texts.

The Respirator Certification Program pursuant to 30 CFR 11 and related Respirator Research Programs under the direction of DSR seeks to achieve improved respiratory protection in work environments requiring respiratory defense.

MUSCULOSKELETAL INJURIES: Musculoskeletal injuries can be prevented or reduced with such appropriate intervention measures as:

1. Substitution machines: Hoists, cranes, and dollies can substitute for workers in some aspects of the manual handling of materials.
2. Improved equipment design: Research has shown that improved design of some vibrating tools virtually eliminates hazardous vibration, and suspension or isolation systems may be added to vehicles to greatly reduce whole-body vibration.
3. Task design: Manual tasks can be altered to minimize biomechanical stress to the worker.
4. Worker education: Injuries due to musculoskeletal stresses may be reduced by preplacement strength testing, training in proper ways to do a task, and on-site programs of exercise and physical therapy.
5. Variation of work practices: Periodic rotation of workers into jobs with different physical demands may help reduce the sequela of biomechanical stress.

During FY 1984, DBBS undertook case studies in three work establishments where control measures for reducing lifting hazards and overexertion risks had been introduced using variants of these approaches as described in the NIOSH Work Practices Guide for Manual Materials Handling. Applications tailored to problematic jobs and tasks were found to eliminate or greatly reduce the occurrence of back injuries. Experiences of this nature are being collected by DBBS researchers as part of an effort aimed at updating the original guidelines material.

OCCUPATIONAL CANCERS: A major facet of biomedical and behavioral research in control systems seeks to show how behavioral/motivational/ergonomic (job design) approaches can augment engineering schemes in enhancing the level of safety and health. Recognizing how technical feasibility and cost considerations can limit industry's adoption of preferred engineering control measures, these add-on techniques command greater attention. DBBS' work in this area has taken two forms:

One is the use of demonstration/intervention studies where the utility of behavioral/motivational principles for controlling workplace hazards can be evaluated. In this regard, instituting a training program for increasing worker awareness with certain work practices and housekeeping procedures in laminated plastics manufacturing plants resulted in a 50 percent reduction in their exposure to a known toxic substance, styrene, a hardening agent used in the production process. This was reported in FY 1982, and the nature of this study, involving interactions among behavioral scientists, industrial hygienists, and chemical engineers, has created a keener interest in work practice studies for hazard control throughout the Institute.

Follow-up work to ascertain the success of these work procedures as established at two of the three original target sites began in FY 1983 and ended in FY 1984. Using behavioral observations similar to the initial evaluation, it was found that two-thirds of the work practices and housekeeping measures that had been improved in the earlier research effort were still in evidence after two years. This was remarkable in that no attention or conscious management effort had been made to reinforce or sustain these procedures over this time period. The high level of durability was diminished, however, by the fact that several practices showing most decline were also those performed most frequently. Provisions for defining effective maintenance procedures for these kinds of practices and necessary schedules of maintenance are in need of research study.

The second type of activity has been to furnish ergonomic consultative inputs to the DPSE program in environmental control technology assessment. In FY 1981 and FY 1982, the ergonomics specialists took part in three worksite studies where ventilation systems for limiting worker exposure to chromic acid mist in electroplating operations were under study by Institute engineers. Ergonomics outputs here included aspects of worker awareness of hazards (training, use/availability of personal protective equipment), work station and job task features which could moderate or intensify the exposure hazards (workplace location regarding exposure source, feedback devices to indicate control systems efficiency), and management policies and practices with respect to worker safety and health matters. These results were incorporated in an overall report on control technology assessment in electroplating operations prepared by DPSE in FY 1983. Further consultative work of this kind in FY 1983 involved a worksite assessment of dry chemical-bagging operations. Manual materials handling tasks in such work were examined from the standpoint of their potential for influencing dust exposure levels.

In FY 1984, DBBS developed a checklist for defining ergonomic, behavioral, and motivational factors of consequence in evaluating sterilizing operations using ethylene oxide (ETO). This effort was in connection with a planned DPSE control technology assessment of such operations. Site observations at one sterilizing facility offered a basis for including items dealing with (a) workstation locations and traffic patterns of workers in ETO use areas, (b) presence of indicators to ensure adequate ventilation function in work areas, adequacy of panel displays on sterilizing units in presenting critical data in error-free fashion, (c) posted signs calling attention to exposure hazards, and procedural reminders to enhance safe work practices, (d) nature of training in operating units, knowledge of exposure risks and emergency procedures in case of spill, (e) maintenance practices including safe switchover of cylinders, servicing of ventilation/exhaust systems, and (f) management/supervisory practices to facilitate worker understanding of hazards, compliance with safe work procedures, and periodic inspections/monitoring to sustain high level of attention in operations. In FY 1985, DPSE will incorporate this checklist in worksite evaluations along with ventilation measurements of ETO sterilizing operations and facilities.

Because occupational carcinogenesis is anthropogenic, it should also be preventable by man. NIOSH continues its vigorous efforts to develop materials substitution, engineering controls, and personal protection for workers exposed to carcinogenic hazards. Continued vigilance is required to ensure that the necessary steps are taken which may reduce the number of cancer deaths due to occupational causes.

FY 1984 work involved the documentation of good controls for the manufacture and use of ethylene oxide. Good controls for a number of chemical unit operations which are appropriate for processing potential carcinogens were also studied. FY 1985 work will include additional documentation and research into controls for ethylene oxide in hospitals, and field evaluations of control measures for asbestos removal. This work will enable NIOSH to validate effective control measures and demonstrate the usefulness of direct reading instruments in evaluating emission points and work practices.

NOISE-INDUCED HEARING LOSS: With regard to personal protective devices as a means for reducing workplace exposure to excessive noise, DBBS in 1984 updated the compendium of hearing protectors. This later version takes into account new laboratory test procedures for measuring sound attenuation and also acknowledges new products on the market. Using data supplied by the manufacturers, there are indicated suppliers, model, type, weight, head band force, and average attenuation values at test frequencies 125 to 8000 Hz for 243 different ear protective devices. Also presented are methods for calculating noise reduction factors for the hearing protectors and a discussion of their use in the selection of these devices.

***** CONTROL SYSTEMS *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. WORKPLACE STRESS CONTROL MANUAL
PROJECT OFFICER: LAWRENCE R MURPHY (FTS-684-8293) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO DEVELOP A MANUAL ENABLING ORGANIZATIONS TO ESTABLISH WORKSITE STRESS
MANAGEMENT PROGRAMS.

DIVISION OF PHYSICAL SCIENCES AND ENGINEERING

2. APPLIED CONTROL TECHNOLOGY STUDIES
PROJECT OFFICER: PAUL E CAPLAN (FTS-684-4221) START DT: 10/80 END DT: C
OBJECTIVE: TO SUPPORT CURRENT PROJECTS, DEVELOP NEW PROJECTS, AND COORDINATE
WITHIN AND OUTSIDE THE INSTITUTE.
3. CTA FOR SOLID MATERIALS HANDLING
PROJECT OFFICER: WILLIAM N MCKINNERY (FTS-684-4221) START DT: 10/82 END DT: 06/86
OBJECTIVE: TO IDENTIFY, EVALUATE, AND DISSEMINATE CONTROLS USED TO PROTECT
WORKERS FROM DUST EXPOSURES IN SOLID MATERIALS HANDLING OPERATIONS.
4. CONTROL TECHNOLOGY ASSESSMENT OF ENZYME FERMENTATION PROCESSES
PROJECT OFFICER: KENNETH F MARTINEZ (FTS-684-4295) START DT: 10/82 END DT: 03/86
OBJECTIVE: TO DOCUMENT EFFECTIVE CONTROL TECHNIQUES FOR POTENTIAL EXPOSURES TO
VIABLE AEROSOLS AND PRODUCTS OF ENZYME FERMENTATION PROCESSES.
5. CONTROL TECHNOLOGY--ETHYLENE OXIDE IN HOSPITALS
PROJECT OFFICER: VINCENT D MORTIMER (FTS-684-4283) START DT: 10/83 END DT: 09/86
OBJECTIVE: DOCUMENT AND EVALUATE CONTROL SYSTEMS WHICH MINIMIZE EXPOSURE TO
ETHYLENE OXIDE USED FOR STERILIZING HEAT SENSITIVE EQUIPMENT.
6. CONTROL MONITORING SYSTEMS
PROJECT OFFICER: JEROME P SMITH (FTS-684-4292) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO REDUCE OCCUPATIONAL EXPOSURE BY PROVIDING INFORMATION CONCERNING
TWO TYPES OF MONITORING TECHNIQUES FOR GAS PHASE CONTAMINANTS.

7. DEVELOPMENT OF NEW CONTROL METHODS
 PROJECT OFFICER: KEITH G CROUCH (FTS-684-4255) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO INVESTIGATE THE APPLICABILITY AND IMPROVE INNOVATIVE CONTROL
 METHODS WHICH ARE NOT CURRENTLY IN GENERAL USE.

8. DEVELOPMENT OF PUSH-PULL VENTILATION TECHNIQUES
 PROJECT OFFICER: VLADIMIR HAMPL (FTS-684-4343) START DT: 10/82 END DT: 09/85
 OBJECTIVE: DETERMINE AND DEMONSTRATE THE EFFECTIVENESS OF PUSH-PULL VENTILATION
 IN CONTROLLING WORKPLACE EXPOSURE.

9. FEASIBILITY STUDY: SOLID--LIQUID SEPARATION AND DRYING
 PROJECT OFFICER: PHILLIP A FROEHLICH (FTS-684-4221) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO DETERMINE THE FEASIBILITY OF IN DEPTH STUDIES OF HAZARD CONTROLS
 USED DURING THE LIQUID-SOLID SEPARATION AND DRYING OF CHEMICALS.

10. ASBESTOS REMOVAL CONTROL TECHNOLOGY ASSESSMENT
 PROJECT OFFICER: BRUCE A HOLLETT (FTS-684-4297) START DT: 10/84 END DT: 09/87
 OBJECTIVE: DOCUMENT AND EVALUATE EFFECTIVE ASBESTOS REMOVAL CONTROL METHODS.

11. DEVELOPMENT OF EXHAUST HOOD DESIGN CRITERIA
 PROJECT OFFICER: MATTHEW K KLEIN (FTS-684-4291) START DT: 10/84 END DT: 09/85
 OBJECTIVE: UPDATE AND DEVELOP THE DESIGN CRITERIA FOR EXHAUST HOODS TO
 IMPROVE THE CONTROL OF THE WORKPLACE ENVIRONMENT.

12. DEVELOPMENT OF DIRECT READING MONITORING METHODS
 PROJECT OFFICER: GUY E BURROUGHS (FTS-684-4432) START DT: 10/82 END DT: 09/86
 OBJECTIVE: TO DEVELOP AND EVALUATE DIRECT-READING METHODS TO REDUCE ANALYTICAL
 COSTS AND TURNAROUND TIME.

DIVISION OF SAFETY RESEARCH

13. DEV. OF A NEW CLASSIFICATION SYSTEM FOR HAZARDOUS MATERIALS CONTROL
 PROJECT OFFICER: RICHARD M RONK (FTS-923-4809) START DT: 10/84 END DT: 09/86
 OBJECTIVE: TO PREVENT FIRE AND EXPLOSION TRAUMA THROUGH IMPROVED CLASSIFICATION
 AND SPECIFICATION OF ELECTRICAL EQUIPMENT FOR HAZARDOUS LOCATIONS.

OTHER PERSONAL PROTECTIVE EQUIPMENT

PROGRAM AREA GOAL:

Control work-related diseases and injuries through discovering, assessing, and improving measures to reduce occupational hazards, especially through protective equipment.

PROGRAM OBJECTIVES:

- By FY 1986, evaluate the industrial need and use of chemical protective clothing.
- By FY 1986, make existing permeation data available and encourage additional evaluation and development of predictive models.
- By FY 1986, encourage the development and standardization of product evaluation methods.

PROGRAM DESCRIPTION:

There are a number of multifaceted approaches to injury prevention in the workplace. Included among the varied approaches to injury prevention in the workplace are workplace design, engineering controls, behavior modification, training, and personal protective equipment (PPE). With tightening economic conditions, the use of PPE as an alternative to more expensive engineering controls may be an option exercised by more and more employers. PPE used commonly in workplaces includes respirators, head protection (hard hats), eye protection (safety glasses), face protection (face shields), hearing protection (earplugs), foot protection (safety shoes), hand protection (protective gloves), motion restraints (safety belts), and protective clothing in various combinations. Because of limited resources, the Institute has redirected its efforts and is now concentrating on respirator research, respirator testing and certification, chemical protective clothing (CPC), and hearing protection.

Analysis of data received from the Supplemental Data System (SDS) indicates that chemical exposure is a causal factor in nearly half of the reported illness cases. Also, NIOSH and others have demonstrated that commercially available protective clothing allows many chemicals to permeate in a very short time. Since this exposure is not always readily detectable by the user, contact with carcinogens and other harmful materials could frequently occur, resulting in chemical burns, dermatitis, or cutaneous absorption of toxic chemicals. Further, purchasers of such protective clothing have traditionally been provided with only material degradation data, data which has recently been shown in many instances to evidence poor correlation with the rate of chemical permeation through the material.

Three-year goals in the area of personal protective equipment are to:

1. Evaluate the industrial need and use of chemical protective clothing (CPC).
2. Make existing permeation data available and encourage additional evaluations and development of predictive models.
3. Encourage the development and standardization of product evaluation test methods.

PROGRAM AREA CONCENTRATION

MUSCULOSKELETAL INJURIES: In FY 1984, DBBS will complete a study of gloves as potential protective clothing to reduce vibration for users of vibrating hand tools (chippers and grinders).

SEVERE OCCUPATIONAL TRAUMATIC INJURIES: Activities within DSR have included work to establish test criteria and procedures designed to evaluate the performance of PPE to mitigate or eliminate injury or death. Such test criteria were designed to ensure that certain critical parameters characterizing the device perform in a reliable manner to provide the wearer with the protection needed. Tests have been conducted on a number of protective devices including firefighters' helmets, miners' safety caps, linemen's rubber insulating gloves, women's safety-toe footwear, and flexible-fitting goggles. However, due to resource constraints, DSR has more recently directed its efforts on PPE to respirator research and related activities.

During FY 1984, DBBS began assembling information for a compendium of eye protection which will contain a decision logic for selection and use of the proper glasses/goggles/shields for prevention of eye injuries from solid objects, liquid splashes, and non-ionizing radiation. When completed in FY 1985, it will be published and made available upon request.

NOISE-INDUCED LOSS OF HEARING: In FY 1983, DBBS completed a compendium of personal hearing protection devices and published the results of a field evaluation of personal hearing protectors. In FY 1984, DBBS will publish the compendium of hearing protectors and conduct a study of an inexpensive method for determining worksite effectiveness of personal hearing protectors. Earlier studies have indicated that in the work setting, earplugs offer only one-half the attenuation claimed by manufacturers. Further, workers had difficulty correctly inserting earplugs.

DERMATOLOGIC CONDITIONS: In response to the national concern regarding the exposure of workers in industry and chemical waste dump cleanup operations, DSR has initiated a program designed to evaluate chemical protective clothing. With initial emphasis on glove material, the program will establish a standard permeation test designed to evaluate the permeability of various protective clothing materials, seams, and closures used in garments of such materials by various hazardous chemicals. Such permeability tests could subsequently be combined with appropriate physical test methods such as abrasion, stretching, etc., and other chemical tests such as penetration, degradation, and decontamination, to determine the relative reliability of the protective clothing material to withstand the rigors and environments of actual use and still afford protection to the wearer.

***** OTHER PERSONAL PROTECTIVE EQUIPMENT *****

DIVISION OF SAFETY RESEARCH

1. PHYSIOLOGICAL RESPONSES PROJECT-PHASE III-COOLING GARMENT EFFECTIVENESS
PROJECT OFFICER: MARY K WHITE (FTS-923-4801) START DT: 12/84 END DT: 09/86
OBJECTIVE: TO DEVELOP RECOMMENDATIONS ON THE EFFECTIVENESS OF COOLING GARMENTS
USED IN COMBINATION WITH PROTECTIVE CLOTHING AND RESPIRATORS.
2. PHYSIOLOGICAL RESPONSE TO WEARING PROTECTIVE CLOTHING AND RESPIRATORS
PROJECT OFFICER: MARY K WHITE (FTS-923-4801) START DT: 04/83 END DT: 09/85
OBJECTIVE: TO DEVELOP RECOMMENDATIONS FOR THE SAFE SELECTION AND USE OF
PROTECTIVE CLOTHING USED IN COMBINATION WITH RESPIRATORS.
3. CPC EVALUATION METHODS DEVELOPMENT
PROJECT OFFICER: MICHAEL M RODER (FTS-923-4339) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO PROVIDE EFFECTIVE METHODS FOR PREDICTING THE PERFORMANCE OF
PROTECTIVE CLOTHING AGAINST CHEMICAL EXPOSURES.
4. CPC INFORMATION COLLECTION/DISSEMINATION
PROJECT OFFICER: MICHAEL M RODER (FTS-923-4339) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO OBTAIN PRODUCT EVALUATION DATA, PUT INTO A USER ORIENTED FORMAT AND
DISSEMINATE TO USER.
5. CPC INTERMANUFACTURERS PERFORMANCE VARIABILITY
PROJECT OFFICER: RONALD L MICKELSEN (FTS-923-4339) START DT: 10/84 END DT: 12/86
OBJECTIVE: DETERMINE THE PERFORMANCE VARIABILITY OF CPC MATERIAL BEARING THE SAME
GENERIC NAME BUT PRODUCED BY DIFFERENT MANUFACTURERS.
6. CPC QUICK EMPIRICAL METHODS
PROJECT OFFICER: STEPHEN P BERARDINELLI (FTS-923-4337) START DT: 10/84 END DT: 12/85
OBJECTIVE: TO PROVIDE A VALIDATED METHOD OF EASILY USING COLLECTED TEST DATA TO
PREDICT CHEMICAL PROTECTIVE CLOTHING (CPC) PERFORMANCE.
7. CHEMICAL PROTECTIVE CLOTHING IN CHEMICAL WASTE-DUMPS
PROJECT OFFICER: STEPHEN P BERARDINELLI (FTS-923-4337) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO VALIDATE TWO CHEMICAL RESISTANCE TEST METHODS AND TO EVALUATE OTHER
FIELD TEST METHODS UNDER ACTUAL USAGE.

8. SAFETY IN HAZARDOUS MATERIALS INCIDENTS

PROJECT OFFICER: RICHARD M RONK (FTS-923-4809)

START DT: 10/81

END DT: C

OBJECTIVE: TO DEVELOP SAFETY AND HEALTH INFORMATION FOR USE DURING HAZARDOUS
MATERIALS INCIDENTS.

SAMPLING/ANALYSIS

PROGRAM AREA GOAL:

Control work-related diseases and injuries through discovering, assessing, and improving measures to reduce occupational hazards, especially through control technology and hazard-detection devices.

PROGRAM OBJECTIVES:

- By FY 1986, ensure more cost effective use of resources by developing a manual of standard operating procedures for the prioritization, collection, handling, shipping, and analysis of samples.
- By FY 1986, maintain the proficiency of the professional staff and its ability to perform state-of-the-art analytical measurements through training of personnel and updating of instruments.
- By FY 1986, provide 20 modifications of methods or developments in support of field activities.
- By FY 1986, contain costs while maintaining a high level of quality assurance.
- By FY 1986, update the performance standards contained in 30 CFR 74 to improve the quality of certified coal mine dust personal sampler units for coal mine dust compliance monitoring by MSHA.
- By FY 1986, continue research on improving tests used in the certification program for dust samplers.
- By FY 1986, ensure that a state-of-the-art analytical laboratory to support Institute analytical chemistry needs is maintained.

PROGRAM DESCRIPTION

This program provides sampling consultation, analytical support, and field instrument maintenance to other research activities within NIOSH. Analytical chemistry support is provided to industrial hygienists and engineers who make decisions on the hazard potential of workplace exposure and the effectiveness of engineering control systems. Support is also provided to in-house toxicological research programs by providing supporting data for exposure tests. A quality assurance program is maintained for in-house as well as contract laboratories to ensure that reported data meet standards for reliability.

DPSE supports Institute projects by analyzing air, bulk, and biological samples. Approximately 17,000 samples were analyzed in FY 1984. In order to meet the varied needs of this task, DPSE maintains two analytical services contracts in addition to the in-house laboratory. The majority of the samples collected in the field can be analyzed following the methods described in the NIOSH Manual of Analytical Methods, and it has proven cost-effective to have these routine analyses done under contract. A second contract provides rapid response in the area of methods development and special measurement of non-routine samples which may be very difficult to analyze. This effort serves as a complement to the effort performed in-house by NIOSH scientists.

By 1986, NIOSH will have developed improved procedures for sampling and analyzing work environments, such as chemical dump sites, foundries, coke ovens, and coal conversion plants, which contain complex mixtures of toxic and carcinogenic organic compounds. Such procedures will enable NIOSH to characterize worker exposures in these workplaces more completely and more rapidly.

A manual of standard operating procedures for collecting, handling, shipping, and analyzing industrial hygiene samples was completed in FY 1984. This manual contains procedures for pre-survey planning, support requests, sample submittal forms, quality assurance, sample receipt policy, and other pertinent information. In FY 1985, the manual will be updated with a series of technical bulletins on new sampling and analysis procedures. The Quality Assurance manual will also be revised.

NIOSH will continue to maintain the proficiency of the professional staff and their ability to perform state-of-the-art analytical measurements through training of personnel and updating of instrumental capabilities. During FY 1984, NIOSH continued to take the lead in industrial hygiene measurements by updating its capabilities in the areas of ion chromatography, gas chromatography, Fourier transform infrared spectroscopy, and electron microscopy. Continuing education is an important Institute function if its staff is to stay abreast of quickly changing analytical chemistry methodology and provide leadership in the development of new sampling and analytical methods. Several of the staff, have been cross-trained in organic and inorganic analytical techniques in order to broaden the laboratories' ability to respond to analytical problems. DPSE will modify or develop approximately 20 analytical methods in support of field activities over a three-year period. Projections indicate that amines and substituted PNAs will require substantial effort in the area of method research.

NIOSH, with some support from "Superfund," has conducted three visits to hazardous waste sites to evaluate portable direct reading instruments as well as to provide on-site analysis of environmental samples. Samples were analyzed in a mobile laboratory by gas chromatography, ion chromatography, and X-ray fluorescence spectroscopy. This work will continue in FY 1985.

Additionally, NIOSH will contain sampling and analytical costs while maintaining our current high level of quality assurance. Efforts to contain costs have included better planning of surveys, coordination with groups requesting support, and use of qualitative screening to prevent large numbers of unnecessary quantitative measurements below detection limits. DPSE has supported HHEs involving ethylene oxide and ethylene bromide by using portable gas chromatography.

In addition to analytical support, DPSE operates a maintenance and calibration laboratory. In FY 1984, 350 industrial hygiene instruments were serviced, repaired, or calibrated. A nickel-cadmium battery cyclor/charger was designed and constructed to extend the useful lifetime of some of NIOSH's portable instruments. Prototype sensors for ammonia were fabricated and data loggers were interfaced to portable analytical instruments.

PROGRAM AREA CONCENTRATION

OCCUPATIONAL LUNG DISEASES: This program provides support for MSHA by testing and certifying coal mine dust personal sampler units (CMDPSU) and by conducting research to improve existing regulations. The goal of the CMDPSU program is to ensure standardized coal mine dust atmospheric measurements under the Federal Coal Mine Health and Safety Act of 1969 (Public Law 91-173).

DSR operates the MSHA/NIOSH coal mine dust personal sampler unit testing, certification, and research evaluation programs. DPSE conducts research and develops certification criteria for the dust samplers program.

A project to develop an asbestos dust generation system for the NIOSH Proficiency Analytical Testing (PAT) Program to improve asbestos samples used to evaluate laboratories and an evaluation of an automated image analysis system was started. The results of these studies will be available in FY 1985. In FY 1984, a coal dust matrix sample for silica was introduced in the NIOSH PAT Program. Also, the National Bureau of Standards introduced a new silica standard reference material.

DRDS provides industrial hygiene technical support to DSR, the Mining Health Hazard Evaluation Program, and various other DRDS research program activities. This usually involves the support of a fully equipped calibration laboratory and sample analyses such as gravimetric determinations. During FY 1983 and FY 1984, DRDS provided support to the Centers for Disease Control and the United States Department of Agriculture by size-fractionating bulk mineral dusts into respirable-size fractions prior to chemical analysis by DPSE.

Adjunct to epidemiology research studies, DRDS often field tests new sampling techniques, developed by DPSE and others, advancing the practice of industrial hygiene, and providing the most appropriate correlates for epidemiology studies. During FY 1983, DRDS collaborated with DPSE to develop a prototype personal sampler for cotton dust, and evaluated new personal cassette-type impactors for sampling wood dust exposures. DBBS provides biological sample analytical services for the Health Hazard Evaluation program, field research studies and in-house research projects. Included in this activity are the analyses of urine, blood, tissues, exhaled air, and hair for evidence of absorption of the workplace or test chemical in the worker or experimental animal. Data are used to assess exposure by all routes and can be used in conjunction with environmental data to augment decisions on the safety of the work environment. In addition, consultation and laboratory analysis is available for the physical and chemical characterization (sizing and analysis) of particulate materials, be they workplace air samples, bulk samples, or tissues.

During FY 1984, biological monitoring support has been supplied to more than 20 Health Hazard Evaluations, to an in-house human research study on the neurotoxicity of paint spray solvents, and to a variety of in-house animal research studies. Particulate analyses have been performed on human lung, as well as on bulk materials supplied to DBBS.

During FY 1984, DRDS worked to refine sampling techniques for areas contaminated with microbial agents; including fungal, bacterial, and protozoan contaminants. DRDS will continue to report to the Division of Physical Sciences and Engineering on the field performance of NIOSH sampling and analytical methods. For example, beginning in FY 1984 and continuing through FY 1985, DRDS has conducted collaborative field trials of various solvents for use in polynuclear aromatic hydrocarbon analysis.

Sampling and analytical methods were developed and validated by DPSE for vanadium pentoxide (V_2O_5), ammonium metavanadate (NH_4VO_3), ammonia (NH_3), and hydrogen fluoride (HF). Methods for sodium hydroxide (NaOH), chlorine (Cl), chlorine dioxide (ClO_2), and hydrogen cyanide (HCN) will be developed in FY 1985 and FY 1986.

NEUROTOXIC DISORDERS: During FY 1984, sampling and analytical methods were developed for Bromoxynil (a pesticide), Glutaraldehyde (used as a sterilizer in hospitals), Xanthate esters (used as flotation agents in ore refining) and Zearalanol (an estrogenic growth promoter for cattle). In support of toxicological research, methods were developed for the analysis of sodium cyclamate and a series of alcohols.

Sampling and analytical methods for dichlorobenzidine in pigment manufacturing; ethylhexanol and azodicarbonamide in the plastics industry; and allylamine pharbol/pharbol esters, saccharin, and tryptophan in toxicological research were developed in support of field activities and laboratory research. By 1986, NIOSH will have developed eight new species-specific sampling and analytical methods to identify and monitor exposures in metal mines, in primary metals industries, and in inorganic pigment industries. A method for measurement of lead sulfide was developed and validated by DPSE in FY 1983.

Biological monitoring services have spanned the areas of occupational lung diseases, carcinogenesis, neurotoxicity, dermal exposure, cardiotoxicity, and disorders of reproduction, mostly by use in the Health Hazard Evaluation program. A similar level of effort will continue in FY 1985.

***** SAMPLING/ANALYSIS *****

DIVISION OF PHYSICAL SCIENCES AND ENGINEERING

1. QUALITY ASSURANCE OF ANALYTICAL MEASUREMENTS
PROJECT OFFICER: DAVID L SMITH (FTS-684-4215) START DT: 10/84 END DT: C
OBJECTIVE: ENSURES THE RELIABILITY OF ALL DATA GENERATED BY IN-HOUSE AND CONTRACT ANALYTICAL GROUPS.
2. HHE ANALYTICAL SUPPORT
PROJECT OFFICER: ARDITH A GROTE (FTS-684-4215) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDES TIMELY ANALYTICAL SERVICES TO THE HHE PROGRAM BY ASSURING RAPID TURNAROUND OF REQUESTS FOR SAMPLE ANALYSES AND METHOD DEVELOPMENT.
3. MINING AND RESPIRATORY DISEASE ANALYTICAL SUPPORT
PROJECT OFFICER: MARILYN HAWKINS (FTS-684-4220) START DT: 10/84 END DT: C
OBJECTIVE: THIS PROJECT WILL PROVIDE ANALYTICAL SUPPORT TO ENERGY, RESEARCH, RESPIRATORY DISEASE STUDIES, AND SAFETY RESEARCH.
4. SAMPLING AND ANALYSIS FOR ALDEHYDES
PROJECT OFFICER: EUGENE R KENNEDY (FTS-684-4259) START DT: 10/82 END DT: 09/85
OBJECTIVE: EXTEND SAMPLING AND ANALYTICAL TECHNIQUE FOR ACROLEIN TO FURFURAL AND GLUTARALDEHYDE AND ALSO ADAPT IT FOR DIFFUSIVE SAMPLING.
5. DEVELOPMENT OF PERSONAL MONITORING METHODS FOR AMINES
PROJECT OFFICER: PAULA FEY O'CONNOR (FTS-684-4234) START DT: 05/83 END DT: 05/86
OBJECTIVE: DEVELOPMENT OF AN AIR MONITORING METHOD FOR ALIPHATIC AMINES USING A REACTIVE SORBENT FOR SAMPLING AND ION CHROMATOGRAPHY FOR ANALYSIS.
6. ANALYSIS OF EXHALED BREATH
PROJECT OFFICER: ROBERT A GLASER (FTS-684-4259) START DT: 01/83 END DT: 06/85
OBJECTIVE: TO DEVELOP A SOLID SORBENT SAMPLER FOR DIRECT COLLECTION OF EXHALED BREATH SAMPLES.
7. DEVELOPMENT OF ALTERNATIVE SAMPLER FOR ISOCYANATES
PROJECT OFFICER: MARTHA J SEYMOUR (FTS-684-4257) START DT: 10/82 END DT: 12/85
OBJECTIVE: DEVELOPMENT OF AN AIR SAMPLING METHOD FOR ISOCYANATES WHICH WOULD USE A STABLE DERIVATIZING AGENT AND ELIMINATE THE NEED FOR IMPINGERS.

8. ANALYTICAL METHOD FOR TOTAL HYDROCARBONS ON CHARCOAL
 PROJECT OFFICER: ROBERT A LUNSFORD (FTS-684-4258) START DT: 10/82 END DT: 09/85
 OBJECTIVE: DEVELOP AN IMPROVED METHOD FOR ANALYZING CHARCOAL-TUBE SAMPLES FOR
 TOTAL HYDROCARBONS.

9. DEVELOPMENT OF X-RAY DIFFRACTION ANALYTICAL METHODS
 PROJECT OFFICER: THOMAS P CARSEY (FTS-684-4272) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO DEVELOP SAMPLING/ANALYTICAL METHODS FOR CHROMIUM (VI) COMPOUNDS.

10. SPECIALIZED GC/MS ANALYTICAL SERVICES
 PROJECT OFFICER: CHARLES V COOPER (FTS-684-4258) START DT: 10/82 END DT: C
 OBJECTIVE: PROVIDE CONTINUING SPECIALIZED GAS CHROMATOGRAPHY/MASS SPECTROMETRY
 SUPPORT.

11. REVISION OF NIOSH MANUAL OF ANALYTICAL METHODS
 PROJECT OFFICER: PETER M ELLER (FTS-684-4323) START DT: 10/82 END DT: C
 OBJECTIVE: REVISE THE SEVEN VOLUMES OF THE SECOND EDITION. ADD NEW DATA AND
 METHODS, ELIMINATE REDUNDANCY, REDUCE SIZE BY 50%, PROVIDE FOR UPDATES.

12. MAINTENANCE AND CALIBRATION
 PROJECT OFFICER: JENSEN H GROFF (FTS-684-4373) START DT: 10/82 END DT: C
 OBJECTIVE: A PROGRAM TO REPAIR, CALIBRATE AND IMPROVE UTILIZATION OF FIELD
 SAMPLING EQUIPMENT AND DIRECT READING INSTRUMENTS.

13. COMPREHENSIVE ANALYTICAL CHEMISTRY SERVICES
 PROJECT OFFICER: DONALD D DOLLBERG (FTS-684-4262) START DT: 10/83 END DT: 09/87
 OBJECTIVE: PROVIDE TECHNICAL MANAGEMENT OF ANALYTICAL CHEMISTRY SERVICES TO
 INSTITUTE RESEARCH.

14. ANALYTICAL SUPPORT TO DBBS RESEARCH AND DSHEFS INDUSTRYWIDE STUDIES
 PROJECT OFFICER: BARRY R BELINKY (FTS-684-4220) START DT: 10/83 END DT: C
 OBJECTIVE: PROVIDES ANALYTICAL CHEMISTRY SUPPORT TO DBBS AND IWSB, DSHEFS, WITH
 PRIORITY SUPPORT TO ALL NIOSH GROUPS PROVIDED VIA CONTRACT.

15. ANALYTICAL SUPPORT TO DPSE RESEARCH
 PROJECT OFFICER: GANGADHAR CHOUDHARY (FTS-684-4217) START DT: 10/84 END DT: C
 OBJECTIVE: TO PROVIDE ANALYTICAL CHEMISTRY SUPPORT TO CONTROL TECHNOLOGY
 ASSESSMENT AND DPSE RESEARCH ACTIVITIES.

16. MONITORING RESEARCH SECTION SUPPORT FOR METHOD MANUAL REVISION
PROJECT OFFICER: MARY L WOEBKENBERG (FTS-684-4266) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO PROVIDE A METHODS MANUAL FORMAT FOR DIRECT-READING INSTRUMENT
METHODS; TO PROVIDE INSTRUMENT WRITE-UPS FOR PEDAGOGIC APPLICATIONS.

17. ANALYTICAL SUPPORT FOR HAZARDOUS WASTE ACTIVITY
PROJECT OFFICER: CHARLES L GERACI (FTS-684-4219) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE RAPID ANALYSIS OF SAMPLES AT SITE AND INHOUSE (TASK I).
DEVELOP INHOUSE ANALYTICAL CAPABILITY FOR CHLORINATED DIOXINS (TASK II).

DIVISION OF SAFETY RESEARCH

18. COAL MINE DUST PERSONAL SAMPLER UNIT CERTIFICATION
PROJECT OFFICER: JOSEPH R WILLIAMS (FTS-923-4864) START DT: 05/72 END DT: C
OBJECTIVE: EVALUATE THE PERFORMANCE OF COAL MINE DUST SAMPLING EQUIPMENT USED IN
THE MSHA MINE ATMOSPHERE SAMPLING PROGRAM.

DIVISION OF STANDARDS DEVELOPMENT AND TECHNOLOGY TRANSFER

19. STATISTICAL REVIEW AND CONSULTATION
PROJECT OFFICER: KENNETH A BUSCH (FTS-684-8302) START DT: 10/83 END DT: C
OBJECTIVE: PROVIDES SENIOR-LEVEL STATISTICAL CONSULTATION; REVIEWS STUDY DESIGNS
FOR EFFICIENCY AND RELIABILITY.

INSTRUMENT/METHODS DEVELOPMENT

PROGRAM AREA GOAL:

Control work-related diseases and injuries through discovering, assessing, and improving measures to reduce occupational hazards, especially through hazard-detection devices.

PROGRAM OBJECTIVES:

- By FY 1986, complete performance criteria for aerosol sampling.
- By FY 1986, develop 8 new species-specific sampling and analytical methods to identify and monitor exposures in metal mines, in primary metals industries, and in inorganic pigment industries.
- By FY 1986, publish performance specifications and test protocols for new passive monitors for users and manufacturers.
- By FY 1986, develop six new biological monitoring methods to evaluate worker uptake of industrial chemicals.

PROGRAM DESCRIPTION:

Monitoring of the workplace environment represents one of the fundamental practices in the conduct of a successful preventive health program. Thousands of chemicals are being used by industry, but few industries have established workplace environmental sampling and analytical methods that are validated at the recognized safe occupational exposure level.

This program conducts pioneering research to develop and evaluate new air sampling and analytical methods, biological monitoring methods, and direct reading instruments for use in measuring and controlling potential chemical and physical hazards in the workplace. The quality of environmental data is assessed regularly through the Proficiency Analytical Testing Program. The program elements include five points: strategies, performance criteria, procedures, methods development and validation, and quality assurance. Monitoring strategies define the sampling procedure and analytical range. The sampling situation many dictate detectable limits many times below an established or proposed standard, or differing degrees of accuracy. The strategy, once defined, leads to establishing performance criteria, as was the case in the joint NIOSH/OSHA Standards Completion Program and is currently being done for passive monitor samplers, with an established monitoring need which identifies critical parameters for studying a procedure. The methods are then used by NIOSH and others in the industrial hygiene community. Written and verbal feedback on the methods or instruments and a quality assurance program measure the effectiveness of respective methods and provide for modifications in any one of five points considered.

The Institute's sampling and analytical methods research program is vital to the assessment of environmental quality. The data are used to make decisions for workplace standards, compliance, and control. As such, quality assurance on a nationwide basis is necessary since data are shared and compared. NIOSH has its own quality assurance program. It also operates the voluntary Proficiency Analytical Testing (PAT) program, composed of more than 400 private and government industrial hygiene laboratories worldwide. The private laboratories and many of the public laboratories participate in PAT through the American Industrial Hygiene Association Laboratory Accreditation Program. Analysis of PAT program data provides necessary information for planning future methods development (e.g., new asbestos and silica projects). By 1986, NIOSH will compile existing biological methods as well as six new methods into a separate section of the third edition of the NIOSH Manual of Analytical Methods.

By 1986, NIOSH will publish performance specifications and testing protocols for new passive monitors for users and manufacturers. In FY 1984, protocols developed by NIOSH were sent to peer reviewed journals for publication. The results of this research were reported at several technical meetings. Laboratory and theoretical studies of physical parameters which influence these samplers were completed in FY 1984. The use of these criteria will increase the reliability of the samplers before they become commercially available.

The Institute develops biological and environmental monitoring methods under specific disease categories. Many of the developments have broader implications relating to general performance standards for the methods and quality assurance. Some chemicals are implicated in more than one disease. The Institute has found it convenient to bring all these environmental and biological methods together into the NIOSH Manual of Analytical Methods which is available to the public from the U.S. Government Printing Office.

During FY 1984, the NIOSH Manual of Analytical Methods was revised, and a third edition appeared in May 1984 containing 102 new or revised methods. Significant additions to the third edition of the manual were introductory chapters on quality assurance, sampling of airborne environments, evaluation of methods, and biological monitoring.

The importance of biological monitoring was recognized with a separate section containing 13 methods. Methods are included to assess worker exposure to heavy metals, toluene, MBOCA, PCBs, pentachlorophenol, xylene, MEK, ethanol, and fluorocarbons. Seventy-five additional environmental and biological monitoring methods will appear in the next printing in FY 1985.

Biological monitoring as an aid in the assessment of worker exposure to chemicals cuts across all "chemical" categories of the "top-ten." Chemicals contributing to OCCUPATIONAL LUNG DISEASES, OCCUPATIONAL CANCERS, NEUROTOXIC DISORDERS, DISORDERS OF REPRODUCTION, DERMATOLOGIC CONDITIONS, PSYCHOLOGIC DISORDERS, AND CARDIOVASCULAR DISEASES can all be assayed in workers using biological monitoring methods.

The development of biological monitoring methods involves the study of the pharmacokinetics of the industrial chemical in the mammalian system so that the movement of the workplace chemical can be properly studied and the right biological monitoring test selected. The sampling time, analytical method, sample stability and a variety of workplace, life-style, and environmental factors affect the results. Additional methods that were developed and field tested include glycol ether acid metabolites in urine, indicators of heavy metal kidney damage (N-acetyl-glucosaminidase), acetone and MEK in blood, ethylbenzene metabolite in urine, and xylene metabolites in urine. Methods developed but not field tested include methylenedianiline in urine and 2,5-hexanedione in urine, a metabolite of hexane and MnBK. A previously developed method, MBOCA in urine tested in animals, has been critically evaluated in humans. Methods to be developed and/or evaluated in FY 1985 include methylenedianiline in urine, MEK metabolite in urine, 2,5-hexanedione in urine, MEBK in blood, non-specific urinary thioethers and D-glucaric acid as indicators of exposure to cytotoxic drugs, the insect repellent m-DET in blood or urine, and biochemical indicators of stress.

PROGRAM AREA CONCENTRATION

OCCUPATIONAL LUNG DISEASES: By 1986, NIOSH will complete its performance criteria for aerosol sampling. Accurate sampling data are important if risk factors are to be determined in mining, textiles, and primary metals industries. Gas diffusion sampling devices are finding increased usage in monitoring chemicals that are responsible for the ten leading causes of work-related diseases and injuries as is evidenced by the numbers of papers appearing in scientific journals, and the peer review of articles by NIOSH scientists for journal editors. One point stands out: there are insufficient performance criteria for use of these devices. Objectives for the future will establish performance criteria for samplers based on new technology.

Early in FY 1984, NIOSH completed a report on coal mine dust (respirable dust) sampling and analysis. A sampling and analytical method was prepared in FY 1983. Performance criteria for respirable dust sampling were prepared in FY 1984. These criteria formed the basis of an International Standards Organization (ISO) draft respirable dust sampling method.

DPSE develops, evaluates, and improves direct-reading monitoring methods to enhance responsiveness, reduce analytical costs, and shorten turnaround time. Accurate monitoring devices are developed and evaluated for unique exposure assessment situations (inside respirator masks) and for airborne hazards for which convenient and accurate monitoring methods are not available.

The development and field testing of biological monitoring methods to assess worker uptake of workplace chemicals is a new area of emphasis for the Institute. The biological monitoring methods allow one to assess uptake (in contrast to environmental exposure) of the airborne workplace chemical which is a combination of the environmental concentration, breathing rate, dermal transpiration and length of exposure. Important routes of exposure such as dermal and oral can also be assessed and differentiated. The techniques under investigation are blood analysis of the parent compound, urine analysis of the parent compound or its metabolites, analysis of expired air, and analysis of other tissues such as hair. The field testing of the biological methods permit an understanding of other influences on the biological monitoring approach and further ensures the ruggedness of the methods. When the biological methods are used they permit correlation with exposure and health effects.

In FY 1985, methods research to develop sampling and analytical methods for halogen gases will be initiated. Sampling and analytical problems for silica determination were revealed in a collaborative test completed in FY 1983. A three-year research effort to resolve these problems and extend the present limit of quantitations will be initiated in FY 1985.

Theoretical aerosol and gas sampling studies aid in identifying parameters which affect the accuracy of workplace monitoring devices. These investigations lead to performance standards and procedures for methods development and instrument design.

Asbestos related disease is a continuing problem. While many industries are finding substitutes for asbestos, it is still a workplace problem, especially in the maintenance and construction trades. In FY 1984, NIOSH stated at OSHA hearings that there is no safe concentration of exposure to asbestos. NIOSH then recommended an optical microscope method to measure asbestos concentrations. In FY 1985, DPSE will initiate a project to develop more sensitive analytical procedures, study sampling problems, develop a new Proficiency Analytical Testing Program, and explore the concept of detection limits versus quantitation limits when recommending no health threshold standards.

OCCUPATIONAL LUNG DISEASES AND CANCER: DPSE develops, modifies, and evaluates sampling and analytical methods in support of NIOSH field studies, in-house research, criteria documents, and other federal agencies (i.e., OSHA, MSHA, BOM, etc.). Sampling and analytical methods are developed for specific analyses (e.g., formaldehyde or acrolein), and generic methods such as total isocyanates. Methods may be modified to eliminate awkward sampling devices, to increase safe handling of the method, or to lower or extend the analytical range. Essential to this mission is an awareness of emerging and state-of-the-art analytical techniques and instrumentation. This awareness has introduced liquid chromatography and ion chromatography into the industrial hygiene analytical chemistry laboratory to fill gaps in the analytical methodology. With utilization of several classes of computers and laboratory automation, DPSE has increased productivity, provided better data management, and improved its quality control and analytical precision.

OCCUPATIONAL CANCERS: Pharmacokinetics or toxicokinetics, the movement of chemicals in biological systems whereby a time-course of the chemicals' absorption, distribution, biotransformation, and elimination can be plotted, is applied by DBBS to the development of methods for evaluating a worker's exposure to workplace chemicals. Such biological monitoring methods are developed in support of the research investigations and for field studies. In FY 1983, biological monitoring methods were developed for the assessment of exposure to ethylbenzene, xylene, styrene, formaldehyde, pentachlorophenol and paint spray solvents. A significant effort was expended in the revision of ten methods for inclusion in the third edition of the NIOSH Manual of Analytical Methods wherein biological monitoring methods will appear in a separate section. Methods development activities are currently being investigated for exposure to dimethylformamide, polycyclic aromatic hydrocarbons and the insect repellent DEET.

During FY 1983, this research program accomplished the following: developed an analytical method for the analysis of asbestos and a multi-element analysis in urine procedure; field tested sampling and analytical methods for acrolein and total isocyanates; evaluated field and laboratory protocols for testing passive monitors using sulfur dioxide monitors (this work continues for formaldehyde and ammonia monitors); and developed and evaluated a method for vanadium trioxide.

In FY 1984, a new sampling and analytical method for mineral fibers was written and submitted to OSHA for the proposed revised asbestos standard. New methods for multi-element analysis of metals in blood and tissue were developed, and field and laboratory protocols for testing passive monitors were evaluated using formaldehyde (HCHO) and ammonia (NH₃). Prototype direct reading instruments for the two latter chemicals were also developed.

Research started in FY 1984 on developing sampling and analytical methods for glutaraldehyde; furfural; 1,3-butadiene; 2,4, and 2,6-toluenediamine, ammonium metavanadate; HF, HCN, and ethylene oxide will continue into FY 1985. Also in FY 1985, methods development research will include procedures for increasing the efficiency of multi-element analysis through new digestion procedures. Development of a new method for hexavalent chromium (Cr VI) and silica are planned.

***** INSTRUMENTS/METHODS DEVELOPMENT *****

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

1. METHOD TO PREDICT HEAT EFFECTS IN MINERS

PROJECT OFFICER: FRANCIS N DUKES-DOBOS (FTS-684-8469)

START DT: 10/79

END DT: 09/85

OBJECTIVE: TO DEVELOP PERSONAL MONITORING METHOD FOR EARLY DETECTION OF EXCESSIVE HEAT EXPOSURE OF UNDERGROUND MINES.

DIVISION OF PHYSICAL SCIENCES AND ENGINEERING

2. ANALYTICAL METHODS FOR ORGANIC COMPOUNDS

PROJECT OFFICER: ALEXANDER W TEASS (FTS-684-4233)

START DT: 10/82

END DT: C

OBJECTIVE: DEVELOPMENT OF ANALYTICAL METHODS FOR ORGANIC COMPOUNDS IN AIR AND OTHER MATRICES OF INDUSTRIAL-HYGIENE INTEREST.

3. HF AND CYANIDE S/A METHOD DEVELOPMENT (ION CHROMATOGRAPHY)

PROJECT OFFICER: MARY E CASSINELLI (FTS-684-4273)

START DT: 10/82

END DT: 06/85

OBJECTIVE: DEVELOP IMPROVED SAMPLING AND ANALYTICAL METHODS FOR HF, HCN AND CYANIDE.

4. ANALYTICAL METHODS FOR ASBESTOS FIBERS

PROJECT OFFICER: PAUL A BARON (FTS-684-4266)

START DT: 10/84

END DT: 09/88

OBJECTIVE: DEVELOP NEW OR IMPROVED SAMPLING AND ANALYTICAL METHODS FOR MONITORING ASBESTOS FIBERS.

5. GAS AND VAPOR MEASUREMENT TECHNIQUES

PROJECT OFFICER: HARLEY V PILTINGSRUD (FTS-684-4441)

START DT: 10/84

END DT: 09/87

OBJECTIVE: TO DEVELOP NEW INSTRUMENTS AND METHODS FOR DIRECT, ON-SITE ANALYSIS OF ENVIRONMENTAL CONTAMINANTS AND TO EVALUATE PERSONAL SAMPLING PUMPS.

DISSEMINATE FINDINGS AND RECOMMENDATIONS ON WORK-RELATED DISEASES AND INJURIES

One of NIOSH's program goals is to disseminate scientific findings and appropriate recommendations to all organizations and individuals to reduce work-related diseases and injuries. Training and developing personnel for the field are essential elements of the program. NIOSH scientists disseminate findings by recommending governmental actions (recommend standards), informing the public of identified problems and their solutions (research reports), and providing service (HHEs). Transferring information into private and public organizations through education, conferences, and joint actions (government, management, and labor) is an integral link in the disseminating process to ensure prevention of identified problems on a much broader front than NIOSH has resources to accomplish. Priorities for dissemination are given to NIOSH's Ten Leading Work-Related Diseases and Injuries.

PROGRAM AREAS: Information Dissemination/Document Development
Work Force Development

INFORMATION DISSEMINATION

PROGRAM AREA GOAL:

Disseminate scientific findings and appropriate recommendations to all organizations and individuals with the need to know to assist them in reducing work-related diseases and injuries.

PROGRAM OBJECTIVES:

- By FY 1984, publish the results of a study of excavation, trenching, and shoring practices jointly with the National Bureau of Standards.
- By FY 1986, complete documents addressing hazards encountered in the precast concrete products industry, the land-based oil and gas well drilling industry, the fabricated structural metal products industry, and the grain elevators and feed mills industry.
- By FY 1986, merge health and safety document development processes.
- By FY 1986, publish four to six Surveillance Reports containing information on high-risk industries and occupations each year.

PROGRAM DESCRIPTION:

This is a continuing program area for NIOSH, and all of the NIOSH divisions are involved. It is necessitated by the Institute's statutory mandates to conduct research, evaluate occupational hazards, and develop criteria that can serve as a basis for OSHA's and MSHA's regulatory activities. Inherent in these functions is the need to disseminate findings, conclusions, and recommendations. These need to be made available to workers directly and to others who have responsibilities for improving workers' health and safety.

Projects in this program area will focus on (1) ensuring scientific and technical quality of NIOSH publications, (2) improving methods for setting priorities, (3) expanding the audience by diversifying the types and formats of informational products, and (4) developing more efficient dissemination strategies.

In developing recommended standards under the OSHA and MSHA mandates, DSDTT draws upon the breadth of NIOSH expertise as well as advice provided by occupational safety and health professionals from other government agencies, trade associations, organized labor, and academia. DSDTT has the NIOSH clearinghouse of the world's scientific and technical literature to draw upon in the development of Institute documents and recommendations. NIOSH scientists, supported by the DSDTT staff, critically evaluate scientific data and produce recommendations for workplace standards and good practices.

In FY 1984, NIOSH assisted the Department of Labor (OSHA, MSHA) in eight standards development (formal rulemaking) efforts. In most cases NIOSH provided formal comments on their proposed rule, and later testified at their public hearings, cross-examining witnesses when requested. Subjects addressed included: controlling worker exposure to asbestos and ethylene dibromide, reducing grain elevator explosions, and improving worker safety at oil and gas well drilling sites.

In addition to NIOSH's direct support to DOL's regulatory process, in FY 1984, NIOSH produced a variety of other policy statements providing guidance to occupational safety and health professionals engaged in reducing workplace hazards. One criteria document, four current intelligence bulletins, four hazard alerts, and one technical guideline were produced, mainly by DSDTT, but usually with considerable support from each of the NIOSH research divisions.

In FY 1984, DSHEFS continued its efforts to actively disseminate the results of its field investigations and surveillance activities to professionals in the OSH field, and to appropriate employers and employees. Such efforts include (1) submission of 533 completed reports on industrial hygiene and medical studies (i.e. health hazard evaluation and industrywide study reports) to NTIS; (2) publication of 57 articles in technical journals or NIOSH Technical Reports with 78 new manuscripts approved for publication; (3) publication of six articles in CDC's MMWR; (4) providing 209 reports to requestors of information regarding potentially hazardous industries or agents identified in NIOSH's National Occupational Hazards Survey (NOHS); and (5) giving 145 presentations pertaining to the results of DSHEFS studies before technical, academic, and professional groups. DBBS, DRDS, DPSE, and DSR were also actively engaged in dissemination of the results of their research efforts in FY 1984.

DSDTT will coordinate a number of significant programs with DSR in FY 1985. These include safety research priority setting, publication of "Safety Alerts" targeted to specialized audiences where intervention can occur, respirator recommendations in criteria documents, personal protective equipment recommendations in documents, and participation of DSDTT criteria managers on selected DSR field injury and fatality investigations. In FY 1985, the types and quantities of policy documents produced are expected to remain about the same as in FY 1984. In FY 1985, DSDTT plans to submit to MSHA documents on asbestos, radiation, silica, and diesel exhausts. Documents tentatively targeted for OSHA include those on n-butyl alcohol, glycol ethers, the semi-conductor industry, sewer maintenance, carbon monoxide, propane engines, epichlorohydrin, metal working fluids, 4,4'-methylenedianiline, grain dusts, acrolein, special product saw mills, meat packing, and power presses.

PROGRAM AREA CONCENTRATION

OCCUPATIONAL LUNG DISEASES: DSHEFS major publications and dissemination efforts (not including speeches) in the area of occupational lung diseases in FY 1984 included:

- (1) one MMWR article on sulfur dioxide/respiratory dysfunction;
- (2) articles: uranium miners--lung cancer; gold miners--lung cancer and silicosis; detergent industry (enzyme exposures)--respiratory disease; phosphate industry--lung cancer; smoking and the histopathology of lung cancer; methods for controlling for smoking in cohort mortality studies; and cotton dust concentrations in the non-textile cotton industry--respiratory disease.

In FY 1985, DRDS will publish the summary of a joint NIOSH/WHO monograph on diseases related to vegetable dusts in the WHO Bulletin. The monograph will be published in FY 1985. This is as a result of a NIOSH/WHO workshop held in FY 1983.

DBBS published and presented results of studies on platinum and vanadium pentoxide induced asthmatic responses in monkeys, the responses of monkeys to various cotton dust extracts, the use of scanning electron microscopy in studying lung diseases, and on the finding of lung tumors in rats following intratracheal instillation of silica.

In June 1984, DSDTT testified at OSHA hearings on their proposed rule for reducing worker exposure to asbestos. In September 1984, DSDTT produced a current intelligence bulletin on the potential for lung cancer among cadmium exposed workers. In FY 1985, NIOSH expects to complete three criteria documents on silica, asbestos (in mines), and radon daughters.

MUSCULOSKELETAL DISORDERS: Several papers were published by DBBS in FY 1984 on ergonomic problems associated with VDT work. Papers were also published by DBBS on musculoskeletal studies of carpet layers and microscope workers. A paper summarizing findings in some 20 ergonomics health hazard evaluations was prepared for submission to a journal, and articles summarizing findings of research on hand-arm vibration were prepared for a special journal issue. DSHEFS had one technical journal article on how to design epidemiologic studies of vibration syndrome.

OCCUPATIONAL CANCERS: In FY 1984, DSDTT completed four documents describing the carcinogenic effects of hazards in the workplace (1,3-butadiene, dioxin, cadmium, monohalothanes). Work will continue in FY 1985 on other NIOSH policy documents addressing potential workplace carcinogens (PCBs, dinitrotoluene, welding, etc.).

DSHEFS major publications and dissemination efforts (not including speeches) in the area of occupational cancers included:

- (1) three MMWR articles: breast cancer in Texas; top ten article on occupational cancer in the United States; sarcoma in workers exposed to dioxin.
- (2) ten technical journal articles: cancer risk from exposure to styrene, chemotherapeutic agents, ethylene oxide, dioxin.
- (3) exposures in the pulp and paper industry and in petroleum refineries, cancer mortality in oil refineries, leukemia risk in ordinance workers.

Presentations were made and papers were published on results of studies by DBBS on foundry mold particulates, foundry mold pyrolysis effluents, and on propylene and ethylene oxides.

SEVERE OCCUPATIONAL TRAUMATIC INJURIES: During 1984, four DSR safety documents were published. One document, "Guidelines for Controlling Hazardous Energy During Maintenance and Servicing," is intended for use in the field by the individuals responsible for developing safe work procedures for non-production tasks. This document, which features a decision tree, should be of increasing value as the nation's manufacturing processes evolve into automated modes. Efforts to enhance worker safety will focus more and more upon maintenance workers engaged in set-up, repair, and maintenance activities.

Three documents address hazards found in specific industries, and provide recommended safe work practices developed for use by management and workers alike. In addition, these documents have been submitted to OSHA for their use in standards development activities. The documents address hazards faced by workers in the oil and gas well drilling industry, the grain elevators and feed mills industry, and the pre-cast concrete industry. Documents nearing completion include one addressing selection and use of personal protective equipment for hazardous materials incidents, and one addressing hazards in the fabricated structural metals industry.

DSR is developing a construction industry strategy document which includes a method for numerically ranking high-risk occupations in the industry to establish research priorities. This document, which is undergoing peer review, may serve as a model for subsequent priority-setting efforts. DSHEFS had two major publications in this area, an MMWR article dealing with injuries to loggers, and a study of eye effects among video display terminal users.

CARDIOVASCULAR DISEASES: DSHEFS had two major technical articles in FY 1984 dealing with cardiovascular disease in workers exposed to nitroglycerin and carbon disulfide. DSDTT published an "alert" warning employers and employees in aircraft refueling operations of potential carbon-monoxide exposures. Initial studies by DBBS on cardiovascular effects of two-methoxy ethanol on rat fetuses exposed in utero were presented.

DISORDERS OF REPRODUCTION: In FY 1984, DSHEFS had five major articles dealing with disorders of reproduction: two surveillance publications from national data; two epidemiologic methodology papers; and one pertaining to disorders of reproduction in workers exposed to polychlorinated biphenyls and carbon disulfide. Work by DBBS on several aspects of reproduction was presented and published including behavioral teratology of alcohol solvents, reproductive studies with glycol ethers, teratogen studies with *Drosophila*, and methods of sperm analysis.

NEUROTOXIC DISORDERS: DSHEFS had one major technical article dealing with workers exposed to carbon disulfide. In addition to book chapters, a number of presentations were made and scientific articles were published by DBBS on testing methods, experimental human subject testing, and behavioral teratology of alcohol solvents.

NOISE-INDUCED LOSS OF HEARING: A compendium of hearing protectors was published in FY 1984. Presentations and publications were also made by DBBS on measurement of impulse noise.

DERMATOLOGIC CONDITIONS: The method developed by DBBS for studying percutaneous absorption of volatile compounds by hairless mice was perfected, and results of studies with benzene were submitted to OSHA and for publication as a journal article.

PSYCHOLOGIC DISORDERS: DSHEFS had one major publication in this area dealing with psychogenic illness in an electronics plant. Several presentations and publications on stress of VDT work and extended workdays were made by DBBS staff.

DISSEMINATE FINDINGS AND RECOMMENDATIONS ON WORK-RELATED DISEASES AND INJURIES

***** INFORMATION DISSEMINATION/DOCUMENT DEVELOPMENT *****

DIVISION OF SAFETY RESEARCH

1. ED. SAF. PROGRAMS FOR SMALL GRAIN HANDL. FAC. AND ON-FARM OPERATIONS
PROJECT OFFICER: RICHARD M RONK (FTS-923-4809) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO DEVELOP AND DISSEMINATE INFORMATION ON THE PREVENTION OF GRAIN
ELEVATOR FIRES AND EXPLOSIONS.

DIVISION OF STANDARDS DEVELOPMENT AND TECHNOLOGY TRANSFER

2. STANDARDS COMPLETION PROGRAM (SCP) GUIDELINES
PROJECT OFFICER: MAURICE GEORGEVICH (FTS-684-8311) START DT: 10/82 END DT: C
OBJECTIVE: DEVELOP OCC. HEALTH GUIDELINES ON ASBESTOS FOR CHEM. HAZARDS. UPDATE
GUIDELINES AND POCKET GUIDE TO CHEM. HAZARDS, AS APPROPRIATE.
3. CONSULTATION AND BRANCH ADMINISTRATION
PROJECT OFFICER: WILLIAM D WAGNER (FTS-684-8319) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE ADMINISTRATIVE SUPPORT TO THE DOCUMENT DEVELOPMENT BRANCH
PROGRAMS AND CONSULTATIVE ASSISTANCE TO THE DSDTT AND OTHER REQUESTS.
4. DOCUMENT DEVELOPMENT
PROJECT OFFICER: RALPH D ZUMWALDE (FTS-684-8311) START DT: 10/70 END DT: C
OBJECTIVE: DEVELOP DOCUMENTS DURING FY 85 THAT WILL PROVIDE SAFETY AND HEALTH
RECOMMENDATIONS TO OSHA, MSHA, EPA, INDUSTRY, AND LABOR.
5. DIVISION MANAGEMENT
PROJECT OFFICER: RICHARD A LEMEN (FTS-684-8302) START DT: 10/70 END DT: C
OBJECTIVE: PROVIDES DIRECTION AND GUIDANCE TO THE DSDTT PROGRAMS.
6. QUANTITATIVE RISK ASSESSMENT
PROJECT OFFICER: THEODORE J MEINHARDT (FTS-684-8302) START DT: 10/70 END DT: C
OBJECTIVE: PROJECT WILL PROVIDE ASSESSMENT OF PERTINENT HEALTH DATA TO SUPPORT
TWO RECOMMENDED OCCUPATIONAL HEALTH AND SAFETY STANDARDS.

7. DOL (OSHA/MSHA) REGULATORY RESPONSES
 PROJECT OFFICER: LAWRENCE F MAZZUCKELLI (FTS-684-8302) START DT: 10/83 END DT: C
 OBJECTIVE: PROVIDE TECH. SUPPORT TO OSHA/MSHA IN RESPONSE TO REQUESTS FOR NIOSH
 ASSIST. IN RULEMAKING EFFORTS AND COORDINATE DEVELOP. OF INST. TESTIMONY.
8. LIBRARY SERVICES
 PROJECT OFFICER: VIVIAN K MORGAN (FTS-684-8323) START DT: 10/83 END DT: C
 OBJECTIVE: THIS PROJECT PROVIDES FOR THE BUILDING, MAINTENANCE AND TRANSFER OF
 INFORMATION FROM THE NIOSH LIBRARY COLLECTION TO NIOSH STAFF.
9. PUBLISHING AND DISSEMINATION OF NIOSH PUBLICATIONS
 PROJECT OFFICER: VIVIAN K MORGAN (FTS-684-8323) START DT: 10/83 END DT: C
 OBJECTIVE: PROVIDES FOR PUBLISHING AND DISSEMINATING DOCUMENTS RELATING TO NIOSH
 RESEARCH AND THE TEN LEADING WORK-RELATED DISEASES AND INJURIES.
10. TECHNOLOGY TRANSFER
 PROJECT OFFICER: THEODORE F SCHOENBORN (FTS-684-8326) START DT: 10/83 END DT: C
 OBJECTIVE: THIS PROJECT PROVIDES FOR THE MARKETING OF NIOSH-DEVELOPED DATA BASES,
 NEW APPROACHES TO TECHNOLOGY TRANSFER, AND INSTITUTE EXHIBIT PROGRAMS.
11. INFORMATION RETRIEVAL AND ANALYSIS
 PROJECT OFFICER: RODGER L TATKEN (FTS-684-8328) START DT: 10/70 END DT: C
 OBJECTIVE: PROVIDES FOR ACQUISITION AND DISSEMINATION OF OSH INFORMATION IN
 SUPPORT FOR NIOSH RESEARCH AND IN RESPONSE TO PUBLIC INQUIRIES.
12. PRIORITIES DEVELOPMENT
 PROJECT OFFICER: SANFORD S LEFFINGWELL (FTS-684-8306) START DT: 10/70 END DT: C
 OBJECTIVE: TO ANALYZE INSTITUTE RESEARCH OUTPUT AND DEVELOP PRIORITIES FOR NIOSH
 DOCUMENTS AND RESEARCH.
13. REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)
 PROJECT OFFICER: DORIS V SWEET (FTS-684-8317) START DT: 10/70 END DT: C
 OBJECTIVE: PROVIDES FOR THE COLLECTION, VERIFICATION AND INPUT OF TOX. DATA IN A
 COMPUTERIZED FILE USED TO PRODUCE LEGISLATIVELY MANDATED PUBLICATIONS.

14. NIOSHTIC
PROJECT OFFICER: WILLIAM D BENNETT (FTS-684-8317) START DT: 10/70 END DT: C
OBJECTIVE: PROVIDE FOR THE COLLECTION, VERIFICATION, AND INPUT OF TECH. LIT. INTO
NIOSH'S COMPUTERIZED OSH BIBLIOGRAPHY DATA BASE.
15. NIOSH INFORMATION SYSTEMS
PROJECT OFFICER: RICHARD J LEWIS (FTS-684-8317) START DT: 10/70 END DT: C
OBJECTIVE: PROVIDES FOR THE DEVELOPMENT OF INFORMATION SYSTEMS TO SUPPORT THE
DATA NEEDS OF PRAB, DSDTT, OTHER NIOSH DIVISIONS, AND THE PUBLIC.
16. INFORMATION SUPPORT/TECHNOLOGY TRANSFER FOR HAZARDOUS WASTE PROGRAM
PROJECT OFFICER: THEODORE F SCHOENBORN (FTS-684-8326) START DT: 10/83 END DT: C
OBJECTIVE: THIS PROJECT PROVIDES INFORMATION SUPPORT FOR THE HAZARDOUS WASTE
PROGRAM AND ENSURES DISSEMINATION OF THE COMPLETED GUIDANCE MANUALS.

WORK FORCE DEVELOPMENT

PROGRAM AREA GOAL:

Disseminate scientific findings and appropriate recommendations to all organizations and individuals with the need to know to assist them in reducing work-related disease and injuries: training and developing personnel.

PROGRAM OBJECTIVES:

- By FY 1986, develop an Occupational Health and Applied Industrial Hygiene Course for sanitarians and other State Health Department personnel.
- By FY 1986, provide educational consultation and deliver pilot retraining programs to 15 State Health Departments.
- By FY 1986, present continuing education programs to 35,000 OSH practitioners via NIOSH direct training courses and the Educational Resource Centers.
- By FY 1986, present vocational/industrial arts OSH train-the-trainer workshops for secondary school teachers in four State departments of education.
- By FY 1986, approve/re-approve applications from 100 training organizations for provision of pulmonary function testing training courses.
- By FY 1986, provide academic programs in the core and allied OSH disciplines for 6,000 trainees through the ERC and small training-grant mechanisms.
- By FY 1986, produce 2,000 graduates from NIOSH-supported OSH academic programs.
- By FY 1986, complete the OSH Labor Market Survey of Supply/Demand Characteristics.
- By FY 1986, incorporate OSH educational content into the business curriculum of four major colleges of business administration.
- By FY 1986, provide training to State Health Department personnel in industrial and occupational (I/O) coding.

PROGRAM DESCRIPTION:

The NIOSH mission established by the Occupational Safety and Health Act of 1970 is two-fold in scope:

Section 20 of the Act mandates the NIOSH research function, and Section 21 mandates the training and education function. The Work Force Development Program is designed to implement Section 21 of the Act by increasing the numbers and competence of the OSH professional and para-professional work force. Work force development activities are based on the premise that prevention research results are of limited value unless they are actually applied to the protection of the worker.

NIOSH, as a research institute, has two major foci for its activities: to produce significant, valid information, and to get this information out to the workplace where it can be used to improve conditions and protect the worker. The latter is a primary one because research, no matter how good, cannot be effective until translated into action programs. This NIOSH program provides the mechanism for NIOSH research to be brought to bear upon prevention, intervening before worker exposure occurs.

The Work Force Development Program, with its sub-activities of technical training and education, curriculum development, manpower assessment, and educational resource development is an OSH hazard "prevention" program. It is consistent with the HHS agency-wide research-in-prevention initiative and, at the same time, carries out one of the two mandates of the NIOSH mission.

CONTINUING EDUCATION

NIOSH conducts technical training courses for the Department, for other federal, State and local government agencies, and for the private sector including OSH practitioners in industry, management, and labor unions. Courses are provided to new NIOSH personnel for orientation and to existing staff members for maintenance of competence and career development.

In 1970, the OSH Act established a tuition-free training program with NIOSH. Since 1973, the Institute's training program has been conducted on a reimbursable self-sustaining basis. In FY 1974, the first year of reimbursable training, 50 courses were presented, in which 1,100 professionals were trained, and the Institute realized over a quarter of a million dollars in tuition fees. The number of trainees trained directly by NIOSH steadily increased until 1977 when mechanisms were developed with outside organizations to provide "indirect" training to meet the ever-increasing demand. The Educational Resource Center (ERC) grant program contributed a large part to the indirect training efforts. In FY 1983, the ERC programs, coupled with the Institute's own direct training program, provided training to almost 14,000 OSH practitioners.

In FY 1984, special customized training courses were presented to the U. S. Navy (Portsmouth, New Hampshire Shipyard, and the Pearl Harbor Fleet Base), to the MSHA Training Academy (Beckley, West Virginia), and the American Association for Laboratory Accreditation (Washington, D. C.).

The effort, begun in FY 1982, to build and maintain an OSH competency in State government agencies, in particular, State health departments, was continued. Courses in ionizing and non-ionizing radiation were presented to the State of Iowa Department of Labor (Des Moines). A course dealing with the hazards associated with the use of video display terminals (VDTs) was presented in Boston, Massachusetts, in conjunction with the Harvard ERC. This course brought in people from several States (Connecticut, Massachusetts, Maine, New Jersey, New York, Rhode Island, Tennessee, Vermont, and West Virginia) and from State and federal agencies as well as from academia and private industry. Consultation and training assistance in response to requests from labor unions continued as a high priority. The vocational/industrial arts OSH training program was presented to the Rhode Island State Department of Education in Providence. A course focusing on the Ten Leading Work-Related Diseases and Injuries was presented to representatives of State and local health departments in the States of Kentucky and Ohio. A Principles of Photography Course was presented to research and technical support staff who use photographs and slides for data documentation. Two courses entitled "Orientation in Occupational Safety and Health" were presented to NIOSH Headquarters staff in Atlanta, Georgia, one to top administrative and senior advisory staff, and one to clerical and technical support staff.

In FY 1985, this program again will offer short courses in the core disciplines of industrial hygiene, occupational medicine, occupational safety, occupational health nursing, and the allied fields such as toxicology and ergonomics. Courses will be conducted by direct mechanism, using DTMD faculty supported by the research divisions, and by indirect mechanisms including ERC continuing education courses. Special courses will be conducted for NIOSH personnel and specialized training to outside organizations will include State, MSHA, OSHA, and HHS agencies. Courses are planned for the States of Alaska, Hawaii, New York, and New Jersey, as well as for the U. S. Navy Base in Pearl Harbor. Training consultation to foreign governments and accommodation of foreign visitors in NIOSH courses will continue.

Curriculum Development: It is through the assimilation of facts and information from the Institute's research program that the OSH curriculum development activity custom designs programs to meet the needs of various disciplines at varying levels of complexity. A train-the-trainer program to introduce and sensitize vocational education/industrial arts instructors to the hazards of their working environment has been initiated. The process for implementation of the Voc-Education program follows very closely that of the science teacher program which was the most successful mass training program NIOSH has attempted.

In FY 1984, DTMD coordinated the development of a document on hazardous substances in School Science Programs dealing with toxic and carcinogenic substances. The activity was funded by the Consumer Product Safety Commission (CPSC), developed by the Council of State Science Supervisors (CSSS), and coordinated and reviewed for technical accuracy by NIOSH. Over 5000 copies have been disseminated by CPSC and CSSS. A two-day lecture series on the Ten Leading Work-Related Diseases and Injuries was completed and pilot tested with State and local health agencies. Ten videotapes on continuing and completed research activities within the various research divisions have been produced and disseminated through the academic users network.

These included the following subjects: Pilot Worker Notification Study (DSHEFS); The Exposure of Children to Lead from Smelters (DSHEFS); VDT Radiation Issues (DBBS); Foundry Health Hazards (DSDTT); What Does OPPE Do? (OPPE); Metabolism of Aromatic Amines (DSDTT); Dioxin and Soft Tissue Sarcoma (DSHEFS); The Human Workplace Model (Tom Leamon, U. of Illinois, DTMD); Belt Sander Ventilation Innovations (DPSE); Project Minerva Tape, "It's a New Day." A videotape program showing the incorporation of OSH principles in a corporate management program has been produced. The tape is to be used as part of the Project Minerva briefing package. A program of instruction for an advanced OSH nursing program was completed to provide direction for curriculum content of the program.

In FY 1985, the major thrust areas will be in the development of a new dual phase training program on "Hazard Communication" or "Worker Right to Know." One phase of the program will be used to provide information to safety and health professionals for the training of potentially 20 million general industry employees in the SICs between 20-39. The second phase will be used to train personnel from local or State agencies, other than OSHA, responsible for assuring compliance with this standard. Programs to be continued will involve the development and pilot testing of curriculum for schools of business and schools of engineering, continuation of the development of the advanced nursing curriculum and the Recognition Course on OSH hazards for Allied Health Professionals and Paraprofessionals, and revision of the NIOSH syllabus. In addition, assistance will be provided to DRDS for the National Coal Study by developing audio visual materials.

HAZARDOUS WASTE TRAINING PROGRAM

This program is a major part of the Superfund Interagency Agreement between NIOSH and EPA and will provide for the training of individuals working at hazardous waste dump sites. More specifically, it will deal with the potential problems of exposure in situations of hazardous waste site cleanups and in operational hazardous waste treatment and disposal sites. Guidelines and training programs related to emergency response to spills of hazardous materials are the domain of the Federal Emergency Management Administration (FEMA).

NIOSH is charged in Public Law 96-510, the Comprehensive Environment Response Compensation and Liability Act of 1980 (CERCLA/Superfund), with responsibility for occupational hazards exposure to hazardous waste operations. Many industrial hygiene and safety principles necessary for working with hazardous materials are already known and will be incorporated into aspects of the overall training program. Materials specific to the problem of hazardous wastes are incorporated into the DSDTT Guidance Document and serve as the major building blocks for development of the training package. This package contains curriculum materials designed to prepare personnel for entry into situations where the potential for exposure to hazardous wastes exist. The program was field tested to assure that it meets the needs of personnel who need to receive this training. The total training program consists of two parts. Part I is a train-the-trainer program for management and health professionals and deals with the transfer of technology resulting from the development of the guidance document. Part II consists of a training package to be used by management to train their workers to deal with the day-to-day hazards of their work.

In FY 1983, course outlines were developed, reviewed, and revised for the uncontrolled waste site courses and for the train-the-trainer course. In FY 1984, course instructor guides, student texts, and audiovisual aids were developed and peer reviewed. The courses were pilot tested in conjunction with Michigan State University with an audience of currently active hazardous waste site workers and supervisors in Troy, Michigan. A second pilot test was conducted with an audience of State health agency personnel for the State of Georgia. A train-the-trainer course was presented to industrial hygiene program faculty and continuing education program directors from fifteen NIOSH Educational Resource Centers in Atlantic City, N.J. As a result of this program, one or more hazardous waste courses was presented to each HHS region by the responsible ERC(s). In FY 1985, this activity will continue and expand on the basis of regional needs and technical advances.

EDUCATIONAL RESOURCE DEVELOPMENT

The OSH Act calls for an adequate supply of resources; i.e., qualified personnel and educational/informational programs to carry out the purposes of the Act. The educational resource development activity assesses these resource requirements and continually evaluates current programs. Ongoing assessment of OSH professionals identifies trends and gaps between manpower needs and supply/demand. A primary use for this information is to more effectively utilize Institute funding and expertise to foster and support educational and training programs in the academic and non-federal sectors.

Over the last seven years, the Institute has conducted research investigations relating to manpower supply and demand. Since the early 1970s, NIOSH training grants have provided a progressively increasing pipeline of highly qualified graduates to serve as educators, researchers, or practitioners in the OSH field. Numerous other institutions received consultative assistance from NIOSH to develop new educational programs. Since 1977, ERC outreach assistance activities to new, emerging programs have been significantly increased. NIOSH has a continuing program of promoting the OSH field as a career choice to pre-baccalaureate students as well as to workers who are seeking early or mid-career change. Career brochures, academic program directories, and continuing education schedules, are distributed widely to support guidance counseling and recruitment efforts. In FY 1982, an initiative to impact other scientific, technical, and professional fields (i.e., non-OSH disciplines) through their academic/educational systems started with programs designed to influence schools of engineering and schools of business. Engineering and business schools contacted included Purdue University, Ohio State University, Temple University, Xavier University, and Johns Hopkins University.

In FY 1984, the Institute continued to guide, administer, and monitor the training project grants and the fifteen Educational Resource Center grants. The efforts to impact allied and non-allied OSH professions and related disciplines via their own educational systems continued with the programs designed to influence schools of engineering and schools of business. A status report on the study to determine OSH training/curriculum routes in the College of Engineering at the Georgia Institute of Technology was prepared. Additional contacts were established with engineering schools and professional engineering societies including the ASME and AIChE. Proceedings of the Third Control Technology Workshop and

Preliminary Planning for the Fourth Control Technology Workshop were completed. A project was initiated with the Accreditation Board for Engineering Technology (ABET) to assess the current influence of OSH educational materials on engineering school curricula. The NIOSH Control Technology Engineering Education (CTEE) working group completed a long range five-year work plan for impacting academic engineering education.

Project Minerva was introduced to the American Assembly of Collegiate Schools of Business (AACSB) and the Academy of Management. A videotape, titled "It's a New Day," was produced for showing to Colleges of Business Administration to show the relationship of occupational safety and health to modern business management. The first MS/MBA program in the U. S. was started at Temple University as an outgrowth of Project Minerva activities between the College of Business and the industrial hygiene/occupational medicine training program funded with a NIOSH training grant. The OSH Labor Market Survey project started in FY 1982 continued. The FY 1983 Nursing Symposium Proceedings were published and the steering committee for organizing and planning an Invitational Nursing Institute was formed. DTMD participated in a project with the Division of Nursing, Bureau of Health Professionals, HRSA, and HHS to review the requirements for nursing personnel and to consider their impact on future resource requirements. Consultation was provided to the Nursing Programs at UCLA, University of Pennsylvania, University of Michigan, University of South Florida, University of Texas, University of California at Fullerton, and Boston University. NIOSH collaborated in the publication of Report Number 5, "Occupational Health Nursing in the 1980s," with the Nursing Subcommittee of the Permanent Commission and International Association on Occupational Health. Four Health Promotion/Health Protection projects were developed and funded as part of the ERC educational research activities.

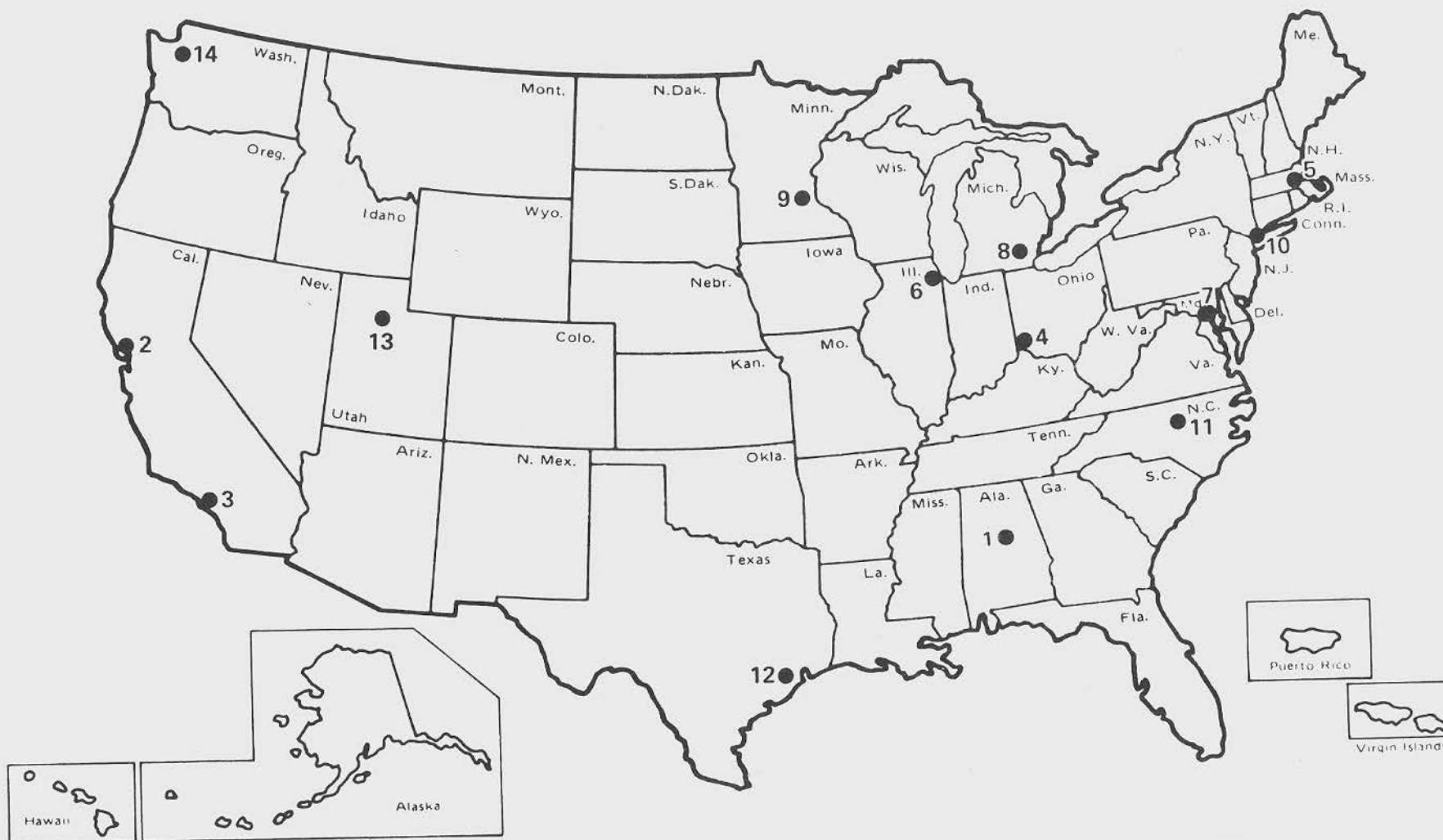
In FY 1985, the OSH Labor Market Survey project will be concluded. The Nursing Invitational Institute will be held sponsored by the ERC Nursing Program Conglomerate. The Engineering Education and the Business Administration Education Enforcement Programs will be continued along with the training grant program and the educational consultation program.

In FY 1984, a manual acknowledging the ergonomic and stress issues associated with the use of video display terminals was prepared. Also, a worksite stress management manual was begun as part of a joint DBBS-DSDTT-DTMD project. A video display terminal fact sheet and compendia of hearing protectors and eyewear were completed in FY 1984 and will be ready for use in FY 1985. A manual for recognition and control of upper extremity disorders such as carpal tunnel syndrome, epicondylitis, thoracic outlet syndrome and tenosynovitis was also prepared. These manuals, as well as other research-related materials, will be available for incorporation into the curriculum development/course presentation efforts of DTMD.

As in the past, the DBBS will continue to cooperate with the DTMD in a variety of technical areas related to its work in support of the NIOSH Top Ten Research Initiatives. Specific areas could include ergonomics, heat stress, hearing conservation, psychological stress, and various aspects of industrial toxicology. These activities can be summarized in two major areas: 1) assistance in preparation of training materials such as manuals, video-tapes and other items related to recognition, evaluation and control of hazards causing specific occupational illness and injury, and 2) presentation of lectures and demonstrations in OSH training courses in areas pertaining to the DBBS's research activities.

Figure 7

• NIOSH EDUCATIONAL RESOURCE CENTERS •



- 1 University of Alabama (Birmingham)
- 2 University of California (Berkeley)
- 3 University of Southern California
- 4 University of Cincinnati

- 5 Harvard University
- 6 University of Illinois
- 7 Johns Hopkins University
- 8 University of Michigan
- 9 University of Minnesota
- 10 Mt. Sinai School of Medicine
- 11 University of North Carolina

- 12 University of Texas
- 13 University of Utah
- 14 University of Washington

In FY 1984, DTMD and DPSE collaborated with the Center for Professional Development and Training (CPDT) to stimulate improvements in engineering school curricula and continuing education offerings for practicing engineers related to the occupational safety and health field. Through an existing cooperative agreement with the Association of Schools of Public Health (ASPH), schools of public health and schools of engineering jointly developed and delivered OSH instructional materials for academic and continuing education engineering programs. This project and other related engineering education enhancement programs address the 1990 Objective which states, "By 1990, at least 70 percent of all graduate engineers should be skilled in the design of plants and processes that incorporate occupational safety and health control technologies." In FY 1985, DPSE will play a major role in the implementation of the five-year workplan developed by the CTEE working group.

In FY 1983, a joint effort led by DSHEFS and DTMD was initiated to explore the possibility of occupational health training of primary care medical providers. In FY 1984, Educational Resource Center consultants convened to identify key groups involved in the teaching of such physicians. In FY 1985, methods for increasing general physician's awareness of occupational safety and health concerns will be explored with these groups. Consideration will be given to incorporating the occupational sentinel health event concept in this training. This project addresses the 1990 Prevention Objective which states that, "By 1990, at least 70 percent of primary health care providers should routinely elicit occupational health exposures as part of patient history, and should know how to interpret the information to patients in an understandable manner."

In FY 1984, DSDDT and DTMD jointly distributed training materials through the NIOSH Clearinghouse, the National Technical Information Service (NTIS), the National Audiovisual Center, and other targeted dissemination mechanisms. In FY 1985, they will collaborate in the dissemination of selected technology transfer documents, e.g., Current Intelligence Bulletins (CIBs), Criteria Documents, and Hazard Alerts to the various academic/educational user networks.

In FY 1984, the DRDS-developed instructional package for training X-ray B-readers was distributed through the ERC continuing education/outreach network. In FY 1985, DTMD will help develop orientation/instructional materials for miners to increase participation in the National Coal Study.

PROGRAM AREA CONCENTRATION

OCCUPATIONAL LUNG DISEASES: The pulmonary function testing training course approval system will be maintained as required under the Cotton Dust Standard. A series of audiovisual presentations on the problems of asbestos removal from school buildings was developed with OSHA, EPA, and NCI. The series consisted of an overview of the problem, a program on personnel and medical monitoring, and a program on

sample screening (Kupel-Kim Method). Over 1,000 copies of these programs were disseminated through NIOSH, EPA, and OSHA for loan in conducting contractor training sessions. A training manual entitled "Maintaining and Donning Self-Contained Breathing Apparatus" was developed for use by firemen and other emergency workers. An instructor resource training guide for managers of respiratory protection programs and for the operation and maintenance of the self-contained breathing apparatus (SCBA) was completed.

MUSCULOSKELETAL DISORDERS: A manual for recognition and prevention of upper extremity disorders such as carpal tunnel syndrome, epicondylitis, thoracic outlet syndrome, tenosynovitis, and cervical brachial disorders was prepared by DBBS. This manual will be available for distribution in FY 1985. Other manuals will be developed as soon as the ongoing research provides information suitable for practical application. These manuals will be used as resource materials for existing training courses or as a basis for new course development.

SEVERE OCCUPATIONAL TRAUMATIC INJURIES: An Occupational Safety and Health Simulation Module (ELCAB) was designed to give students an opportunity to apply problem recognition and analysis skills to realistic occupational activities via the classroom setting. The simulation was pilot tested in an advanced safety management class in a university setting. A Training Resource Manual, "Safety and Health in Confined Work Spaces," received technical/user review from over twenty representatives of major labor unions and industrial firms in the construction industry, including the United Association of Plumbers and Pipefitters, and the International Association of Boilermakers. A slide/tape package based on the ELCAB simulation module was developed. In FY 1984, DSR and DTMD produced a safety training course package for lift truck operators, including a course manual and slide/tape modules.

DISORDERS OF REPRODUCTION: Videotape programs were produced on the subjects of health hazards associated with spray painting, radiofrequency heaters and sealers, and video display terminals.

NEUROTOXIC DISORDERS: Videotape programs were produced on the subjects of health hazards associated with spray painting, radiofrequency heaters and sealers, and video display terminals. A joint WHO/NIOSH monograph on Neurotoxic Disorders with a training component will be field tested in a developing country through a WHO Regional Office. DBBS helped develop the document DTMD used to test it.

PSYCHOLOGIC DISORDERS: The ELCAB, as described, was also applied to psychologic disorders. A slide/tape package based on the ELCAB simulation module was developed and will be available in early 1985. In FY 1985, the materials will be distributed as a NIOSH course package. In FY 1984, a worksite stress management manual was developed as a joint DBBS-DSDTT-DTMD project. The "Health Issues of VDT Use" training course developed by DBBS and DTMD was presented to audiences who supervise VDT operations in government and private sector work settings.

***** WORK FORCE DEVELOPMENT *****

DIVISION OF TRAINING AND MANPOWER DEVELOPMENT

1. CONTINUING EDUCATION
PROJECT OFFICER: EDWARD D LEININGER (FTS-684-8228) START DT: 10/77 END DT: C
OBJECTIVE: TO PROVIDE TRAINING COURSES, CONSULTATION, AND TECHNICAL ASSISTANCE TO ORGANIZATIONS AND INDIVIDUALS INVOLVED IN THE OSH FIELD.

2. EDUCATIONAL RESOURCE DEVELOPMENT
PROJECT OFFICER: THOMAS C PURCELL (FTS-684-8241) START DT: 10/77 END DT: C
OBJECTIVE: TO ADMINISTER TRAINING GRANTS; TO ASSESS MANPOWER SUPPLY/DEMAND AND TO INFLUENCE THE CURRICULA OF NON-OSH ACADEMIC PROGRAMS.

3. CURRICULUM DEVELOPMENT
PROJECT OFFICER: NORBERT J BERBERICH (FTS-684-8229) START DT: 10/77 END DT: C
OBJECTIVE: TO DESIGN AND DEVELOP EDUCATIONAL CURRICULUM, TRAINING COURSES, AND AUDIOVISUAL SUPPORT MATERIALS FOR OSH PROFESSIONALS AND TECHNICIANS.

4. HAZARDOUS WASTE TRAINING PROGRAM
PROJECT OFFICER: EDWARD D LEININGER (FTS-684-8228) START DT: 10/84 END DT: 09/85
OBJECTIVE: TO MANAGE ERC TRAINING COURSES AND FINALIZE CURRICULUM MATERIALS ACCORDING TO IA WITH EPA FOR CERCLA/SUPERFUND.

ADMINISTER INSTITUTE PROGRAMS

NIOSH's goal, in administering Institute programs, is to administer these programs with a sense of total commitment for the highest principles of public stewardship. The administration program is an Institute-wide system for financial and program information, systematically organized into significant and measurable program elements. NIOSH's management system monitors three dimensions of accountability, resources (input), organization (who is accountable), and results (output).

PROGRAM AREA: Institute Administration

INSTITUTE ADMINISTRATION

PROGRAM AREA GOAL:

Administer NIOSH programs with a sense of total commitment to the highest principles of public stewardship.

PROGRAM OBJECTIVES:

- By FY 1986, NIOSH will develop an automated system which will enhance our current management efforts in the area of cost analysis, and yield a more sophisticated programmatic analysis of the Institute's outcome objectives.
- By FY 1986, NIOSH will explore and develop innovative management techniques which will further enhance the decision-making process of the Institute.

PROGRAM DESCRIPTION:

NIOSH's goal, in administering Institute programs, is to provide the methods for establishing and achieving the Institute's objectives. An Institute-wide computerized planning and budgetary system for managing over 350 projects has been implemented. It provides necessary financial and program information systematically organized into significant and measurable program elements. NIOSH's management system monitors three dimensions of accountability--resources, organization, and results.

Among the activities administered by the Institute are management of all NIOSH facilities, a Science Advisory Staff, a Board of Scientific Counselors, an information program, and a career development program involving long-term postgraduate training each year for about one percent of the total Institute staff.

The Institute coordinates management activities in the areas of financial management, labor relations, personnel liaison, administrative services, procurement, travel, contracts, interagency agreements, property, printing, internal safety, and information resource management to all NIOSH offices/divisions.

NIOSH has a system of standard operating procedures, the NIOSH Management Manual. The NIOSH Management Manual provides supervisors and program officials with the guidelines and instructions on both programmatic and administrative policies and procedures. The issuances are written in abbreviated form to supplement existing regulations, and have been developed for internal management use.

REGIONAL OFFICES

There are ten regional offices in DHHS and each one has at least two occupational safety and health experts. The regional offices are the "eyes and ears" of the Institute, being in daily contact with States, industries, unions, individual workers, professional organizations, academic institutions, and the general public in an effort to provide information and technical assistance as needed.

One of the major program activities of NIOSH regions is the conduct of HHEs/TAs. The upsurge in hazard evaluations conducted by regional personnel parallels the overall Institute growth in this area. The regions currently conduct nearly half of the total NIOSH HHEs/TAs. Although a considerable amount of regional office personnel time is consumed with the conduct of HHEs/TAs, the overall mission is much broader. The regional office is in daily contact with industries, unions, individual workers, professional organizations, academic institutions, the general public, and a myriad of local, State, and federal agencies in an effort to provide information and technical assistance as needed.

RESEARCH GRANTS

The Institute manages a program of research grants. This program encourages researchers at universities and elsewhere to focus greater attention on work-related diseases and injuries. The grants research program supports the long-term integrity of the Institute by maintaining a stable science base that contributes to the development of the available pool of scientific and medical experts.

INTERNATIONAL HEALTH

Interest in work-related diseases and injuries has grown dramatically throughout the world. NIOSH has a cooperative agreement with the World Health Organization (WHO) which has three objectives:

1. Stimulate occupational health and safety research.
2. Develop and disseminate information useful to developing countries.
3. Investigate and disseminate information regarding control strategies.

NIOSH RESEARCH GRANTS FUNDING HISTORY

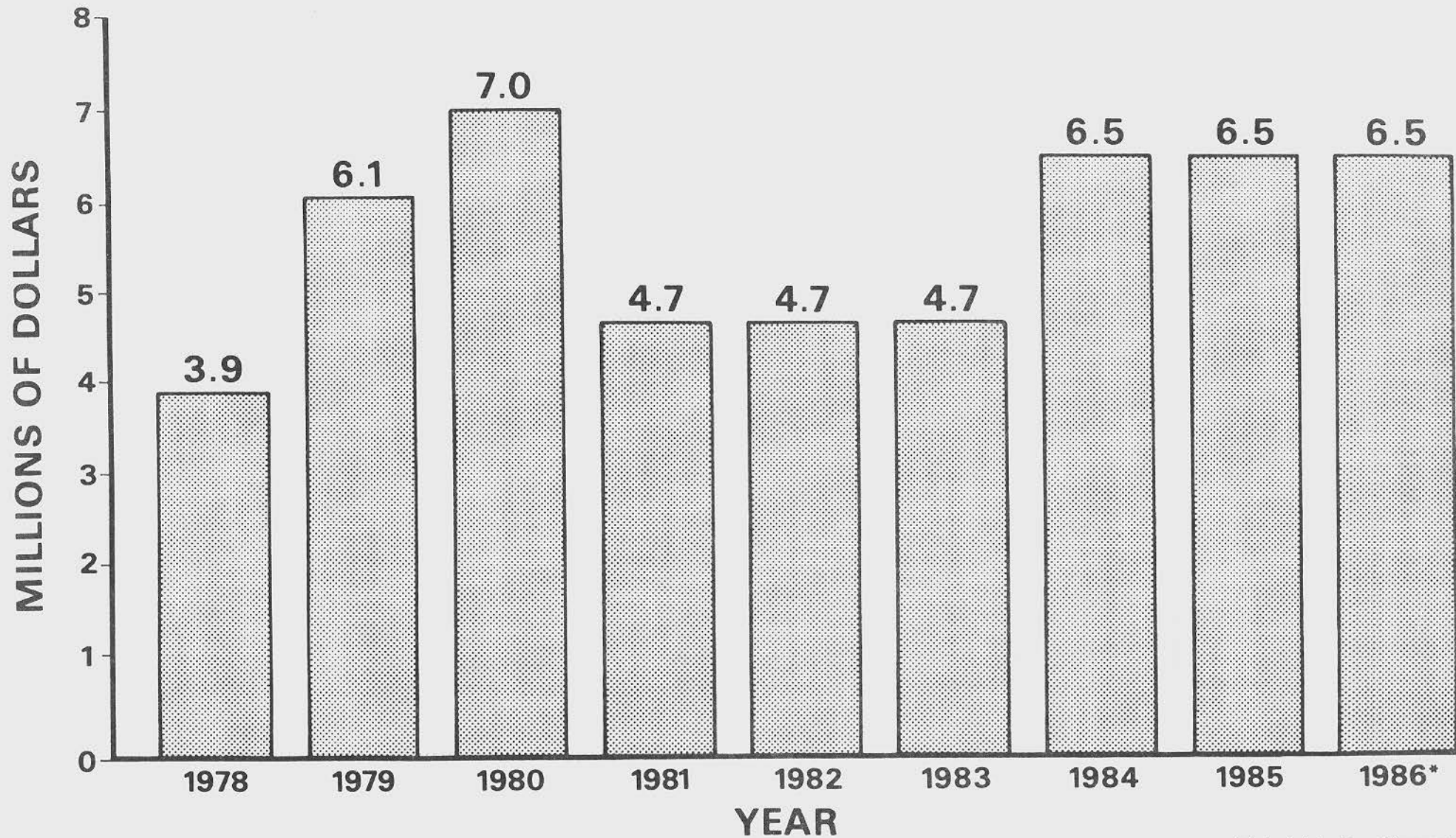


Figure 8

*Administration Request.

NIOSH APPROPRIATIONS

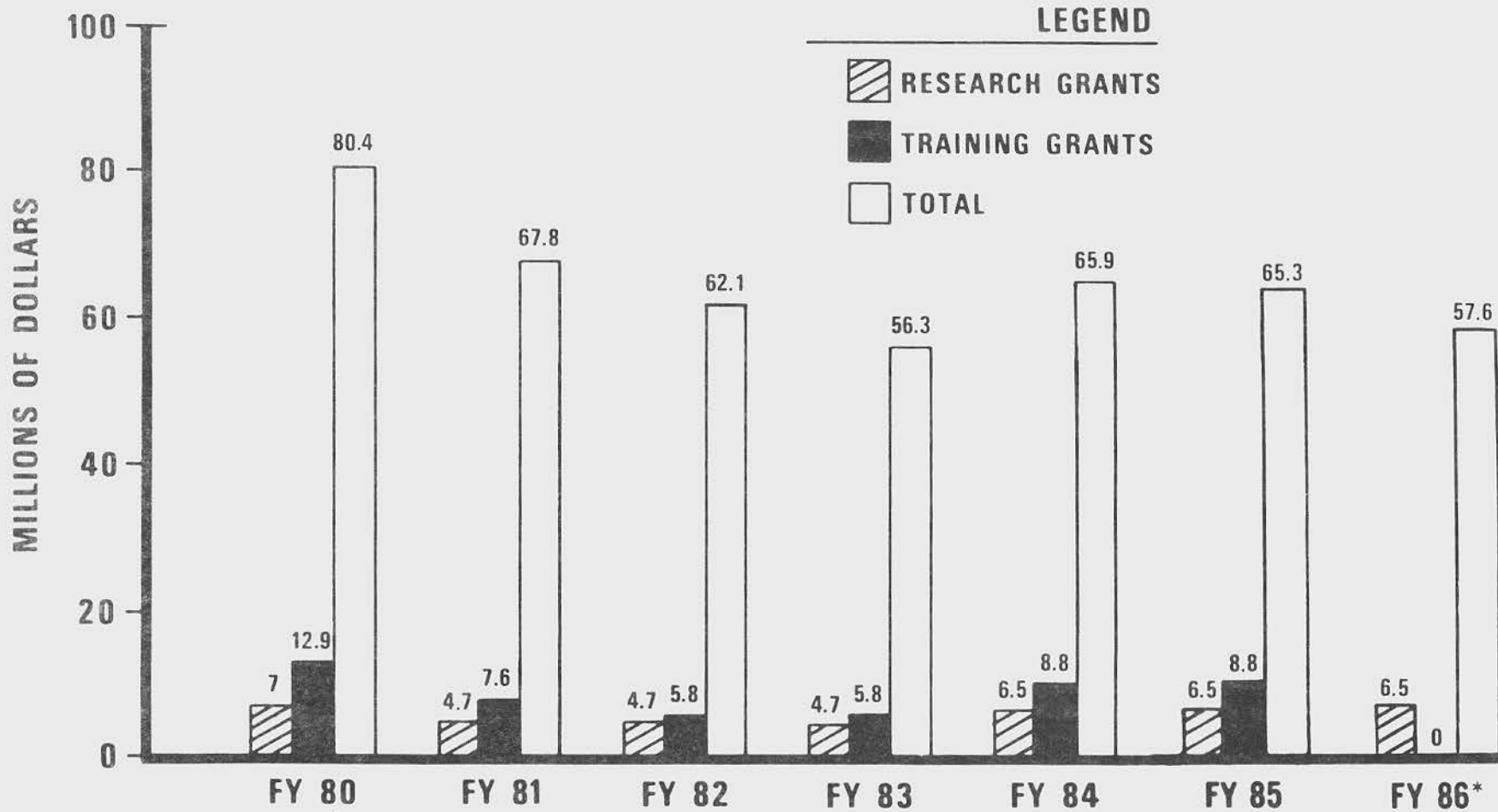


Figure 9

*President's Budget

Priorities in this regard include scientist-to-scientist exchanges with many countries, including a special concern for the needs of developing countries. NIOSH also administers a bilateral agreement with Finland to cooperate on occupational health and safety research.

Relevance of such activities is twofold:

1. NIOSH/WHO cooperation in the development of standards for identification and classification of occupational respiratory diseases provides support to U.S. Standards and Disease Prevention policies.
2. NIOSH can access, exchange, and expand data bases which are related to occupational safety and health. These data bases are used to assist research and standards development critical to preventing work-related injury or illness.

PROGRAM PLANNING

Program planning provides for control over resources and performance. The Institute has developed a project management system to evaluate variances in cost and technical performance as well as variances in project scheduling. Program planning also is based on opportunities to intervene in economic, legal, and technical processes to prevent hazards in the workplace. Policy analysis provides baseline information on these processes and permits special assessment of possible intervention targets.

ADMINISTER INSTITUTE PROGRAMS

***** INSTITUTE ADMINISTRATION *****

OFFICE OF THE DIRECTOR

1. INSTITUTE POLICY
PROJECT OFFICER: J DONALD MILLAR, M.D. (FTS-236-3771) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE MANAGEMENT AND POLICY DIRECTION FOR THE INSTITUTE.
2. SENIOR SCIENTIFIC ADVISORY STAFF
PROJECT OFFICER: ELLIOTT HARRIS (FTS-236-3773) START DT: 10/84 END DT: C
OBJECTIVE: ADVISE THE INSTITUTE DIRECTOR ON STRATEGY FOR POLICY DEVELOPMENT
ON ISSUES RELATING TO OCCUPATIONAL SAFETY AND HEALTH RESEARCH.
3. CONGRESSIONAL AND INFORMATION ACTIVITIES
PROJECT OFFICER: DIANE E DUNKIN (FTS-236-3061) START DT: 10/84 END DT: C
OBJECTIVE: CONDUCT NIOSH INFORMATION/COMMUNICATIONS PROGRAM.
4. STATE AND REGIONAL OPERATIONS--HEADQUARTERS
PROJECT OFFICER: PHILLIP W STRINE (FTS-236-3190) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE POLICY GUIDANCE AND COORDINATION TO REGIONAL OFFICE STAFF
ON PROGRAM DEVELOPMENT AND IMPLEMENTATION OF NIOSH PROGRAMS.
5. RESEARCH AND DEMONSTRATION GRANTS
PROJECT OFFICER: ROY M FLEMING (FTS-236-3343) START DT: 10/84 END DT: C
OBJECTIVE: DEVELOP GRANT PROGRAMS, REVIEW APPLICATIONS, AND MONITOR RESEARCH
AND DEMONSTRATION GRANTS IN PRIORITY AREAS OF SCIENTIFIC INVESTIGATIONS.

OFFICE OF ADMINISTRATION AND MANAGEMENT SERVICES

6. OFFICE OF THE DIRECTOR, OAMS
PROJECT OFFICER: J BRIAN DUGAN (FTS-236-3691) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE MANAGEMENT AND DIRECTION TO ALL OAMS BRANCHES.

7. NIOSH-WIDE INFORMATION AND MANAGEMENT SYSTEMS
PROJECT OFFICER: ANDREW T SUMNER (FTS-236-3895) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE LEADERSHIP AND SERVICES AS NIOSH-WIDE FOCUS FOR INFORMATION
AND MANAGEMENT SYSTEMS COORDINATION AND DEVELOPMENT.

OFFICE OF PROGRAM PLANNING AND EVALUATION

8. OFFICE OF THE DIRECTOR, OPPE
PROJECT OFFICER: MELVIN L MYERS (FTS-236-3794) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE MANAGEMENT FOR INSTITUTE PLANNING, EVALUATION, AND
INTERNATIONAL PROGRAMS.
9. HEALTH PROMOTION
PROJECT OFFICER: CHARLES A ALTHAFER (FTS-236-3794) START DT: 10/84 END DT: C
OBJECTIVE: INCORPORATE OCCUPATIONAL RISK FACTORS INTO HRAS AND USE THEM IN
DEVELOPING WORKSITE HEALTH PROMOTION PROGRAMS.

***** DIVISION ADMINISTRATION *****

DIVISION OF RESPIRATORY DISEASE STUDIES

10. DIVISION MANAGEMENT

PROJECT OFFICER: ROBERT E GLENN (FTS-923-4474)

START DT: 10/84

END DT: C

OBJECTIVE: PROVIDE MANAGEMENT AND LEADERSHIP FOR THE DIVISION OF RESPIRATORY
DISEASE STUDIES.

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

11. DIVISION MANAGEMENT

PROJECT OFFICER: BARRY L JOHNSON (FTS-684-8465)

START DT: 10/84

END DT: C

OBJECTIVE: PROVIDE MANAGEMENT AND LEADERSHIP FOR THE DIVISION OF BIOMEDICAL AND
BEHAVIORAL SCIENCE.

DIVISION OF PHYSICAL SCIENCES AND ENGINEERING

12. DIVISION MANAGEMENT

PROJECT OFFICER: WALTER M HAAG (FTS-684-4321)

START DT: 10/84

END DT: C

OBJECTIVE: PROVIDE MANAGEMENT AND LEADERSHIP FOR THE DIVISION OF PHYSICAL
SCIENCES AND ENGINEERING.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

13. DIVISION MANAGEMENT

PROJECT OFFICER: JAMES M MELIUS (FTS-684-4428)

START DT: 10/84

END DT: C

OBJECTIVE: PROVIDE MANAGEMENT AND LEADERSHIP FOR THE DIVISION OF SURVEILLANCE,
HAZARD EVALUATIONS, AND FIELD STUDIES.

DIVISION OF SAFETY RESEARCH

14. SAFETY DIVISION MANAGEMENT

PROJECT OFFICER: JOHN B MORAN (FTS-923-4595)

START DT: 10/84

END DT: C

OBJECTIVE: PROVIDE MANAGEMENT AND LEADERSHIP FOR THE DIVISION OF SAFETY RESEARCH.

DIVISION OF TRAINING AND MANPOWER DEVELOPMENT

15. PROGRAM MANAGEMENT

PROJECT OFFICER: ALAN D STEVENS (FTS-684-8221)

START DT: 10/84

END DT: C

OBJECTIVE: PROVIDE MANAGEMENT AND LEADERSHIP FOR THE DIVISION OF TRAINING
AND MANPOWER DEVELOPMENT.

DIVISION OF STANDARDS DEVELOPMENT AND TECHNOLOGY TRANSFER

16. DIVISION MANAGEMENT

PROJECT OFFICER: RICHARD A LEMEN (FTS-684-8302)

START DT: 10/70

END DT: C

OBJECTIVE: PROVIDE MANAGEMENT AND LEADERSHIP FOR THE DIVISION OF STANDARDS DEVELOPMENT
AND TECHNOLOGY TRANSFER.

N I O S H P R O J E C T S

B Y

D I V I S I O N S

DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE

The Division of Biomedical and Behavioral Science (DBBS) conducts laboratory research for the development of criteria for standards in the areas of toxicology, behavioral science, physiology, ergonomics, and the effects of physical agents. DBBS investigates new problems created by technology requiring ameliorative action, and develops medical criteria to assure that the work place is not responsible for diminished health, functional capacity, or life expectancy of workers.

DBBS plans and conducts laboratory and work site research on the psychological, behavioral, physiological, and motivational factors which reflect stress situations posed by job demands as well as those induced by chemical and/or physical agents. The division determines human tolerance limits to physical work and ability to adjust to environmental conditions as influenced by age, sex, body build, state of health, physical fitness, and psychosocial factors.

The division also conducts laboratory investigations designed to evaluate the dose effects of toxic agents, singly and in combination, on neurobehavioral functions in experimental animals, and performs work site experiments designed to define and characterize effects of toxic agents on the nervous system. Through in-depth and long-term investigations, DBBS develops information on cumulative dose-response effects. The division also develops and applies research methodology to quantify short-term and long-term alterations in the cardiopulmonary function of animals exposed to industrial chemicals. Through laboratory diagnosis of biological samples from animals and humans exposed experimentally or occupationally to toxic industrial substances, DBBS provides clinical and biochemical laboratory consultation and develops procedures for laboratory diagnosis of occupational diseases, including biological monitoring methods.

DBBS conducts laboratory and work site research on hazards from such physical agents as noise, infrasound and ultrasound, vibration, and non-ionizing and ionizing energy sources in the work place. The division develops improved procedures, instrumentation, and methodologies for the evaluation of potential occupational hazards resulting from workers' exposure to physical agents, and provides consultation for the development of health criteria and standards pertaining to physical agents as found at the work place.

DBBS is located at the Robert A. Taft Laboratory, 4676 Columbia Parkway, Cincinnati, Ohio 45226. The Division Director is Barry L. Johnson, Ph.D., telephone (513) 684-8465, FTS 684-8465.

*** DIVISION OF BIOMEDICAL AND BEHAVIORAL SCIENCE ***

DISORDERS OF REPRODUCTION

1. BEHAVIORAL TERATOLOGY OF ALCOHOL SOLVENTS
PROJECT OFFICER: B K NELSON (FTS-684-8383) START DT: 10/82 END DT: 09/87
OBJECTIVE: EVALUATE THE REPRODUCTIVE HAZARD OF ALCOHOL SOLVENTS USING STANDARD
TERATOLOGICAL TECHNIQUES AND NEUROBEHAVIORAL INDICES OF TOXICITY.
2. EPIDEMIOLOGIC STUDY OF RF HEATER OPERATORS
PROJECT OFFICER: VIRGINIA J BEHRENS (FTS-684-8281) START DT: 10/84 END DT: 03/89
OBJECTIVE: DETERMINE IF EXPOSURE TO RADIO FREQUENCY (RF) RADIATION FROM RF HEATERS
IS ASSOCIATED WITH ADVERSE REPRODUCTIVE OUTCOMES IN WOMEN WORKERS.
3. REPRODUCTIVE EFFECTS OF LOW FREQUENCY RF RADIATION IN RATS
PROJECT OFFICER: JOSEPH M LARY (FTS-684-8482) START DT: 10/83 END DT: 09/88
OBJECTIVE: DETERMINE THE REPRODUCTIVE EFFECTS ON LABORATORY ANIMALS FROM EXPOSURE
TO LOW FREQUENCY RF RADIATION.
4. BIOCHEMICAL INDICES OF MALE REPRODUCTIVE IMPAIRMENT
PROJECT OFFICER: KENNETH L CHEEVER (FTS-684-8487) START DT: 10/82 END DT: 12/85
OBJECTIVE: TO EVALUATE THE FEASIBILITY OF USING SERUM LDH-X LEVELS AS A SCREEN
FOR INDICATING PATHOLOGICAL DAMAGE TO THE TESTIS.
5. METABOLISM AND EXCRETION STUDIES ON BIS(2-METHOXYETHYL)ETHER (DIGLYME)
PROJECT OFFICER: DONALD E RICHARDS (FTS-684-8487) START DT: 10/84 END DT: 09/86
OBJECTIVE: TO CHARACTERIZE THE METABOLISM AND EXCRETION OF BIS(2-METHOXYETHYL)-
ETHER TO ELUCIDATE ITS MECHANISM OF TESTICULAR TOXICITY.
6. SEMEN ANALYSIS IN ANIMAL, LONGITUDINAL AND FIELD STUDIES
PROJECT OFFICER: STEVEN M SCHRADER (FTS-684-8357) START DT: 10/84 END DT: 09/88
OBJECTIVE: TO DEVELOP LONGITUDINAL BASELINE DATA ON THE HUMAN SEMEN PROFILE AND
TO EVALUATE OCCUPATIONAL EXPOSURE EFFECTS ON THE HUMAN SEMEN PROFILE.
7. INHALATION REPRODUCTIVE AND DEVELOPMENTAL TOXICITY TESTING
PROJECT OFFICER: BRYAN D HARDIN (FTS-684-8394) START DT: 10/84 END DT: 09/89
OBJECTIVE: DESIGN AND CONDUCT REPRODUCTIVE AND DEVELOPMENTAL TOXICITY ASSAYS FOR
SELECTED NIOSH/NTP CHEMICALS USING INHALATION AS THE ROUTE OF EXPOSURE.

8. CARDIOVASCULAR FETOTOXICITY AND FUNCTIONAL TERATOGENESIS
PROJECT OFFICER: MARK TORAASON (FTS-684-8357) START DT: 10/83 END DT: 09/86
OBJECTIVE: DEVELOP AND TEST METHODS THAT ASSESS CARDIOVASCULAR FUNCTION IN
ANIMALS EXPOSED IN UTERO TO SUSPECTED TERATOGENS.

9. PRIORITIZING CHEMICALS FOR REPRODUCTIVE TOXICITY TESTING
PROJECT OFFICER: BRYAN D HARDIN (FTS-684-8394) START DT: 10/80 END DT: 09/87
OBJECTIVE: EVALUATE SIGNIFICANT NIOSH/NTP CHEMICALS IN AN IN VIVO ASSAY AND
ESTABLISH RELATIVE PRIORITY FOR CONVENTIONAL REPRODUCTIVE TESTING.

10. EVALUATION OF DROSOPHILA FOR TERATOGEN SCREENING
PROJECT OFFICER: RONALD L SCHULER (FTS-684-8357) START DT: 10/81 END DT: 09/87
OBJECTIVE: ACCURACY DETERMINATION OF SHORT-TERM IN VITRO DROSOPHILA SCREENING
TEST FOR REPRODUCTIVE AND DEVELOPMENTAL TOXINS.

NEUROTOXIC DISORDERS

11. NEUROBEHAVIORAL EFFECTS FROM SINGLE/MIXED SPRAY PAINT AGENTS
PROJECT OFFICER: ROBERT B DICK (FTS-684-8383) START DT: 10/78 END DT: 03/87
OBJECTIVE: EVALUATE THE NEUROBEHAVIORAL EFFECTS OF ACUTE AND CHRONIC EXPOSURES TO
SPRAY PAINT AGENTS.

12. METHODOLOGIES FOR WORKSITE NEUROTOXICITY EVALUATIONS
PROJECT OFFICER: W K ANGER (FTS-684-8383) START DT: 10/83 END DT: 03/86
OBJECTIVE: DEVELOPMENT, INSTRUMENTATION, AND EVALUATION OF TESTS/TEST BATTERIES
TO SCREEN WORKER POPULATIONS FOR NEUROTOXICITY.

13. NEUROTOXICITY OF ALIPHATIC CARBON SOLVENTS
PROJECT OFFICER: JOHN M RUSSO (FTS-684-8383) START DT: 10/83 END DT: 09/86
OBJECTIVE: DETERMINE RELATIONSHIP BETWEEN STRUCTURAL CHARACTERISTICS OF CARBON
SOLVENTS AND THEIR BEHAVIORAL EFFECTS AFTER ACUTE EXPOSURES.

14. NEUROTOXICITY FROM EXPOSURE TO HEAVY METALS
PROJECT OFFICER: W K ANGER (FTS-684-8383) START DT: 10/83 END DT: 12/88
OBJECTIVE: TO EVALUATE THE RELATION OF OCCUPATIONAL HEAVY METAL EXPOSURES TO
NEUROTOXICITY IN WORKERS.

15. NEUROTOXICITY EVALUATIONS OF FUMIGATORS
PROJECT OFFICER: W K ANGER (FTS-684-8383) START DT: 10/80 END DT: 09/86
OBJECTIVE: AN EVALUATION OF THE NEUROBEHAVIORAL EFFECTS IN HUMANS OF CHRONIC
EXPOSURES TO FUMIGANTS.

16. INHALATION TOXICOLOGY RESEARCH SUPPORT
PROJECT OFFICER: AMIR KHAN (FTS-684-8356) START DT: 10/84 END DT: C
OBJECTIVE: CONDUCT EXPOSURE STUDIES FOR DBBS ANIMAL INHALATION TOXICOLOGY PROGRAM.

CONTROL SYSTEMS

17. WORKPLACE STRESS CONTROL MANUAL
PROJECT OFFICER: LAWRENCE R MURPHY (FTS-684-8293) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO DEVELOP A MANUAL ENABLING ORGANIZATIONS TO ESTABLISH WORKSITE STRESS MANAGEMENT PROGRAMS.

OCCUPATIONAL LUNG DISEASE

18. BIOMONITORING OF EXPOSURE TO COAL TAR PITCH
PROJECT OFFICER: WILLIAM P TOLOS (FTS-684-8339) START DT: 10/83 END DT: 09/86
OBJECTIVE: DEVELOP SUITABLE BIOLOGICAL MONITORING METHODS TO EVALUATE WORKERS' EXPOSURE TO COAL TAR PITCH.
19. DIAGNOSTIC AND RESEARCH PATHOLOGY
PROJECT OFFICER: JAG B LAL (FTS-684-8360) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE GROSS AND MICROSCOPIC EXAMINATION AND DIAGNOSIS AND CONSULTATIVE SERVICES FOR NIOSH PROGRAMS.
20. EVALUATION OF MESOTHELIOMA PRODUCTION BY ASBESTOS SUBSTITUTES
PROJECT OFFICER: STANLEY F PLATEK (FTS-684-8337) START DT: 10/84 END DT: 09/88
OBJECTIVE: THIS PROJECT WILL EVALUATE THE MESOTHELIOMA PRODUCTION POTENTIAL OF TWO ASBESTOS-SUBSTITUTE MATERIALS IN RATS BY INTRAPLEURAL IMPLANTATION.
21. CHRONIC INHALATION TOXICITY OF VANADIUM PENTOXIDE
PROJECT OFFICER: WILLIAM J MOORMAN (FTS-684-8275) START DT: 10/83 END DT: 09/88
OBJECTIVE: TO ASSESS CHRONIC DOSE-RESPONSE TOXICITY OF VANADIUM PENTOXIDE (CARDIAC, PULMONARY, MUTAGENIC AND CARCINOGENIC).
22. PULMONARY HYPERSENSITIVITY OF INDUSTRIAL AGENTS
PROJECT OFFICER: EDWIN A KNECHT (FTS-684-8274) START DT: 10/78 END DT: 09/87
OBJECTIVE: TO IDENTIFY AND EVALUATE OCCUPATIONAL AGENTS SUSPECTED TO BE RESPONSIBLE FOR THE INDUCTION OF OCCUPATIONAL ASTHMA.

23. PARTICULATE AND TISSUE ANALYSIS SERVICE AND RESEARCH
 PROJECT OFFICER: LLOYD E STETTLER (FTS-684-8337) START DT: 10/84 END DT: C
 OBJECTIVE: PROVIDE PARTICULATE PHYSICAL AND CHEMICAL ANALYSIS SERVICE TO NIOSH
 RESEARCH PROGRAMS.
24. FIBROGENICITY OF COAL SLAGS
 PROJECT OFFICER: LLOYD E STETTLER (FTS-684-8337) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO ASSESS THE FIBROGENIC POTENTIALS OF FOUR COAL SLAGS IN RATS BY
 INTRATRACHEAL INSTILLATION.
25. ANIMAL HUSBANDRY SERVICES
 PROJECT OFFICER: JAG B LAL (FTS-684-8360) START DT: 10/84 END DT: C
 OBJECTIVE: PROVIDE ANIMAL HUSBANDRY, VETERINARY MEDICINE AND ANIMAL CLINICAL
 DIAGNOSTIC SUPPORT FOR DBBS RESEARCH PROGRAMS.

DERMATOLOGIC CONDITIONS

26. PERCUTANEOUS ABSORPTION CHARACTERISTICS OF OCCUPATIONAL CHEMICALS
 PROJECT OFFICER: ALLAN S SUSTEN (FTS-684-8357) START DT: 10/84 END DT: 09/89
 OBJECTIVE: INVESTIGATE PERCUTANEOUS ABSORPTION OF VOLATILE CHEMICALS THROUGH
 DAMAGED SKIN; HOLD SYMPOSIUM ON DERMAL ABSORPTION OF CHEMICALS.

CARDIOVASCULAR DISEASE

27. OCCUPATIONAL CARDIAC TOXICITY
 PROJECT OFFICER: DENNIS W LYNCH (FTS-684-8274) START DT: 10/80 END DT: 06/86
 OBJECTIVE: TO IDENTIFY INDUSTRIALLY IMPORTANT CARDIOTOXIC CHEMICALS AND EVALUATE
 THEIR TOXICITY SO AS TO REDUCE THE INCIDENCE OF CARDIOVASCULAR DISEASE.

OCCUPATIONAL CANCERS (OTHER THAN LUNG)

28. DICHLOROETHANE DRUG INTERACTIONS--NCI
 PROJECT OFFICER: KENNETH L CHEEVER (FTS-684-8487) START DT: 10/80 END DT: 09/85
 OBJECTIVE: DETERMINE IF THE TOXIC INTERACTIONS BETWEEN 1,2-DIBROMOETHANE AND
 DISULFIRAM IN RATS CAN BE EXTENDED TO OTHER HALOETHANES AND DRUGS.
29. BLADDER CANCER ASSOC WITH OCCUP EXPOSURE: APPROPRIATE ANIMAL MODELS
 PROJECT OFFICER: FRANCIS B DANIEL (FTS-684-8496) START DT: 10/84 END DT: 09/86
 OBJECTIVE: EVALUATE DNA DAMAGE/REPAIR PROCESSES IN HUMAN AND LABORATORY ANIMALS
 UROTHELIA TO FACILITATE THE SELECTION OF ANIMAL MODELS.

30. BIOMONITORING FOR POPULATIONS OCCUPATIONALLY EXPOSED TO AROMATIC AMINES
 PROJECT OFFICER: FRANCIS B DANIEL (FTS-684-8496) START DT: 10/84 END DT: 09/87
 OBJECTIVE: DEVELOP BIOMONITORING TECHNIQUES FOR QUANTITATING CHEMICAL-DNA
 ADDUCTS IN WORKERS OCCUPATIONALLY EXPOSED TO AROMATIC AMINES.
31. ASSESSMENT OF COCARCINOGENIC ACTIVITY OF ASPHALT FUMES
 PROJECT OFFICER: RICHARD W NIEMEIER (FTS-684-8394) START DT: 10/82 END DT: 09/88
 OBJECTIVE: IDENTIFY ACTIVE COMPONENTS OF ASPHALT FUMES AND DEVELOP INDICATORS FOR
 ASSESSING EXPOSURE AND ULTIMATELY REDUCING THE CARCINOGENIC RISK.
32. IN VITRO TESTS FOR WORKPLACE COCARCINOGENS
 PROJECT OFFICER: JEFFREY S BOHRMAN (FTS-684-8357) START DT: 10/80 END DT: 09/88
 OBJECTIVE: IDENTIFY AND VALIDATE RAPID AND RELIABLE IN VITRO METHODS AS SCREENING
 TECHNIQUES IN THE ASSESSMENT OF WORKPLACE COCARCINOGENS.

MUSCULOSKELETAL INJURIES

33. TRAUMATOGENIC FACTORS IN OCCUPATIONAL WRIST DISORDERS
 PROJECT OFFICER: DANIEL J HABES (FTS-684 8286) START DT: 10/80 END DT: 09/86
 OBJECTIVE: CHARACTERIZE JOB TASK AND PERSONAL FACTORS IN THE DEVELOPMENT OF UPPER
 EXTREMITY MUSCULOSKELETAL DISORDERS.
34. LOWER EXTREMITY DISORDERS OF OCCUPATIONAL ORIGIN
 PROJECT OFFICER: DANIEL J HABES (FTS-684-8286) START DT: 10/83 END DT: 12/87
 OBJECTIVE: ELABORATION OF BIOMECHANICAL RISK FACTORS IN JOB TASKS POSING LOWER
 EXTREMITY MUSCULOSKELETAL PROBLEMS.
35. FATIGUE EFFECTS OF EXTENDED WORKDAYS AND WORKLOAD
 PROJECT OFFICER: MICHAEL J COLLIGAN (FTS-684-8291) START DT: 10/82 END DT: 09/86
 OBJECTIVE: DEVELOP GUIDELINES FOR FATIGUE ALLOWANCE AS A FUNCTION OF TASK
 CHARACTERISTICS AND LENGTH OF WORK PERIOD.
36. LAB STUDY OF MUSCULOSKELETAL AND PSYCHOMOTOR EFFECTS OF WHOLE-BODY VIBR.
 PROJECT OFFICER: ALAN H PURDY (FTS-684-8281) START DT: 10/83 END DT: 09/86
 OBJECTIVE: INVESTIGATE THE RELATIONSHIP OF WHOLE-BODY VIBRATION ON SPINAL
 DEFORMATION AND STRENGTH, AS WELL AS PSYCHOMOTOR DECREMENT.
37. FIELD MEASUREMENTS OF WORKERS EXPOSED TO WHOLE-BODY VIBRATION
 PROJECT OFFICER: THOMAS E DOYLE (FTS-684-8282) START DT: 10/83 END DT: 09/86
 OBJECTIVE: CHARACTERIZE ENVIRONMENTAL WHOLE-BODY VIBRATION AND NOISE IMPINGING ON
 VEHICULAR OPERATORS.

38. WORKSITE STUDY OF ERGONOMIC ASPECTS OF INDUSTRIAL MICROSCOPE USE
PROJECT OFFICER: CRAIG L ANDERSON (FTS-684-8383) START DT: 10/84 END DT: 09/86
OBJECTIVE: IDENTIFY POTENTIAL MUSCULOSKELETAL AND VISUAL HAZARDS OF INDUSTRIAL
MICROSCOPE USE, AND DEFINE AN ERGONOMIC BASIS FOR CONTROL MEASURES.

39. APPRAISAL/EXPANSION OF MANUAL MATERIAL HANDLING TASK LIMITS
PROJECT OFFICER: DONALD W BADGER (FTS-684-8286) START DT: 10/84 END DT: 09/87
OBJECTIVE: EVALUATION OF OVEREXERTION RISK IN OTHER THAN SAGITTAL LIFTING TASKS;
RECOMMEND PERMISSIBLE LIMITS FOR THESE ACTIVITIES.

NOISE-INDUCED LOSS OF HEARING

40. OCCUPATIONAL IMPULSE NOISE: EXPOSURE, EFFECT, AND CONTROL
PROJECT OFFICER: JOHN ERDREICH (FTS-684-8281) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO DETERMINE HEALTH EFFECTS OF IMPULSE NOISE AND METHODS FOR EXPOSURE
CONTROL.

41. MONITORING OF INDUSTRIAL HEARING LOSS
PROJECT OFFICER: JOHN ERDREICH (FTS-684-8281) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO ESTABLISH BASELINE DATA FOR HEARING LOSS AND TO ESTABLISH
SURVEILLANCE OF SAME.

PSYCHOLOGIC DISORDERS

42. OCCUPATIONAL INCIDENCE OF STRESS DISORDERS
PROJECT OFFICER: LAWRENCE R MURPHY (FTS-684-8293) START DT: 10/83 END DT: 09/87
OBJECTIVE: TO RANK ORDER OCCUPATIONS ACCORDING TO THE INCIDENCE OF STRESS
DISORDERS USING NATIONAL HEALTH DATA BASES.

43. STRESS IN INFORMATION PROCESSING
PROJECT OFFICER: JOSEPH J HURRELL (FTS-684-8386) START DT: 10/81 END DT: 06/86
OBJECTIVE: TO OFFER CONCEPTS OF COGNITIVE TASK DEMAND CAPABLE OF BEING MEASURED
AND EVALUATED IN TERMS OF STRESS/STRAIN OUTCOMES.

44. REDUCING VDT STRESS BY ERGONOMIC MEASURES
PROJECT OFFICER: ROGER R ROSA (FTS-684-8386) START DT: 10/80 END DT: 09/85
OBJECTIVE: APPLICATION OF ERGONOMIC PRINCIPLES TO VDT TASKS SO AS TO CONTROL
VISUAL AND MUSCULOSKELETAL STRAIN.

45. METHODS FOR RATING JOB STRESS/STRAIN
 PROJECT OFFICER: JOSEPH J HURRELL (FTS-684-8386) START DT: 10/83 END DT: 03/88
 OBJECTIVE: EVALUATE CURRENT METHODS FOR MEASURING STRESS/STRAIN (PSYCHOLOGICAL,
 BEHAVIORAL, PHYSIOLOGICAL) AND DEVELOP NEW METHODS IF NECESSARY.
46. JOB STRESS IN SECRETARIAL/CLERICAL WORKERS
 PROJECT OFFICER: BARBARA G COHEN (FTS-684-8386) START DT: 10/80 END DT: 09/86
 OBJECTIVE: TO EXPLORE AND DEFINE SOURCES OF JOB STRESS IN CLERICAL TYPE
 OCCUPATIONS THAT AFFECT THE HEALTH AND WELL-BEING OF OFFICE WORKERS.
47. JOB STRESS IN VIDEO DISPLAY TERMINAL (VDT) WORK
 PROJECT OFFICER: LAWRENCE M SCHLEIFER (FTS-684-8293) START DT: 10/78 END DT: 10/87
 OBJECTIVE: IDENTIFY AND EVALUATE JOB TASK AND ERGONOMIC FACTORS THAT ARE RELATED
 TO PSYCHOLOGICAL AND PHYSICAL STRAIN IN VDT WORK.

DIVISION ADMINISTRATION

48. DIVISION MANAGEMENT
 PROJECT OFFICER: BARRY L JOHNSON (FTS-684-8465) START DT: 10/84 END DT: C
 OBJECTIVE: MANAGEMENT OF DBBS.
49. CONSULTATION AND BRANCH ADMINISTRATION
 PROJECT OFFICER: LLOYD E STETTLER (FTS-684-8433) START DT: 10/84 END DT: C
 OBJECTIVE: PROVIDE SUPERVISION AND GUIDANCE TO TECHNICAL SUPPORT BRANCH PROGRAMS.
50. TOXICOLOGY TECHNICAL ASSISTANCE AND CONSULTATION
 PROJECT OFFICER: TRENT R LEWIS (FTS-684-8392) START DT: 10/84 END DT: C
 OBJECTIVE: PROVIDE TECHNICAL TOXICOLOGIC ASSISTANCE AND CONSULTATION TO NIOSH,
 FEDERAL, STATE AND LOCAL GOVERNMENTAL AGENCIES AND THE PRIVATE SECTOR.

INSTRUMENTS/METHODS DEVELOPMENT

51. METHOD TO PREDICT HEAT EFFECTS IN MINERS
 PROJECT OFFICER: FRANCIS N DUKES-DOBOS (FTS-684-8469) START DT: 10/79 END DT: 09/85
 OBJECTIVE: TO DEVELOP PERSONAL MONITORING METHOD FOR EARLY DETECTION OF EXCESSIVE
 HEAT EXPOSURE OF UNDERGROUND MINES.

HEALTH HAZARD EVALUATIONS AND TECHNICAL ASSISTANCE

52. BEHAVIORAL-ERGONOMIC EVALUATIONS RE HHEs, TAs, CTAs
PROJECT OFFICER: ALEXANDER L COHEN (FTS-684-8291) START DT: 10/80 END DT: C
OBJECTIVE: OFFER EVALUATIONS OF JOB RELATED MUSCULOSKELETAL, NEUROTOXIC, STRESS
PROBLEMS AND ERGONOMIC INPUTS INTO CONTROL TECHNOLOGY ASSESSMENTS.
53. BRANCH ADMINISTRATION AND CONSULTATION
PROJECT OFFICER: ALEXANDER L COHEN (FTS-684-8291) START DT: 10/84 END DT: C
OBJECTIVE: ADVISE ON JOB RELATED NEUROTOXICITY, STRESS, ERGONOMICS, AND HEALTH
MOTIVATION ISSUES AND MANAGE STAFFING/PROGRAMMING NEEDS.
54. CLINICAL CHEMISTRY AND BIOLOGICAL MONITORING CONSULTATION AND SUPPORT
PROJECT OFFICER: ANTHONY W SMALLWOOD (FTS-684-8339) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE CLINICAL, BIOCHEMICAL, AND BIOLOGICAL MONITORING DATA FOR
HHEs AND RESEARCH PROJECTS.
55. HEALTH HAZARD EVALUATIONS OF PHYSICAL AGENTS
PROJECT OFFICER: WILLIAM E MURRAY (FTS-684-8482) START DT: 10/84 END DT: C
OBJECTIVE: TO RESPOND TO THOSE HEALTH HAZARD EVALUATION REQUESTS WHICH INVOLVE
POTENTIAL HAZARDS FROM PHYSICAL AGENTS.
56. PAEB BRANCH ADMINISTRATION AND CONSULTATION
PROJECT OFFICER: JAMES M SMITH (FTS-684-8477) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE ADMINISTRATIVE ASSISTANCE AND SUPPORT IN FIELDS OF RADIATION,
VIBRATION, BIOACOUSTICS AND OTHER JOB RELATED PROBLEMS.
57. COMPARATIVE INHALATION TOXICITY OF LEAD OXIDE AND LEAD SULFIDE
PROJECT OFFICER: DENNIS W LYNCH (FTS-684-2874) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO DETERMINE AND COMPARE THE ORGAN SYSTEM TOXICITIES OF INHALED LEAD
OXIDE AND LEAD SULFIDE.
58. BIOLOGICAL MONITORING METHODS DEVELOPMENT AND EVALUATION
PROJECT OFFICER: LARRY K LOWRY (FTS-684-8338) START DT: 10/84 END DT: C
OBJECTIVE: DEVELOP BIOLOGICAL MONITORING METHODS AND EVALUATE THEIR USEFULNESS IN
ASSESSING ANIMAL AND HUMAN EXPOSURES.

DIVISION OF PHYSICAL SCIENCES AND ENGINEERING

The Division of Physical Sciences and Engineering (DPSE) conducts worksite and laboratory research to develop procedures and equipment for the control and measurement of occupational health hazards. It also operates a quality control reference program for industrial hygiene laboratories.

The aim of the division's control technology program is to prevent occupational diseases and injuries by assisting employers in better design and operation of the workplace. This work involves identification, evaluation and transfer of effective engineering controls used in a variety of processes and industries. It also provides engineering expertise in formulating effective workplace standards.

DPSE conducts research to establish performance requirements for direct reading, area, and personal instrumentation used in the evaluation and prevention of exposures to hazardous levels of chemical and physical agents. The division also provides consultation for the development of criteria and standards on monitoring strategies, instrumentation, and controls.

The research program develops and improves methods for analysis of toxic and carcinogenic substances found in the workplace. DPSE provides consultation in analytical chemistry to all elements of NIOSH and to other government agencies, recommending appropriate sampling and analytical methods.

The Proficiency Analytical Testing (PAT) program ensures quality control. The division provides reference samples to both public and private industrial hygiene laboratories, determines the analytical competence of participating laboratories, and assists the laboratories in improving analytical performance. The division also encourages and supports development and promulgation of national guidelines for accreditation of industrial hygiene laboratory facilities; selects and develops standard reference materials for use in the measurement of industrial hygiene hazards, and provides quality assurance in the analysis of the Institute's laboratory and field programs, and contract laboratories.

DPSE provides analytical chemistry support to the Institute's laboratory research and field investigation programs including routine measurement of samples by established methods, special measurement of complex samples, and short-term development of methods. This analytical support involves the use of state-of-the-art analytical instrumentation such as high resolution gas chromatography, gas chromatography-mass spectrometry, high performance liquid and ion chromatography, and Fourier Transform Infrared Spectroscopy (FTIR).

The Division of Physical Sciences and Engineering is located at 5555 Ridge Avenue, Cincinnati, Ohio 45226. The Division Director is Walter M. Haag, telephone (513) 684-4321, FTS 684-4321.

*** DIVISION OF PHYSICAL SCIENCES AND ENGINEERING ***

HEALTH HAZARD EVALUATIONS AND TECHNICAL ASSISTANCE

1. IN-RESPIRATOR MASK MONITORING METHODS

PROJECT OFFICER: DAVID J HUEBENER (FTS-684-4266)

START DT: 10/83

END DT: 09/86

OBJECTIVE: TO DEMONSTRATE THE EFFICACY OF IN-RESPIRATOR MASK MONITORING FOR INPUT TO PERFORMANCE STANDARDS FOR RESPIRATORS.

CONTROL SYSTEMS

2. APPLIED CONTROL TECHNOLOGY STUDIES

PROJECT OFFICER: PAUL E CAPLAN (FTS-684-4221)

START DT: 10/80

END DT: C

OBJECTIVE: TO SUPPORT CURRENT PROJECTS, DEVELOP NEW PROJECTS, AND COORDINATE WITHIN AND OUTSIDE THE INSTITUTE.

3. CTA FOR SOLID MATERIALS HANDLING

PROJECT OFFICER: WILLIAM N MCKINNERY (FTS-684-4221)

START DT: 10/82

END DT: 06/86

OBJECTIVE: TO IDENTIFY, EVALUATE, AND DISSEMINATE CONTROLS USED TO PROTECT WORKERS FROM DUST EXPOSURES IN SOLID MATERIALS HANDLING OPERATIONS.

4. CONTROL TECHNOLOGY ASSESSMENT OF ENZYME FERMENTATION PROCESSES

PROJECT OFFICER: KENNETH F MARTINEZ (FTS-684-4295)

START DT: 10/82

END DT: 03/86

OBJECTIVE: TO DOCUMENT EFFECTIVE CONTROL TECHNIQUES FOR POTENTIAL EXPOSURES TO VIABLE AEROSOLS AND PRODUCTS OF ENZYME FERMENTATION PROCESSES.

5. CONTROL TECHNOLOGY--ETHYLENE OXIDE IN HOSPITALS

PROJECT OFFICER: VINCENT D MORTIMER (FTS-684-4283)

START DT: 10/83

END DT: 09/86

OBJECTIVE: DOCUMENT AND EVALUATE CONTROL SYSTEMS WHICH MINIMIZE EXPOSURE TO ETHYLENE OXIDE USED FOR STERILIZING HEAT SENSITIVE EQUIPMENT.

6. CONTROL MONITORING SYSTEMS

PROJECT OFFICER: JEROME P SMITH (FTS-684-4292)

START DT: 10/83

END DT: 09/85

OBJECTIVE: TO REDUCE OCCUPATIONAL EXPOSURE BY PROVIDING INFORMATION CONCERNING TWO TYPES OF MONITORING TECHNIQUES FOR GAS PHASE CONTAMINANTS.

7. DEVELOPMENT OF NEW CONTROL METHODS

PROJECT OFFICER: KEITH G CROUCH (FTS-684-4255)

START DT: 10/83

END DT: 09/86

OBJECTIVE: TO INVESTIGATE THE APPLICABILITY AND IMPROVE INNOVATIVE CONTROL METHODS WHICH ARE NOT CURRENTLY IN GENERAL USE.

8. DEVELOPMENT OF PUSH-PULL VENTILATION TECHNIQUES
 PROJECT OFFICER: VLADIMIR HAMPL (FTS-684-4343) START DT: 10/82 END DT: 09/85
 OBJECTIVE: DETERMINE AND DEMONSTRATE THE EFFECTIVENESS OF PUSH-PULL VENTILATION
 IN CONTROLLING WORKPLACE EXPOSURE.
9. FEASIBILITY STUDY: SOLID--LIQUID SEPARATION AND DRYING
 PROJECT OFFICER: PHILLIP A FROEHLICH (FTS-684-4221) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO DETERMINE THE FEASIBILITY OF INDEPTH STUDIES OF HAZARD CONTROLS
 USED DURING THE LIQUID-SOLID SEPARATION AND DRYING OF CHEMICALS.
10. ASBESTOS REMOVAL CONTROL TECHNOLOGY ASSESSMENT
 PROJECT OFFICER: BRUCE A HOLLETT (FTS-684-4297) START DT: 10/84 END DT: 09/87
 OBJECTIVE: DOCUMENT AND EVALUATE EFFECTIVE ASBESTOS REMOVAL CONTROL METHODS.
11. DEVELOPMENT OF EXHAUST HOOD DESIGN CRITERIA
 PROJECT OFFICER: MATTHEW K KLEIN (FTS-684-4291) START DT: 10/84 END DT: 09/85
 OBJECTIVE: THE PROJECT OBJECTIVE IS TO UPDATE AND DEVELOP THE DESIGN CRITERIA FOR
 EXHAUST HOODS TO IMPROVE THE CONTROL OF THE WORKPLACE ENVIRONMENT.
12. DEVELOPMENT OF DIRECT READING MONITORING METHODS
 PROJECT OFFICER: GUY E BURROUGHS (FTS-684-4432) START DT: 10/82 END DT: 09/86
 OBJECTIVE: TO DEVELOP AND EVALUATE DIRECT-READING METHODS TO REDUCE ANALYTICAL
 COSTS AND TURNAROUND TIME.

OCCUPATIONAL LUNG DISEASE

13. QUALITY ASSURANCE--EXTERNAL
 PROJECT OFFICER: MARTIN T ABELL (FTS-684-4266) START DT: 10/83 END DT: C
 OBJECTIVE: A CONTINUING PROGRAM TO ENSURE IMPROVED ACCURACY OF INDUSTRIAL HYGIENE
 MEASUREMENTS AND RESULTING DATA BEING GENERATED IN THE UNITED STATES.
14. IMPROVED METHOD FOR SAMPLING AND ANALYSIS OF SILICA
 PROJECT OFFICER: THOMAS P CARSEY (FTS-684-4272) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO DEVELOP A NEW OR IMPROVED METHOD FOR SAMPLING AND ANALYSIS OF
 SILICA.

OCCUPATIONAL CANCERS (OTHER THAN LUNG)

15. CHEMICAL CHARACTERIZATION OF ROOFING ASPHALT FUMES
PROJECT OFFICER: ROBERT A LUNSFORD (FTS-684-4258) START DT: 01/83 END DT: 03/85
OBJECTIVE: IDENTIFY ORGANIC COMPOUNDS IN PETROLEUM ASPHALT FUMES IN SUPPORT OF
OTHER PROJECTS ADDRESSING THE ETIOLOGY OF ITS CARCINOGENICITY.

SAMPLING/ANALYSIS

16. QUALITY ASSURANCE OF ANALYTICAL MEASUREMENTS
PROJECT OFFICER: DAVID L SMITH (FTS-684-4215) START DT: 10/84 END DT: C
OBJECTIVE: ENSURES THE RELIABILITY OF ALL DATA GENERATED BY IN-HOUSE AND CONTRACT
ANALYTICAL GROUPS.
17. HHE ANALYTICAL SUPPORT
PROJECT OFFICER: ARDITH A GROTE (FTS-684-4215) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDES TIMELY ANALYTICAL SERVICES TO THE HHE PROGRAM BY ASSURING
RAPID TURNAROUND OF REQUESTS FOR SAMPLE ANALYSES AND METHOD DEVELOPMENT.
18. MINING AND RESPIRATORY DISEASE ANALYTICAL SUPPORT
PROJECT OFFICER: MARILYN HAWKINS (FTS-684-4220) START DT: 10/84 END DT: C
OBJECTIVE: THIS PROJECT WILL PROVIDE ANALYTICAL SUPPORT TO ENERGY, RESEARCH,
RESPIRATORY DISEASE STUDIES, AND SAFETY RESEARCH.
19. SAMPLING AND ANALYSIS FOR ALDEHYDES
PROJECT OFFICER: EUGENE R KENNEDY (FTS-684-4259) START DT: 10/82 END DT: 09/85
OBJECTIVE: EXTEND SAMPLING AND ANALYTICAL TECHNIQUE FOR ACROLEIN TO FURFURAL AND
GLUTARALDEHYDE AND ALSO ADAPT IT FOR DIFFUSIVE SAMPLING.
20. DEVELOPMENT OF PERSONAL MONITORING METHODS FOR AMINES
PROJECT OFFICER: PAULA FEY O'CONNOR (FTS-684-4234) START DT: 05/83 END DT: 05/86
OBJECTIVE: DEVELOPMENT OF AN AIR MONITORING METHOD FOR ALIPHATIC AMINES USING A
REACTIVE SORBENT FOR SAMPLING AND ION CHROMATOGRAPHY FOR ANALYSIS.
21. ANALYSIS OF EXHALED BREATH
PROJECT OFFICER: ROBERT A GLASER (FTS-684-4259) START DT: 01/83 END DT: 06/85
OBJECTIVE: TO DEVELOP A SOLID SORBENT SAMPLER FOR DIRECT COLLECTION OF EXHALED
BREATH SAMPLES.

22. DEVELOPMENT OF ALTERNATIVE SAMPLER FOR ISOCYANATES
 PROJECT OFFICER: MARTHA J SEYMOUR (FTS-684-4257) START DT: 10/82 END DT: 12/85
 OBJECTIVE: DEVELOPMENT OF AN AIR SAMPLING METHOD FOR ISOCYANATES WHICH WOULD USE
 A STABLE DERIVATIZING AGENT AND ELIMINATE THE NEED FOR IMPINGERS.
23. ANALYTICAL METHOD FOR TOTAL HYDROCARBONS ON CHARCOAL
 PROJECT OFFICER: ROBERT A LUNSFORD (FTS-684-4258) START DT: 10/82 END DT: 09/85
 OBJECTIVE: DEVELOP AN IMPROVED METHOD FOR ANALYZING CHARCOAL-TUBE SAMPLES FOR
 TOTAL HYDROCARBONS.
24. DEVELOPMENT OF X-RAY DIFFRACTION ANALYTICAL METHODS
 PROJECT OFFICER: THOMAS P CARSEY (FTS-684-4272) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO DEVELOP SAMPLING/ANALYTICAL METHODS FOR CHROMIUM (VI) COMPOUNDS.
25. SPECIALIZED GC/MS ANALYTICAL SERVICES
 PROJECT OFFICER: CHARLES V COOPER (FTS-684-4258) START DT: 10/82 END DT: C
 OBJECTIVE: PROVIDE CONTINUING SPECIALIZED GAS CHROMATOGRAPHY/MASS SPECTROMETRY
 SUPPORT.
26. REVISION OF NIOSH MANUAL OF ANALYTICAL METHODS
 PROJECT OFFICER: PETER M ELLER (FTS-684-4323) START DT: 10/82 END DT: C
 OBJECTIVE: REVISE THE SEVEN VOLUMES OF THE SECOND EDITION. ADD NEW DATA AND
 METHODS, ELIMINATE REDUNDANCY, REDUCE SIZE BY 50%, PROVIDE FOR UPDATES.
27. MAINTENANCE AND CALIBRATION
 PROJECT OFFICER: JENSEN H GROFF (FTS-684-4373) START DT: 10/82 END DT: C
 OBJECTIVE: A PROGRAM TO REPAIR, CALIBRATE AND IMPROVE UTILIZATION OF FIELD
 SAMPLING EQUIPMENT AND DIRECT READING INSTRUMENTS.
28. COMPREHENSIVE ANALYTICAL CHEMISTRY SERVICES
 PROJECT OFFICER: DONALD D DOLLBERG (FTS-684-4262) START DT: 10/83 END DT: 09/87
 OBJECTIVE: PROVIDE TECHNICAL MANAGEMENT OF ANALYTICAL CHEMISTRY SERVICES TO
 INSTITUTE RESEARCH.
29. ANALYTICAL SUPPORT TO DBBS RESEARCH AND DSHEFS INDUSTRYWIDE STUDIES
 PROJECT OFFICER: BARRY R BELINKY (FTS-684-4220) START DT: 10/83 END DT: C
 OBJECTIVE: PROVIDES ANALYTICAL CHEMISTRY SUPPORT TO DBBS AND IWSB, DSHEFS, WITH
 PRIORITY SUPPORT TO ALL NIOSH GROUPS PROVIDED VIA CONTRACT.

30. ANALYTICAL SUPPORT TO DPSE RESEARCH
 PROJECT OFFICER: GANGADHAR CHOUDHARY (FTS-684-4217) START DT: 10/84 END DT: C
 OBJECTIVE: TO PROVIDE ANALYTICAL CHEMISTRY SUPPORT TO CONTROL TECHNOLOGY
 ASSESSMENT AND DPSE RESEARCH ACTIVITIES.
31. MONITORING RESEARCH SECTION SUPPORT FOR METHOD MANUAL REVISION
 PROJECT OFFICER: MARY L WOEBKENBERG (FTS-684-4266) START DT: 10/83 END DT: 09/85
 OBJECTIVE: TO PROVIDE A METHODS MANUAL FORMAT FOR DIRECT-READING INSTRUMENT
 METHODS; TO PROVIDE INSTRUMENT WRITE-UPS FOR PEDAGOGIC APPLICATIONS.
32. ANALYTICAL SUPPORT FOR HAZARDOUS WASTE ACTIVITY
 PROJECT OFFICER: CHARLES L GERACI (FTS-684-4219) START DT: 10/84 END DT: C
 OBJECTIVE: PROVIDE RAPID ANALYSIS OF SAMPLES AT SITE AND INHOUSE (TASK I)
 DEVELOP INHOUSE ANALYTICAL CAPABILITY FOR CHLORINATED DIOXINS (TASK II).

DIVISION ADMINISTRATION

33. ADMINISTRATIVE SUPPORT FOR DPSE RESEARCH
 PROJECT OFFICER: WALTER M HAAG (FTS-684-4321) START DT: 10/84 END DT: 09/85
 OBJECTIVE: PROVIDE LEADERSHIP TO DEVELOP AND ACCOMPLISH DIVISION PROGRAM IN
 SUPPORT OF NIOSH GOALS.
34. STATISTICAL SUPPORT FOR DPSE RESEARCH
 PROJECT OFFICER: STANLEY A SHULMAN (FTS-684-4325) START DT: 10/85 END DT: 09/86
 OBJECTIVE: TO DESIGN EXPERIMENTS AND ANALYZE DATA FROM EXPERIMENTS AND SURVEYS.

INSTRUMENTS/METHODS DEVELOPMENT

35. ANALYTICAL METHODS FOR ORGANIC COMPOUNDS
 PROJECT OFFICER: ALEXANDER W TEASS (FTS-684-4233) START DT: 10/82 END DT: C
 OBJECTIVE: DEVELOPMENT OF ANALYTICAL METHODS FOR ORGANIC COMPOUNDS IN AIR AND
 OTHER MATRICES OF INDUSTRIAL-HYGIENE INTEREST.
36. HF AND CYANIDE S/A METHOD DEVELOPMENT (ION CHROMATOGRAPHY)
 PROJECT OFFICER: MARY E CASSINELLI (FTS-684-4273) START DT: 10/82 END DT: 06/85
 OBJECTIVE: DEVELOP IMPROVED SAMPLING AND ANALYTICAL METHODS FOR HF, HCN AND
 CYANIDE.

37. ANALYTICAL METHODS FOR ASBESTOS FIBERS
PROJECT OFFICER: PAUL A BARON (FTS-684-4266) START DT: 10/84 END DT: 09/88
OBJECTIVE: DEVELOP NEW OR IMPROVED SAMPLING AND ANALYTICAL METHODS FOR MONITORING
ASBESTOS FIBERS.
38. GAS AND VAPOR MEASUREMENT TECHNIQUES
PROJECT OFFICER: HARLEY V PILTINGSRUD (FTS-684-4441) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO DEVELOP NEW INSTRUMENTS AND METHODS FOR DIRECT, ON-SITE ANALYSIS OF
ENVIRONMENTAL CONTAMINANTS AND TO EVALUATE PERSONAL SAMPLING PUMPS.

DIVISION OF RESPIRATORY DISEASE STUDIES

The Division of Respiratory Disease Studies (DRDS) is the Institute focal point for clinical and epidemiological research on occupational respiratory diseases. The division provides legislatively mandated medical and autopsy services and conducts medical research to fulfill the Institute's responsibilities under the Federal Mine Safety and Health Act of 1977.

The division conducts field studies of occupational respiratory diseases, and designs and interprets cross-sectional and prospective morbidity and mortality studies of occupational respiratory disease. Field studies are conducted at mines, mills, and other industrial plants on the occurrence of occupational respiratory diseases among workers at those installations. The division uses epidemiological techniques, including studies of morbidity and mortality, to detect common characteristics related to occupational respiratory diseases.

To formulate and implement programs which will identify factors involved in the early detection and differential rates of susceptibility to occupational respiratory disease, DRDS conducts cell biology research to determine the role of microorganisms and environmental exposure in occupational respiratory disease. The division also provides autopsy evaluations and a pathology research program. Research is conducted on immunological mechanisms and cell physiology to elucidate the effects of environmental exposure associated with occupational respiratory diseases.

DRDS provides for planning, coordinating, and processing of the medical examinations mandated under the Federal Mine Safety and Health Amendments Act of 1977, and operates a certification program for medical facilities and physicians who participate in the examination program. DRDS also evaluates and approves employer programs for the examination of employees in accordance with published regulations, and arranges for the examination of employees who work at locations not having an approved examination program. The division also conducts the National Coal Workers Autopsy Program and performs research into the post-mortem identification and quantification of occupational respiratory exposures.

DRDS is located at 944 Chestnut Ridge Road, Morgantown, West Virginia 26505. The Division Director is Mr. Robert E. Glenn, telephone (291) 923-4474, FTS 923-4474.

*** DIVISION OF RESPIRATORY DISEASE STUDIES ***

SURVEILLANCE

1. COMPUTER SUPPORT
PROJECT OFFICER: LARRY F BOYCE (FTS-923-4306) START DT: 08/70 END DT: C
OBJECTIVE: PROVIDE DATA PROCESSING SUPPORT TO DRDS.
2. INCREASING OF PARTICIPATION RATES FOR NATIONAL STUDY OF COAL MINERS
PROJECT OFFICER: ROBERT W WHEELER (FTS-923-4474) START DT: 10/84 END DT: 09/86
OBJECTIVE: TO TAKE ACTION TO REVERSE THE CONTINUAL DECLINE IN THE RATES OF MINER PARTICIPATION IN THE NATIONAL STUDY OF COALWORKERS' PNEUMOCONIOSIS.
3. SURVEILLANCE SYSTEM FOR OCCUPATIONAL RESPIRATORY DISEASE
PROJECT OFFICER: THOMAS B RICHARDS (FTS-923-4223) START DT: 09/86 END DT: 09/86
OBJECTIVE: TO DEVELOP A SURVEILLANCE SYSTEM FOR OCCUPATIONAL RESPIRATORY DISEASE.
4. NATIONAL OCCUPATIONAL HEALTH SURVEY OF MINING
PROJECT OFFICER: WALLACE G CARR (FTS-923-4496) START DT: 10/82 END DT: 12/90
OBJECTIVE: TO DESCRIBE OCCUPATIONAL HEALTH PROGRAMS AND POTENTIAL EXPOSURES IN THE MINING INDUSTRY AS REQUESTED BY MSHA.
5. MINING ENVIRONMENTAL DATA ANALYSIS LIBRARY (MEDAL)
PROJECT OFFICER: ALWIN L DIEFFENBACH (FTS-923-4496) START DT: 10/81 END DT: C
OBJECTIVE: TO MAKE HISTORICAL ENVIRONMENTAL DATA AVAILABLE TO NIOSH RESEARCH PROJECTS.

RESPIRATORS

6. EFFECTS OF RESPIRATOR USE IN THE WORKPLACE: FITNESS GUIDELINES
PROJECT OFFICER: THOMAS K HODOUS (FTS-923-4755) START DT: 10/81 END DT: 12/86
OBJECTIVE: TO INVESTIGATE RESPONSES TO RESPIRATOR WEAR UNDER STRENUOUS CONDITIONS AND DEVELOP FITNESS GUIDELINES.

OCCUPATIONAL LUNG DISEASE

7. MORBIDITY/MORTALITY STUDY OF INDUSTRIAL SAND INDUSTRY
PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/83 END DT: 09/86
OBJECTIVE: DETERMINE THE DOSE-RESPONSE RELATION FOR SILICOSIS AND CAUSE-SPECIFIC MORTALITY IN THE INDUSTRIAL SAND INDUSTRY.

8. ENVIRONMENTAL/MORBIDITY/MORTALITY STUDY OF VERMICULITE WORKERS
 PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/83 END DT: 09/85
 OBJECTIVE: TO ASSESS EFFECTS OF VERMICULITE AND TREMOLITE ASBESTOS ON MORBIDITY
 AND MORTALITY AND TO ESTIMATE THE DOSE-RESPONSE ASSOCIATION.

9. MORBIDITY IH STUDY ANTHRACITE SURFACE MINERS/BITUMINOUS HIGH. DRILLERS
 PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/83 END DT: 09/88
 OBJECTIVE: TO ASSESS PREVALENCE AND INCIDENCE OF PNEUMOCONIOSIS IN THE ANTHRACITE
 SURFACE COAL MINE INDUSTRY IN RELATION TO COAL MINE DUST EXPOSURE.

10. MORTALITY STUDY OF CEMENT WORKERS
 PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/79 END DT: 12/85
 OBJECTIVE: TO ASSESS RISK OF PREMATURE DEATH AMONG CEMENT PLANT WORKERS AND THEIR
 CAUSE SPECIFIC MORTALITY.

11. ANALYSIS OF RECEIVING CENTER DATA
 PROJECT OFFICER: ROCHELLE B ALTHOUSE (FTS-923-4476) START DT: 10/83 END DT: 03/87
 OBJECTIVE: TO ASSESS THE EFFECTIVENESS OF THE 2 MG DUST STANDARD AND DETERMINE
 SUCCESS OF TRANSFER OPTION PROGRAM.

12. FOLLOW-UP AND DETERMINATION OF VITAL STATUS, MARION COUNTY, WV
 PROJECT OFFICER: JOSEPH COSTELLO (FTS-923-4476) START DT: 10/82 END DT: 09/85
 OBJECTIVE: DETERMINE CAUSE SPECIFIC MORTALITY OF MINERS AND LOCAL CONTROLS WITH
 LINKAGE TO PAST PULMONARY AND CARDIOVASCULAR MORBIDITY DATA.

13. THE NATIONAL COAL STUDY AND RELATED RESEARCH
 PROJECT OFFICER: MICHAEL D ATTFIELD (FTS-923-4501) START DT: 10/83 END DT: 09/88
 OBJECTIVE: DETERMINE PREVALENCE/PROGRESSION OF LUNG DISEASE IN RELATIONSHIP TO
 DUST EXPOSURE; COLLECT INFORMATION ON DUST LEVELS/COMPOSITION.

14. CASE CONTROL STUDY OF SILICA, SILICOSIS, AND LUNG CANCER
 PROJECT OFFICER: JOHN F GAMBLE (FTS-923-4476) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO DETERMINE THE RELATION. BETWEEN SILICA, SILICOSIS AND LUNG CANCER.

15. NC DUSTY TRADES FILE
 PROJECT OFFICER: HARLAN E AMANDUS (FTS-923-4476) START DT: 10/84 END DT: 09/87
 OBJECTIVE: ESTIMATE DOSE-RESPONSE CURVE FOR SILICA AND CHRYSOTILE ASBESTOS
 RELATED DISEASES.

16. EFFECTS OF FORMALDEHYDE ON THE RESPIRATORY SYSTEM
 PROJECT OFFICER: JOHN F GAMBLE (FTS-923-4476) START DT: 10/84 END DT: 09/87
 OBJECTIVE: THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE EFFECTS OF GASEOUS FORMALDEHYDE ON ACUTE SYMPTOMS AND PULMONARY FUNCTION.
17. MEDICAL FIELD TEAM TECHNICAL SUPPORT
 PROJECT OFFICER: GREGORY C SPRANSY (FTS-923-4387) START DT: 10/83 END DT: C
 OBJECTIVE: TO PROVIDE FIELD TEAM TECHNICAL SUPPORT TO DRDS; FIELD TESTING EQUIPMENT OPERATIONS AND MAINTENANCE.
18. EVALUATION OF HUMAN VENTILATORY EFFECTS OF WASHED COTTON--USDA
 PROJECT OFFICER: ROBERT M CASTELLAN (FTS-923-4223) START DT: 10/81 END DT: 09/86
 OBJECTIVE: TO SUPPORT TRIPARTITE RESEARCH ON COTTON DUST TO DEVELOP WASHED COTTON AS POTENTIAL MEANS TO PREVENT COTTON DUST ORD.
19. ANALYSIS OF DATA FROM AN EGYPTIAN SILICA STUDY
 PROJECT OFFICER: JOHN L HANKINSON (FTS-923-4755) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO PROVIDE IMPORTANT PREVALENCE AND DOSE-RESPONSE DATA ON SILICOSIS IN A CROSS-SECTION OF EGYPTIAN INDUSTRIES.
20. REPRODUCIBILITY IN TESTS OF PULMONARY FUNCTION
 PROJECT OFFICER: THOMAS K HODOUS (FTS-923-4755) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO DETERMINE THE REPRODUCIBILITY OF SEVERAL NON-SPIROMETRIC PULMONARY FUNCTION TESTS, TO ACCESS THEIR USEFULNESS.
21. ANALYSIS OF CWP COMPENSATION DATA
 PROJECT OFFICER: THOMAS K HODOUS (FTS-923-4223) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO DETERMINE THE MAJOR CAUSES OF CWP DISABILITY AND DEVELOP PREVENTION STRATEGIES BASED ON THESE RESULTS.
22. MEDICAL TECHNICAL SUPPORT
 PROJECT OFFICER: JOHN L HANKINSON (FTS-923-4755) START DT: 10/84 END DT: C
 OBJECTIVE: TO PROVIDE MEDICAL TECHNICAL SUPPORT TO DRDS.
23. EPIDEMIOLOGICAL REVIEW OF COTTON MILL SURVEILLANCE DATA
 PROJECT OFFICER: ANDREW J GHIO (FTS-923-4755) START DT: 10/84 END DT: 09/86
 OBJECTIVE: TO REVIEW SURVEILLANCE DATA FROM SELECTED TEXTILE MILLS FOR EVIDENCE TO SUPPORT THE ENDOTOXIN HYPOTHESIS OF BYSSINOSIS CAUSATION.

24. OCC. LUNG DISEASE ASSOC. WITH EXPOSURE TO DIESEL EMISSIONS
 PROJECT OFFICER: MICHAEL A MCCAWLEY (FTS-923-4421) START DT: 10/81 END DT: 09/86
 OBJECTIVE: TO STUDY THE EFFECTS OF DIESEL EMISSIONS ON THE RESPIRATORY SYSTEM,
 ESPECIALLY IN COMBINATION WITH COAL DUST EXPOSURE.
25. CROSS-SECTIONAL AND IH STUDY OF MILD STEEL WELDERS
 PROJECT OFFICER: PAUL HEWETT (FTS-923-4421) START DT: 10/83 END DT: 10/91
 OBJECTIVE: TO DETERMINE IF EXPOSURE TO MILD STEEL WELDING FUMES AND GASES CAUSES
 RESPIRATORY IMPAIRMENT AND DESCRIBE THE DOSE/RESPONSE RELATIONSHIP.
26. INDUSTRIAL HYGIENE TECHNICAL SUPPORT
 PROJECT OFFICER: JERRY L CLERE (FTS-923-4205) START DT: 05/82 END DT: C
 OBJECTIVE: PROVIDE CALIBRATED SAMPLING TRAINS, SAMPLING HEADS/MEDIA, AND LIMITED
 ANALYTICAL SUPPORT TO RESEARCH PROJECTS AND HHEs PERFORMED BY DRDS.
27. MICROORGANISMS IN HVAC SYSTEMS
 PROJECT OFFICER: PHILLIP R MOREY (FTS-923-4421) START DT: 10/84 END DT: 09/87
 OBJECTIVE: DEVELOP PREVENTATIVE AND REMEDIAL MEASURES TO REDUCE LEVELS OF
 MICROORGANISMS ASSOCIATED WITH HVAC SYSTEMS.
28. X-RAY/PATHOLOGY MORPHOMETRIC STUDIES OF CWP
 PROJECT OFFICER: FRANCIS H GREEN (FTS-923-4581) START DT: 10/83 END DT: 09/86
 OBJECTIVE: DETERMINE THE RELATIONSHIP BETWEEN X-RAY CATEGORY OF PNEUMOCONIOSIS
 AND PATHOLOGIC APPEARANCE OF EXCISED COAL WORKERS' LUNGS.
29. SILICOSIS IN COAL WORKERS
 PROJECT OFFICER: FRANCIS H GREEN (FTS-923-4581) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO DETERMINE THE PREVALENCE OF SILICOSIS IN COAL WORKERS AND THE
 RELATIONSHIP BETWEEN TISSUE RESPONSE AND MINERALOGIC PROFILES.
30. COMPARATIVE RESEARCH IN ANALYTICAL PATHOLOGY
 PROJECT OFFICER: FRANCIS H GREEN (FTS-923-4581) START DT: 10/71 END DT: C
 OBJECTIVE: TO ADMINISTER THE NATIONAL COAL WORKERS' AUTOPSY STUDY AND DISASTER
 PLAN AND CONDUCT MICROANALYTICAL STUDIES ON LUNG SAMPLES.
31. STUDIES OF COTTON, JUTE, TOBACCO AND COIR DUST EXPOSED WORKERS
 PROJECT OFFICER: VAL VALLYATHAN (FTS-923-4581) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO CONDUCT EPIDEMIOLOGIC AND PATHOLOGIC STUDIES ON (ASIAN) INDIAN
 WORKERS EXPOSED TO ORGANIC DUSTS UNDER THE PL480 PROGRAM.

32. PATHOLOGY STANDARDS FOR SILICOSIS
 PROJECT OFFICER: FRANCIS H GREEN (FTS-923-4581) START DT: 03/85 END DT: 09/86
 OBJECTIVE: DEVELOP PATHOLOGIC STANDARDS FOR THE UNIFORM DIAGNOSIS OF SILICA
 INDUCED LUNG DISEASES.
33. IMPACT OF COAL DUST IN GASTRIC CANCER AND DEFENSE MECHANISMS
 PROJECT OFFICER: TONG-MAN ONG (FTS-923-4516) START DT: 10/83 END DT: 09/86
 OBJECTIVE: INVESTIGATE RISK FACTORS CONTRIBUTING TO GASTRIC CARCINOGENESIS IN
 COAL MINERS AND THE EFFECT OF COAL DUST ON DEFENSE MECHANISMS.
34. SILICOSIS--INHALATION STUDIES
 PROJECT OFFICER: KENNETH C WEBER (FTS-923-4561) START DT: 10/83 END DT: 09/87
 OBJECTIVE: TO DEVELOP AN APPROPRIATE ANIMAL MODEL OF ACUTE SILICOSIS AND TO
 DETERMINE THE MECHANISM(S) OF LUNG RESPONSE TO INHALED SILICA.
35. BYSSINOSIS--INHALATION STUDIES
 PROJECT OFFICER: KENNETH C WEBER (FTS-923-4561) START DT: 10/83 END DT: 09/87
 OBJECTIVE: TO DEVELOP AN APPROPRIATE ANIMAL MODEL OF BYSSINOSIS USING THE DRDS
 INHALATION FACILITY.
36. IDENTIFICATION OF POSSIBLE CAUSATIVE AGENTS IN BYSSINOSIS
 PROJECT OFFICER: KENNETH C WEBER (FTS-923-4561) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO DETERMINE IF COTTON MILL DUST IS METABOLIZED, DEFINE THE ROLE OF
 PAF IN BYSSINOSIS, AND DEFINE AIRWAY SMOOTH MUSCLE RESPONSES.
37. NRC POSTDOCTORAL ASSOCIATESHIPS PROGRAM
 PROJECT OFFICER: KENNETH C WEBER (FTS-923-4561) START DT: 07/81 END DT: C
 OBJECTIVE: TO PERFORM RESEARCH TO INCREASE OUR KNOWLEDGE AND UNDERSTANDING OF THE
 ETIOLOGY OF OCCUPATIONAL DISEASES.
38. OCCUPATIONAL ASTHMA--ETIOLOGIC AGENT(S) AND DISEASE MECHANISM(S)
 PROJECT OFFICER: JEFFREY S FEDAN (FTS-923-4561) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO DEFINE SELECTED HOST RISK FACTORS, CAUSAL AGENT(S), DISEASE
 MECHANISMS AND DIAGNOSTIC TESTS FOR OCCUPATIONAL ASTHMA.
39. ROLE OF ALVEOLAR CELL INTERACTIONS IN THE PATHOGENESIS OF SILICOSIS
 PROJECT OFFICER: VINCENT CASTRANOVA (FTS-923-4591) START DT: 10/83 END DT: 09/87
 OBJECTIVE: TO EVALUATE COMPLEX INTERACTIONS AMONG LUNG CELLS EXPOSED TO SILICA
 USING MORPHOLOGICAL AND CELL CO-CULTURE TECHNIQUES.

40. IMMUNOTOXICITY OF OCCUPATIONAL (ORGANIC) DUSTS
 PROJECT OFFICER: STEPHEN A OLENCHOCK (FTS-923-4256) START DT: 10/82 END DT: 09/85
 OBJECTIVE: ISOLATE, IDENTIFY COMPONENTS WHICH INTERACT WITH OR ALTER THE IMMUNE SYSTEM; DEFINE MECHANISMS OF DISEASE PRODUCTION.
41. ENDOTOXINS IN COTTON
 PROJECT OFFICER: STEPHEN A OLENCHOCK (FTS-923-4256) START DT: 10/82 END DT: 09/86
 OBJECTIVE: TO QUANTIFY AIRBORNE ENDOTOXINS IN COTTON DUSTS FROM INDUSTRIAL SITUATIONS AND EXPERIMENTAL SOURCES.
42. ANIMAL AND EXPOSURE FACILITY SUPPORT FOR DRDS
 PROJECT OFFICER: PERVIS C MAJOR (FTS-923-4518) START DT: 10/80 END DT: C
 OBJECTIVE: PROVIDE DRDS AND COLLABORATING UNITS WITH EXPERIMENTAL ANIMAL RESEARCH SERVICES, INCLUDING HUSBANDRY, TECHNICAL, AND CONTROLLED EXPOSURE(S).
43. EFFECTIVE SILICA INDICES OF RESPIRABLE MINERAL DUSTS
 PROJECT OFFICER: WILLIAM E WALLACE (FTS-923-4136) START DT: 10/84 END DT: 09/88
 OBJECTIVE: DEVELOP AN EFFECTIVE SILICA INDEX FOR RESPIRABLE MINERAL DUSTS BASED ON ACTIVITY.
44. OCCUPATIONAL HEALTH STUDIES EMERGING ENERGY INDUSTRIES
 PROJECT OFFICER: WILLIAM E WALLACE (FTS-923-4136) START DT: 10/82 END DT: 09/85
 OBJECTIVE: IDENTIFY AND PREVENT OCCUPATIONAL DISEASE IN NEW ENERGY INDUSTRIES PRIOR TO THEIR WIDESPREAD DEPLOYMENT.
45. ENVIRONMENTAL MINING SURVEILLANCE
 PROJECT OFFICER: ALWIN L DIEFFENBACH (FTS-923-4496) START DT: 10/81 END DT: C
 OBJECTIVE: TO CONDUCT ENVIRONMENTAL TARGET INVESTIGATIONS RELATED TO THE NIOSH 1990 OBJECTIVES.
46. PILOT DEMONSTRATIONS--HEALTH PROMOTION STRATEGIES FOR CWP EXAMINATIONS
 PROJECT OFFICER: ROBERT B REGER (FTS-923-4476) START DT: 10/84 END DT: 09/86
 OBJECTIVE: TO DECREASE RISK OF ADVANCED CWP THROUGH GREATER PARTICIPATION IN PREVENTION AND TRANSFER PROGRAMS--NCS AND SURVEILLANCE ADJUNCT.

OCCUPATIONAL CANCERS (OTHER THAN LUNG)

47. MUTAGENIC MONITORING OF WORKPLACE AND WORKERS
 PROJECT OFFICER: TONG-MAN ONG (FTS-923-4516) START DT: 10/79 END DT: 09/86
 OBJECTIVE: DEVELOP MUTAGENESIS ASSAY SYSTEMS AND PERFORM STUDIES FOR DETERMINING POTENTIAL HAZARD OF CHEMICALS AND COMPLEX MIXTURES TO EXPOSED WORKERS.

DIVISION ADMINISTRATION

48. OFFICE OF THE DIRECTOR--DIVISION MANAGEMENT
PROJECT OFFICER: ROBERT E GLENN (FTS-923-4474) START DT: 10/84 END DT: 09/85
OBJECTIVE: PROVIDE OVERALL DIRECTION AND REVIEW TO PROGRAM PLANNING AND GUIDANCE,
AND PROVIDE TECHNICAL AND ADMINISTRATIVE SUPPORT TO THE DIVISION.
49. RECEIVING CENTER
PROJECT OFFICER: MITZIE L MARTIN (FTS-923-4301) START DT: 08/70 END DT: C
OBJECTIVE: PROVIDE FOR AND PROCESS COAL MINER CHEST X-RAYS AS MANDATED BY THE
MINE SAFETY AND HEALTH ACT OF 1977.
50. NATIONAL COAL WORKERS' AUTOPSY STUDY
PROJECT OFFICER: MITZIE L MARTIN (FTS-923-4301) START DT: 05/71 END DT: C
OBJECTIVE: RECEIVE, EVALUATE (PER ESTABLISHED REGULATIONS) AND PAY FOR AUTOPSY CASE
RECEIVED IN RESPONSE TO MANDATE OF THE MINE SAFETY AND HEALTH ACT.

HEALTH HAZARD EVALUATIONS AND TECHNICAL ASSISTANCE

51. MINING HEALTH HAZARD EVALUATIONS AND TECHNICAL ASSISTANCE
PROJECT OFFICER: JOHN L HANKINSON (FTS-923-4755) START DT: 10/84 END DT: C
OBJECTIVE: TO PERFORM HHEs AND TAs IN THE MINING INDUSTRY; TO PERFORM HHEs AND
TAs IN GENERAL INDUSTRY RELATED TO RESPIRATORY CHALLENGES.

DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES

The Division of Surveillance, Hazard Evaluations, and Field Studies (DSHEFS) conducts surveillance of the Nation's work force and its environs to make an early detection and continuous assessment of the magnitude and extent of job-related illnesses, exposures, and hazardous agents. DSHEFS conducts the legislatively mandated health hazard evaluations and industrywide epidemiological research programs through longitudinal record studies and clinical/environmental field studies and surveys. DSHEFS also provides, upon request and on a self-initiated basis, technical assistance, demonstrations, and consultation on technical matters pertaining to occupational safety and health to other Federal agencies, state and local agencies, and other technical groups, unions, employers, and employees.

The DSHEFS' surveillance effort is designed for the early detection and continuous assessment of the magnitude and extent of occupational illnesses, and exposures to hazardous agents, using new and existing data sources from federal, State, and local agencies, labor, industry, tumor registries, physicians, and medical centers. DSHEFS also conducts evaluation and validation studies of occupational illness reporting systems with efforts devoted to developing methods for measuring the magnitude of the national occupational health problem.

The DSHEFS' health hazard evaluation and industrywide studies programs (1) provide a technical service to the occupational safety and health community, (2) identify the occupational causes of disease in the working population and their offspring, and determine the incidence and prevalence of acute and chronic effects of work-related exposures to toxic and hazardous substances, and (3) provide information used in standards development for the control of occupational health hazards.

DSHEFS is located at 555 Ridge Avenue, Cincinnati, Ohio 45226. The Division Director is Philip J. Landrigan, M.D., telephone (513) 684-4428, FTS 684-4428.

*** DIVISION OF SURVEILLANCE, HAZARD EVALUATIONS, AND FIELD STUDIES ***

DISORDERS OF REPRODUCTION

1. REPRODUCTIVE AND CYTOGENETIC EFFECTS OF ETHYLENE DIBROMIDE
PROJECT OFFICER: JENNIFER M RATCLIFFE (FTS-684-4207) START DT: 10/83 END DT: 12/85
OBJECTIVE: TO ADDRESS ETHYLENE DIBROMIDE'S ABILITY TO PRODUCE CYTOGENETIC EFFECTS
AND TO INFLUENCE THE MALE REPRODUCTIVE SYSTEM IN EXPOSED WORKERS.
2. REPRODUCTIVE STUDY OF FEMALE VIDEO DISPLAY TERMINAL (VDT) OPERATORS
PROJECT OFFICER: TERESA M SCHNORR (FTS-684-4481) START DT: 10/84 END DT: 09/87
OBJECTIVE: TO DETERMINE IF FEMALE VDT OPERATORS HAVE AN INCREASED RISK OF
SPONTANEOUS ABORTIONS OR BIRTH DEFECTS.
3. MONITORING REPRODUCTIVE OUTCOMES
PROJECT OFFICER: JOYCE A SALG (FTS-684-4332) START DT: 10/83 END DT: 12/85
OBJECTIVE: TO UTILIZE PARENTAL OCCUPATION AND INDUSTRY INFORMATION FROM BIRTH AND
FETAL DEATH RECORDS TO MONITOR ADVERSE REPRODUCTIVE OUTCOMES.
4. ANALYSIS OF HEALTH INTERVIEW SURVEY DATA
PROJECT OFFICER: SHARON E SHILLING (FTS-684-4332) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO USE THE HEALTH INTERVIEW SURVEY DATA FOR THE SURVEILLANCE OF
OCCUPATION-RELATED ILLNESS IN THE UNITED STATES.
5. CASE-CONTROL SURVEILLANCE TO TEST HYPOTHESES GENERATED BY COMPUTER MAPS
PROJECT OFFICER: ROBERT D DUBROW (FTS-684-4332) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO USE CASE-CONTROL STUDIES BASED UPON DEATH CERTIFICATES TO TEST
HYPOTHESES GENERATED BY GEOGRAPHIC CORRELATION ANALYSES.
6. MORTALITY SURVEILLANCE OF OCCUPATION AND INDUSTRY
PROJECT OFFICER: WILLIAM E CROUSE (FTS-684-4332) START DT: 10/80 END DT: C
OBJECTIVE: TO ENHANCE THE U.S. MORTALITY STATISTICS SYSTEM THROUGH THE COLLECTION,
CODING, AND ANALYSIS OF DECEDENT OCCUPATION AND INDUSTRY DATA.
7. DISABILITY SURVEILLANCE OF OCCUPATION AND INDUSTRY
PROJECT OFFICER: THOMAS J FISCHBACH (FTS-684-4332) START DT: 10/80 END DT: C
OBJECTIVE: TO MONITOR PERMANENT DISABILITY AWARDS AS AN AID TO THE IDENTIFICATION
OF OCCUP. AND IND. GROUPS EXPERIENCING ABNORMAL PATTERNS OF DISABILITY.

8. SURVEILLANCE COOPERATIVE AGREEMENTS BETWEEN NIOSH AND STATES (SCANS)
 PROJECT OFFICER: NINA R LALICH (FTS-684-4332) START DT: 10/79 END DT: C
 OBJECTIVE: TO ASSIST IN THE DEVELOPMENT OF A COOPERATIVE NIOSH-STATE OCCUPATIONAL
 HEALTH AND SAFETY SURVEILLANCE PROGRAM.

9. REGISTRATION OF DISEASE AND EXPOSURE COHORTS
 PROJECT OFFICER: JOYCE A SALG (FTS-684-4332) START DT: 10/78 END DT: C
 OBJECTIVE: TO MAINTAIN DISEASE AND EXPOSURE REGISTRIES, AND FACILITATE PERIODIC
 CASE REVIEWS OR EPIDEMIOLOGIC ANALYSES.

10. COMPUTER GENERATED MAPS
 PROJECT OFFICER: NINA R LALICH (FTS-684-4332) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO DEMONSTRATE THE FEASIBILITY OF USING COMPUTER-GENERATED MAPS FOR
 OCCUP. HEALTH SURV., AND EVALUATE THE UTILITY TO NIOSH AND OTHERS.

11. NATIONAL REPORTING OF SELECTED OCCUPATIONAL DISEASES
 PROJECT OFFICER: ROBERT J MULLAN (FTS-648-4353) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO DEVELOP AND IMPLEMENT A STRATEGY FOR STATE-BASED REPORTING OF
 SELECTED OCCUPATIONAL DISEASES.

12. INCREASING OCCUPATIONAL HEALTH EDUCATION FOR PHYSICIANS
 PROJECT OFFICER: ROBERT J MULLAN (FTS-684-4353) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO ESTABLISH A WORKING GROUP TO DEVELOP AND IMPLEMENT A PLAN FOR
 INCREASING PRIMARY CARE PHYSICIAN AWARENESS OF OSH CONCERNS.

13. ESTIMATION OF OCCUPATIONALLY RELATED MORTALITY AND MORBIDITY
 PROJECT OFFICER: JOHN H MORRISON (FTS-684-4353) START DT: 10/82 END DT: C
 OBJECTIVE: TO DEVELOP AND IMPLEMENT THE NECESSARY METHODS TO ESTIMATE
 OCCUPATIONALLY RELATED MORTALITY AND MORBIDITY.

14. SENTINEL HEALTH EVENT LIST MAINTENANCE
 PROJECT OFFICER: LEELA I MURTHY (FTS-684-4353) START DT: 10/82 END DT: C
 OBJECTIVE: TO MAINTAIN SURVEILLANCE OF THE SCIENTIFIC LITERATURE FOR IDENTIFYING
 NEW SENTINEL HEALTH EVENTS SHE(O)_s AND UPDATING CURRENT SHE(O)_s.

15. ACCESS TO OSHA INSPECTION DATA
 PROJECT OFFICER: JOSEPH A SETA (FTS-684-4491) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO LINK ENVIRONMENTAL MEASUREMENTS COLLECTED DURING OSHA COMPLIANCE
 ACTIVITIES TO THE NOHS AND NOES DATA BASES.

16. ACCESS TO NOHS DATA BASE--PROFILE DEVELOPMENT
 PROJECT OFFICER: JOSEPH A SETA (FTS-684-4491) START DT: 10/78 . END DT: C
 OBJECTIVE: TO DEVELOP INFORMATION PROFILES FROM THE NATIONAL OCCUPATIONAL HAZARD
 SURVEY DATA BASE UPON REQUEST.
17. HAZARD PROFILING SYSTEM
 PROJECT OFFICER: DAVID S SUNDIN (FTS-684-4491) START DT: 10/83 END DT: C
 OBJECTIVE: TO PROVIDE A QUICK ACCESS REPOSITORY FOR DATA ON HAZARDS, OCCUPATIONS,
 AND INDUSTRIES TO ACCOMMODATE INFORMATION REQUESTS.
18. SELF-SURVEY MECHANISMS
 PROJECT OFFICER: DAVID S SUNDIN (FTS-684-4491) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO UPDATE A NIOSH COOPERATIVE EXPOSURE SYSTEM WITH NEW/CURRENT METHODS
 IN USE.
19. TRADENAME INGREDIENTS--NATIONAL OCCUPATIONAL EXPOSURE SURVEY (NOES)
 PROJECT OFFICER: DAVID S SUNDIN (FTS-684-4491) START DT: 10/77 END DT: C
 OBJECTIVE: TO OBTAIN INGREDIENT INFORMATION FROM THE MANUFACTURERS OF THE NEARLY
 100,000 TRADENAMED PRODUCTS RECORDED IN THE NOES.
20. MATERIAL LOCATOR SYSTEM
 PROJECT OFFICER: HERBERT L VENABLE (FTS-684-4491) START DT: 10/80 END DT: C
 OBJECTIVE: TO ASSIST UNIONS IN ORGANIZING INFORMATION RECEIVED FROM THEIR
 MEMBERSHIP ON POTENTIAL EXPOSURE AGENTS.

NEUROTOXIC DISORDERS

21. DIOXIN MORBIDITY AND REPRODUCTIVE STUDY OF U.S. CHEMICAL WORKERS
 PROJECT OFFICER: PATRICIA L MOODY (FTS-684-4207) START DT: 10/84 END DT: 06/87
 OBJECTIVE: TO ASSESS PERSISTENT MORBIDITY AND REPRODUCTIVE OUTCOMES IN WORKERS
 EXPOSED IN THE PAST TO DIOXIN-CONTAMINATED CHEMICALS.

OCCUPATIONAL LUNG DISEASE

22. BERYLLIUM RETROSPECTIVE COHORT INVESTIGATION
 PROJECT OFFICER: ANDREA H OKUN (FTS-684-4411) START DT: 10/81 END DT: 09/87
 OBJECTIVE: TO INVESTIGATE THE MORTALITY EXPERIENCE OF WORKERS EXPOSED TO
 BERYLLIUM.

23. URANIUM MINERS-LOW DOSE INVESTIGATION
 PROJECT OFFICER: ROBERT J ROSCOE (FTS-684-4411) START DT: 10/82 END DT: 06/86
 OBJECTIVE: UPDATE EXPOSURE DATA AND DETERMINE WHETHER EXCESS LUNG CANCER RISK
 EXTENDS TO MINERS WHO RECEIVED LOW EXPOSURES TO RADON DAUGHTERS.
24. MORTALITY AND INDUSTRIAL HYGIENE STUDY OF FORMALDEHYDE
 PROJECT OFFICER: LESLIE T STAYNER (FTS-684-4481) START DT: 10/80 END DT: 12/86
 OBJECTIVE: TO DETERMINE WHETHER EXPOSURE TO FORMALDEHYDE IS ASSOCIATED WITH AN
 EXCESS RISK OF CANCER, AND TO DOCUMENT LEVELS OF EXPOSURE IN INDUSTRY.
25. COHORT MORTALITY STUDY OF ANTIMONY SMELTER WORKERS
 PROJECT OFFICER: TERESA M SCHNORR (FTS-684-4481) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO DETERMINE IF WORKERS EXPOSED TO ANTIMONY HAVE INCREASED CANCER
 MORTALITY, PARTICULARLY LUNG CANCER MORTALITY.
26. MORTALITY STUDY OF WORKERS EXPOSED TO TOLUENE DIISOCYANATE
 PROJECT OFFICER: TERESA M SCHNORR (FTS-684-4481) START DT: 06/83 END DT: 09/86
 OBJECTIVE: TO DETERMINE IF WORKERS EXPOSED TO TOLUENE DIISOCYANATE (TDI) HAVE
 INCREASED CANCER MORTALITY, PARTICULARLY LUNG CANCER.
27. CASE-CONTROL STUDY OF LUNG CANCER IN TEAMSTERS UNION
 PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 10/83 END DT: 06/86
 OBJECTIVE: TO DETERMINE IF SPECIFIC JOB CATEGORIES IN THE TEAMSTERS UNION INVOLVE
 EXCESS RISK OF LUNG CANCER.
28. RETROSPECTIVE COHORT INVESTIGATION OF NON-ASBESTOS WELDERS
 PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 10/84 END DT: 06/87
 OBJECTIVE: TO DETERMINE LUNG CANCER RISK FOR WELDERS WORKING WITH MILD STEEL.
29. MORTALITY AND IH STUDY OF WORKERS EXPOSED TO LEAD CHROMATE PAINTS
 PROJECT OFFICER: DENNIS R ROBERTS (FTS-684-4314) START DT: 10/82 END DT: 06/87
 OBJECTIVE: TO EVALUATE THE LONG-TERM HEALTH EFFECTS OF CHRONIC EXPOSURES TO LEAD
 CHROMATE PIGMENTS.

CARDIOVASCULAR DISEASE

30. MORTALITY AND IH STUDY OF WORKERS EXPOSED TO CARBON MONOXIDE
 PROJECT OFFICER: FRANK B STERN (FTS-684-4411) START DT: 10/79 END DT: 09/85
 OBJECTIVE: TO DETERMINE IF WORKERS EXPOSED TO CARBON MONOXIDE AT OR ABOUT THE
 OSHA STANDARD OF 50 PPM HAVE AN INCREASED RISK OF CVD MORTALITY.

31. STUDY OF SUDDEN DEATH AT WORK IN ALLEGHENY COUNTY, PENNSYLVANIA
PROJECT OFFICER: CYNTHIA C ROBINSON (FTS-684-4481) START DT: 10/84 END DT: 03/86
OBJECTIVE: TO IDENTIFY OCCUPATIONS OR INDUSTRIES WHICH MAY PLACE SUSCEPTIBLE
WORKERS AT RISK OF CATASTROPHIC MEDICAL EVENTS.

32. COHORT AND CASE-CONTROL STUDY OF NITROGLYCERIN-EXPOSED WORKERS
PROJECT OFFICER: LESLIE T STAYNER (FTS-684-4481) START DT: 10/84 END DT: 09/86
OBJECTIVE: TO ASSESS THE RISK OF CARDIOVASCULAR DISEASE MORTALITY AMONG WORKERS
EXPOSED TO NITROGLYCERIN.

OCCUPATIONAL CANCERS (OTHER THAN LUNG)

33. INDUSTRIAL HYGIENE CHARACTERIZATION OF 1,3-BUTADIENE EXPOSED WORKERS
PROJECT OFFICER: JOHN M FAJEN (FTS-684-4363) START DT: 10/84 END DT: 09/86
OBJECTIVE: CHARACTERIZE THE EXTENT OF EXPOSURE OF PRODUCERS, FORMULATORS AND
USERS OF THE 1,3-BUTADIENE MONOMER.

34. MEDICAL, BIOMETRIC AND IH STUDY OF EMERGING PROBLEMS
PROJECT OFFICER: WILLIAM E HALPERIN (FTS-684-4207) START DT: 10/79 END DT: C
OBJECTIVE: TO EVALUATE THE FEASIBILITY OF CONDUCTING STUDIES ON POTENTIAL
WORKPLACE HAZARDS AS THEY ARE IDENTIFIED.

35. MORTALITY AND INDUSTRIAL HYGIENE STUDY OF WORKERS EXPOSED TO TOLUENE
PROJECT OFFICER: FRANK B STERN (FTS-684-4411) START DT: 10/79 END DT: 09/85
OBJECTIVE: TO DETERMINE IF EXPOSURE TO TOLUENE HAS A POTENTIAL FOR LONG-TERM
HEALTH EFFECTS. LEUKEMIA IS OF A PRIORITY CONCERN.

36. MORTALITY AND INDUSTRIAL HYGIENE STUDY OF LEATHER INDUSTRY WORKERS
PROJECT OFFICER: FRANK B STERN (FTS-684-4411) START DT: 10/78 END DT: 09/85
OBJECTIVE: TO DETERMINE IF LEATHER TANNING AND FINISHING INDUSTRY WORKERS HAVE AN
INCREASED RISK OF MORTALITY.

37. COMPILATION OF BLUE COLLAR MORTALITY RATES
PROJECT OFFICER: ROBERT J ROSCOE (FTS-684-4411) START DT: 10/84 END DT: 03/86
OBJECTIVE: TO DEVELOP MORTALITY RATES FOR BLUE COLLAR WORKERS WHICH ARE MORE
APPROPRIATE FOR COMPARISON WITH OCCUPATIONAL COHORTS.

38. MORTALITY STUDY OF WORKERS EXPOSED TO HALOWAX
PROJECT OFFICER: ELIZABETH M WARD (FTS-684-4481) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO DETERMINE WHETHER HALOWAX EXPOSURE IS ASSOCIATED WITH AN EXCESS
RISK OF SOFT TISSUE SARCOMA, LYMPHOMA OR LIVER CANCER.

39. MORTALITY AND IH STUDY OF AUTOMOTIVE WOOD DIE AND MODEL MAKERS
 PROJECT OFFICER: ROBERT J ROSCOE (FTS-684-4411) START DT: 10/80 END DT: 06/85
 OBJECTIVE: DETERMINE THE EXCESS MORTALITY RISKS AMONG AUTOMOTIVE WOOD DIE AND
 MODEL MAKERS.
40. INVESTIGATION OF WORKERS EXPOSED TO MOCA
 PROJECT OFFICER: ELIZABETH M WARD (FTS-684-4481) START DT: 10/82 END DT: 09/86
 OBJECTIVE: TO EVALUATE THE LONG-TERM HEALTH EFFECTS OF EXPOSURE TO 4,4'
 METHYLENEBIS (2-CHLORO ANILINE) IN HUMANS.
41. ETHYLENE OXIDE MORTALITY STUDY
 PROJECT OFFICER: LESLIE T STAYNER (FTS-684-4481) START DT: 10/82 END DT: 06/88
 OBJECTIVE: TO DETERMINE IF EXPOSURE TO ETHYLENE OXIDE IS ASSOCIATED WITH EXCESS
 MORTALITY FROM ANY CAUSE, PARTICULARLY LEUKEMIA.
42. INDUSTRYWIDE STUDY OF WORKERS EXPOSED TO 4,4'-METHYLENE DIANILINE
 PROJECT OFFICER: MARK F BOENIGER (FTS-684-4363) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO CHARACTERIZE WORKPLACE EXPOSURES TO 4,4'-METHYLENE DIANILINE AND
 PERFORM, IF FEASIBLE, AN EPIDEMIOLOGICAL MORTALITY STUDY.
43. CASE-CONTROL STUDY OF BLADDER CANCER IN HAMILTON COUNTY
 PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 10/82 END DT: 07/85
 OBJECTIVE: TO DETERMINE OCCUPATIONAL ASSOCIATION WITH DEATH FROM BLADDER CANCER
 IN HAMILTON COUNTY USING CITY DIRECTORIES AND DEATH CERTIFICATES.
44. INDUSTRIAL HYGIENE CHARACTERIZ. OF ETO EXPOSURE IN HOSPITAL WORKERS
 PROJECT OFFICER: LARRY J ELLIOTT (FTS-684-4363) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO CHARACTERIZE THE EXPOSURE OF HOSPITAL WORKERS TO ETHYLENE OXIDE
 DURING STERILIZATION PROCEDURES.
45. REGISTRY OF DIOXIN WORKERS AND MORTALITY STUDY
 PROJECT OFFICER: MARILYN A FINGERHUT (FTS-684-4411) START DT: 10/79 END DT: 12/86
 OBJECTIVE: TO EXAMINE THE MORTALITY OUTCOMES OF U.S. PRODUCTION WORKERS EXPOSED
 TO DIOXIN.
46. O-DIANISIDINE AND O-TOLIDINE DYE WORKERS EXPOSURE STUDY
 PROJECT OFFICER: BRUCE W HILLS (FTS-684-4314) START DT: 10/82 END DT: 09/86
 OBJECTIVE: TO CHARACTERIZE LEVELS OF EXPOSURE OF WORKERS TO THESE DYES, TEST THE
 URINE FOR DYE METABOLITES AND MUTAGENICITY.

47. LARYNGEAL CANCER INCIDENCE IN WORKERS EXPOSED TO SULFURIC ACID
 PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 09/83 END DT: 09/87
 OBJECTIVE: TO DETERMINE IF OCCUPATIONAL EXPOSURE TO SULFURIC ACID IN PICKLING
 OPERATIONS IN STEEL MILLS IS ASSOCIATED WITH LARYNGEAL CANCER.
48. EPIDEMIOLOGIC AND INDUSTRIAL HYGIENE SUPPORT OF TSCA-EPA
 PROJECT OFFICER: DAVID P BROWN (FTS-684-4203) START DT: 10/81 END DT: C
 OBJECTIVE: TO SUPPLEMENT EPAs AVAILABLE IN-HOUSE EPIDEMIOLOGIC AND INDUSTRIAL
 HYGIENE CAPABILITIES ON STUDIES OF MUTUAL INTEREST TO NIOSH AND EPA.
49. MORTALITY STUDY OF CHEMICAL PLANTS IN KANAWHA VALLEY, WEST VIRGINIA
 PROJECT OFFICER: ROBERT A RINSKY (FTS-684-4386) START DT: 10/79 END DT: 09/86
 OBJECTIVE: TO DETERMINE THE MORTALITY EXPERIENCE OF EMPLOYEES ENGAGED IN THE
 PRODUCTION OF PETROCHEMICAL PRODUCTS.
50. UPDATE OF COMPLETED COHORT MORTALITY STUDIES
 PROJECT OFFICER: DAVID P BROWN (FTS-684-4203) START DT: 10/82 END DT: C
 OBJECTIVE: TO UPDATE VITAL STATUS INFORMATION ON COHORT MORTALITY STUDIES THAT
 WERE CONSIDERED INCONCLUSIVE.
51. MEDICAL SCREENING IN THE WORKPLACE--A SYMPOSIUM
 PROJECT OFFICER: WILLIAM E HALPERIN (FTS-684-4203) START DT: 10/82 END DT: 09/85
 OBJECTIVE: TO ADDRESS THE CURRENT STATE-OF-THE-ART SCREENING PROGRAMS IN THE
 OCCUPATIONAL SETTING AND MAKE RECOMMENDATIONS FOR FUTURE NEEDS.
52. INVENTORY OF UNION RECORDS SYSTEMS
 PROJECT OFFICER: JOHN J WHALEN (FTS-684-4207) START DT: 04/83 END DT: 09/86
 OBJECTIVE: TO DEVELOP INVENTORY OF UNION INSURANCE AND BENEFIT PLANS FOR USE BY
 NIOSH AND OTHERS INTERESTED IN OCCUPATIONAL EPIDEMIOLOGY.
53. EPIDEMIOLOGIC METHODS DEVELOPMENT
 PROJECT OFFICER: DAVID P BROWN (FTS-684-4203) START DT: 10/84 END DT: C
 OBJECTIVE: TO DEVELOP AND MODIFY ANALYTICAL COMPUTER PROGRAMS NECESSARY TO
 SUPPORT OCCUPATIONAL EPIDEMIOLOGY RESEARCH.

MUSCULOSKELETAL INJURIES

54. CARPET LAYERS KNEE
 PROJECT OFFICER: SHIRO TANAKA (FTS-684-4481) START DT: 03/83 END DT: 03/85
 OBJECTIVE: TO EVALUATE THE CHRONIC HEALTH EFFECTS OF KNEELING AND KNEE KICKING ON
 THE KNEE JOINT IN FLOORLAYERS, BRICKLAYERS AND MILLWRIGHTS.

55. TECHNICAL MANAGEMENT SSB
PROJECT OFFICER: LAWRENCE R CATLETT (FTS-684-4211) START DT: 10/83 END DT: C
OBJECTIVE: THE PROJECT PROVIDES TECHNICAL, LOGISTIC, AND ADMINISTRATIVE SUPPORT
TO DSHEFS' OD AND RESEARCH BRANCHES.

DIVISION ADMINISTRATION

56. TECHNICAL MANAGEMENT--DSHEFS (OD)
PROJECT OFFICER: JAMES M MELIUS (FTS-684-4428) START DT: 10/80 END DT: C
OBJECTIVE: PROVIDE TECHNICAL AND POLICY DIRECTION AND ADMINISTRATIVE SUPPORT
TO THE DIVISION.

HEALTH HAZARD EVALUATIONS AND TECHNICAL ASSISTANCE

57. TECHNICAL ASSISTANCE AT HAZARDOUS WASTE SITES
PROJECT OFFICER: JAMES M MELIUS (FTS-684-4382) START DT: 10/84 END DT: C
OBJECTIVE: TO PROVIDE TECHNICAL ASSISTANCE TO EPA AND STATE HEALTH DEPARTMENTS AT
HAZARDOUS WASTE SITES.

58. HEALTH HAZARD EVALUATIONS AND TECHNICAL ASSISTANCE
PROJECT OFFICER: JAMES M MELIUS (FTS-684-4382) START DT: 10/80 END DT: C
OBJECTIVE: TO CONDUCT GENERAL INDUSTRY HEALTH HAZARD EVALUATIONS AT THE REQUEST
OF EMPLOYERS, EMPLOYEES, AND OTHER GOVERNMENTAL AGENCIES.

59. OCCUPATIONAL CANCER CONTROL HAZARD EVALUATIONS
PROJECT OFFICER: JAMES M MELIUS (FTS-684-4382) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO CONDUCT EVALUATIONS OF POSSIBLE CANCER CONTROL TECHNIQUES AS PART
OF GENERAL INDUSTRY HEALTH HAZARD EVALUATIONS.

CROSS CUTTING

60. CASE-CONTROL STUDY OF RENAL DISEASE AND OCCUPATIONAL EXPOSURE
PROJECT OFFICER: NELSON K STEENLAND (FTS-684-4411) START DT: 02/83 END DT: 09/86
OBJECTIVE: TO DETERMINE WHETHER OCCUPATIONAL EXPOSURES INCREASE THE RISK OF
END-STAGE RENAL DISEASE.

THE DIVISION OF SAFETY RESEARCH

The Division of Safety Research (DSR) serves as the focal point for the Institute's occupational safety research program, and designs and conducts safety research efforts aimed at preventing or mitigating traumatic injury and death to workers in all industries. The division evaluates, certifies, and maintains records of hazard measuring respirators and instruments, and develops new performance criteria, standards, and guidelines for certification of personal protective equipment and hazard measuring instruments. The division is responsible for the day-to-day operation of the testing and certification regulations pursuant to 30 CFR 11 and 30 CFR 74.

DSR plans and conducts laboratory and worksite studies to establish effective methods for making work safe through the use of personal protective equipment and engineering controls for equipment, machines, tools, safety devices, and other factors in the workplace. The division conducts worksite research to identify, develop, and document effective work practices and managerial approaches for minimizing the risk of workers being injured as the result of exposure to workplace hazards. DSR also provides technical assistance on solving safety problems which require engineering or system safety expertise for solution, and develops technical criteria to support recommendations for safety standards.

DSR maintains a national surveillance data system for the early detection and monitoring of the occurrence and extent of accidents and injuries in occupational settings, and conducts field epidemiologic studies of occupational injuries and their etiologies. To identify and document effective methods for reducing musculoskeletal injuries, DSR conducts studies to characterize the effects of workplace environment factors on safety, and provides technical assistance on problems requiring expertise in ergonomics, industrial engineering, and related disciplines. Using systems safety techniques, the division analyzes operations to identify hazards and develop injury prevention strategies.

The division also conducts general occupational injury surveillance, including the collection, analysis, and interpretation of injury statistics, and maintains various surveillance data bases. DSR works with State agencies to upgrade injury surveillance, and maintains a national injury surveillance system for risk assessment, research needs, and identification of problems for the occupational safety and health community.

To ensure that air purifying respirators and air supplied respirators continue to meet regulatory requirements, DSR conducts audits, reviews performance requirements, standards, and guidelines for certification. The division also develops new performance requirements and standards for respirators and evaluates the quality control plans for them.

DSR is located at 944 Chestnut Ridge Road, Morgantown, West Virginia 26505. The Division Director is Mr. John Moran, telephone (304) 291-4595, FTS 923-4595.

*** DIVISION OF SAFETY RESEARCH ***

SURVEILLANCE

1. TRAUMATIC INJURY WORKING GROUP PROJECT
PROJECT OFFICER: DONALD L CAMPBELL (FTS-923-4802) START DT: 10/84 END DT: 09/85
OBJECTIVE: TO PRODUCE A NATIONAL STRATEGY REPORT FOR THE CONTROL OF TRAUMATIC
OCCUPATIONAL INJURIES THROUGH THE WORKING GROUP.
2. OCCUPATIONAL SAFETY SURVEYS
PROJECT OFFICER: WILLIAM F PERRY (FTS-923-4811) START DT: 06/77 END DT: C
OBJECTIVE: TO PROVIDE TECHNICAL ASSISTANCE TO BLS AND SELECTED STATE AGENCIES IN
ORDER TO ENHANCE THEIR WORKERS TO CONDUCT OCCUPATIONAL SAFETY SURVEYS.
3. GENERAL SURVEILLANCE
PROJECT OFFICER: ROBERT J CLEVELAND (FTS-923-4812) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE SURVEILLANCE AND INJURY DATA SUPPORT TO OTHER DSR EFFORTS AND TO
MANAGE DAS ACTIVITIES. INCLUDES COOP AGREEMENTS, STATE RISK FOLLOW-UP.
4. PRIORITIES DEVELOPMENT AND SURVEILLANCE SYSTEM COORDINATION
PROJECT OFFICER: ROBERT J CLEVELAND (FTS-923-4812) START DT: 10/81 END DT: C
OBJECTIVE: PROVIDE INPUT TO DEVELOPMENT OF A METHOD FOR PRIORITY SETTING AND
DEVELOP A PILOT STATISTICAL PROFILE DOCUMENT.
5. IDENTIFICATION OF PERMANENT DISABILITY COSTS AND CAUSES
PROJECT OFFICER: ROBERT J CLEVELAND (FTS-923-4812) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO IDENTIFY COSTS AND CAUSES OF PERMANENT DISABILITY INJURIES IN THE
TRAUMATIC AND MUSCULOSKELETAL INJURY AREAS.
6. NEISS OCCUPATIONALLY RELATED DATA SHARING
PROJECT OFFICER: JOSEPH GUSTIN (FTS-923-4806) START DT: 08/80 END DT: C
OBJECTIVE: TO SUPPLY SURVEILLANCE DATA FOR ESTIMATING TOTAL U.S. OCCUPATIONAL
INJURIES, AND TO SUPPLY CASES FOR FOLLOW-UP STUDIES.
7. FATAL OCCUPATIONAL INJURY SURVEILLANCE
PROJECT OFFICER: MICHAEL B MOLL (FTS-923-4805) START DT: 10/84 END DT: C
OBJECTIVE: TO ESTABLISH A FATAL OCCUPATIONAL INJURY DATA BASE USING DEATH
CERTIFICATE INFORMATION.

RESPIRATORS

8. ATMOSPHERE SUPPLIED RESPIRATOR TESTING
PROJECT OFFICER: SAMUEL L TERRY (FTS-923-4333) START DT: 05/72 END DT: C
OBJECTIVE: THE ATMOSPHERE SUPPLIED RESPIRATOR PROJECT EVALUATES AND CERTIFIES
RESPIRATORS AS MANDATED BY TITLE 30 CODE OF FEDERAL REGS PART 11.
9. EVALUATION, CERTIFICATION, AND COORDINATION ACTIVITIES
PROJECT OFFICER: NANCY J BOLLINGER (FTS-923-4331) START DT: 05/72 END DT: C
OBJECTIVE: COORDINATE, REVIEW AND SUPPORT EVALUATION, CERTIFICATION AND AUDITING OF
PERSONAL PROTECTIVE EQUIPMENT AND HAZARD MEASURING INSTRUMENTS.
10. AIR-PURIFYING RESPIRATOR TESTING
PROJECT OFFICER: CHRISTOPHER C COFFEY (FTS-923-4334) START DT: 05/72 END DT: C
OBJECTIVE: THE AIR-PURIFYING RESPIRATOR PROJECT EVALUATES AND CERTIFIES
RESPIRATORS AS MANDATED BY 30 CFR PART 11.
11. QA DOCUMENTATION CONTROL, AIR-PURIFYING REVIEWS, IN-PLANT AUDITS
PROJECT OFFICER: ROBERT G JUSTISS, JR (FTS-923-4577) START DT: 05/72 END DT: C
OBJECTIVE: THE QA DOCUMENTATION PROJECT TRACKS, EVALUATES, AND AUDITS RESPIRATOR
CERTIFICATIONS AS MANDATED BY TITLE 30 CFR PART 11.
12. RESPIRATOR TECHNICAL ASSISTANCE PROJECT
PROJECT OFFICER: GARY P NOONAN (FTS-923-4362) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE FIELD SUPPORT TO THOSE IN NEED OF TECHNICAL AND INFORMATIONAL
ASSISTANCE REGARDING SELECTION AND USE OF RESPIRATORS.
13. RESEARCH STUDIES ON RESPIRATOR PROTECTION FACTORS
PROJECT OFFICER: WARREN R MYERS (FTS-923-4361) START DT: 10/82 END DT: 09/88
OBJECTIVE: STUDY VARIABLES AFFECTING IN-FACEPIECE SAMPLING ACCURACY, MEASURE
WORKPLACE PROTECTION FACTORS AND EVALUATE METHODS FOR PREDICTING THEM.
14. RESP. RESEARCH AND EVAL. FOR HAZARDOUS WASTE DUMP CLEAN-UP
PROJECT OFFICER: STEVEN W LENHART (FTS-923-4361) START DT: 01/83 END DT: 09/85
OBJECTIVE: ASSESS THE EFFECTIVENESS OF ORGANIC VAPOR RESPIRATORS TO PROTECT
WORKERS AT HAZARDOUS WASTE CLEAN-UP SITES.
15. TECHNICAL ADVISOR TO A NIOSH RESEARCH GRANT
PROJECT OFFICER: STEVEN W LENHART (FTS-923-4361) START DT: 10/84 END DT: 09/85
OBJECTIVE: SERVE AS TECHNICAL ADVISOR TO THE INVESTIGATORS OF THE PROJECT
ENTITLED "ASSESSMENT OF RESPIRATORS AMONG AGRICULTURAL WORKERS".

16. AEROSOL PARTICULATE FILTER EFFICIENCY
 PROJECT OFFICER: ERNEST S MOYER (FTS-923-4335) START DT: 10/84 END DT: 09/86
 OBJECTIVE: TO DETERMINE THE OPTIMUM AEROSOL PARTICLE SIZE AS A FUNCTION OF FLOW
 RATE AND RELATIVE HUMIDITY PRECONDITIONING FOR USE IN 30 CFR 11.
17. APPLICABILITY OF JONA'S KINETIC MODEL FOR PREDICTING ORGANIC VAPOR
 PROJECT OFFICER: ERNEST S MOYER (FTS-923-4335) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO EVALUATE THE JONA'S KINETIC MODEL TO PREDICT ORGANIC VAPOR FILTER
 BREAKTHROUGH TIMES.
18. FIBROUS AEROSOL RESEARCH
 PROJECT OFFICER: GREGORY A STEVENS (FTS-923-4335) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO RECOMMEND A RESEARCH APPROACH TO DETERMINE THE EFFECT FIBROUS
 AEROSOLS HAVE ON THE PERFORMANCE OF AIR PURIFYING RESPIRATORS.
19. SCBA "USE TEST" PERFORMANCE REQUIREMENTS
 PROJECT OFFICER: DONALD F KNOWLES (FTS-923-4803) START DT: 10/83 END DT: 09/86
 OBJECTIVE: TO RECOMMEND MODERNIZED PERFORMANCE REQUIREMENTS AND TEST METHODS FOR
 SELF-CONTAINED BREATHING APPARATUS "USE TESTS" USED IN 30 CFR 11.
20. ANALYTICAL AND ANALOG MODELING OF AIR-PURIFYING RESPIRATORS
 PROJECT OFFICER: BARRY G PALLAY (FTS-923-4336) START DT: 10/82 END DT: 09/85
 OBJECTIVE: DEVELOP ANALYTICAL MODELS TO CHARACTERIZE PERFORMANCE OF AIR-PURIFYING
 RESPIRATORS TO ASSIST IN TESTING, CERTIFYING AND PROBLEM INVESTIGATION.
21. EFFECT OF LUNG DEPOSITION ON MEASUREMENT OF PROTECTION FACTORS II
 PROJECT OFFICER: DONALD L CAMPBELL (FTS-923-4802) START DT: 10/83 END DT: 12/85
 OBJECTIVE: INFORM RESPIRATOR RESEARCHERS OF A METHOD TO CORRECT FOR THE EFFECT OF
 LUNG DEPOSITION ON MEASUREMENT OF RESPIRATOR PROTECTION FACTORS.
22. CHARACTERIZING RESPIRATOR FACE FIT
 PROJECT OFFICER: DONALD L CAMPBELL (FTS-923-4802) START DT: 04/85 END DT: 03/86
 OBJECTIVE: INVESTIGATE THE CHARACTERIZATION OF RESPIRATOR FACE FIT BY DIRECT
 MEASUREMENT OF VOLUMETRIC FLOWRATE.

CONTROL SYSTEMS

23. DEV. OF A NEW CLASSIFICATION SYSTEM FOR HAZARDOUS MATERIALS CONTROL
 PROJECT OFFICER: RICHARD M RONK (FTS-923-4809) START DT: 10/84 END DT: 09/86
 OBJECTIVE: TO PREVENT FIRE AND EXPLOSION TRAUMA THROUGH IMPROVED CLASSIFICATION
 AND SPECIFICATION OF ELECTRICAL EQUIPMENT FOR HAZARDOUS LOCATIONS.

SEVERE OCCUPATIONAL TRAUMATIC INJURIES

24. PRESS OPERATOR HAND MOVEMENT STUDY
PROJECT OFFICER: TIMOTHY J PIZATELLA (FTS-923-4807) START DT: 10/82 END DT: 09/85
OBJECTIVE: TO PREVENT AMPUTATIONS BY DETERMINING THE SAFE DISTANCE BETWEEN
TWO-HAND ACTUATORS AND THE POINT OF OPERATION ON POWER PRESSES.
25. SYSTEM SAFETY ANALYSIS OF HIGH RISK CONSTRUCTION ACTIVITIES
PROJECT OFFICER: JAMES W COLLINS (FTS-923-4807) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO DETERMINE METHODS FOR REDUCING INJURIES AND FATALITIES ASSOCIATED
WITH HIGH RISK TASKS IN THE ROOFING INDUSTRY.
26. ASSESSMENT OF METHODS FOR SAFE MACHINE MAINTENANCE
PROJECT OFFICER: JOHN R ETHERTON (FTS-923-4454) START DT: 10/83 END DT: 09/86
OBJECTIVE: TO DEVELOP GUIDELINES TO PREVENT FATALITIES AND TRAUMATIC INJURIES
DURING THE MAINTENANCE OF AUTOMATED MACHINES.
27. EPIDEMIOLOGICAL INVESTIGATIONS OF FALLS FROM LADDERS
PROJECT OFFICER: THEODORE A PETTIT (FTS-923-4010) START DT: 10/80 END DT: 09/85
OBJECTIVE: TO DETERMINE, THROUGH EPIDEMIOLOGICAL METHODS, THE CAUSES AND
INTERVENTION STRATEGIES FOR REDUCING LADDER FALL ACCIDENTS.
28. CONSTRUCTION RESEARCH COORDINATION AND TECHNICAL ASSISTANCE
PROJECT OFFICER: RONALD L STANEVICH (FTS-923-4574) START DT: 10/84 END DT: 09/87
OBJECTIVE: DEVELOP CONCEPT MEMOS FOR POTENTIAL DSR RESEARCH PROJECTS RELATED TO
HIGH-RISK CONSTRUCTION OCCUPATIONS.
29. RAPID TURNAROUND INJURY INVESTIGATIONS
PROJECT OFFICER: ROBERT M BRACKBILL (FTS-923-4812) START DT: 10/84 END DT: 09/86
OBJECTIVE: PROVIDE RAPID ACCESS TO INJURY INVESTIGATION/REPORTS ON A TASK ORDER
BASIS. BUILD CAPABILITY TO CONDUCT SHORT STUDIES IN PRIORITY AREAS.
30. ENCODE OSHA FATALITY INVESTIGATIONS
PROJECT OFFICER: PATRICIA M CUTLIP (FTS-923-4411) START DT: 08/84 END DT: 09/86
OBJECTIVE: ABSTRACT AND ENCODE OSHA FATALITY INVESTIGATION INFORMATION IN A
COMPUTER DATA BASE FOR IDENT. OF HIGH RISK OCCUPATIONS AND INDUSTRIES.
31. EVALUATION OF CONSTRUCTION FATAL ACCIDENT CIRCUMSTANCES
PROJECT OFFICER: RONALD L STANEVICH (FTS-923-4574) START DT: 10/84 END DT: 09/85
OBJECTIVE: CORRELATE FATAL CIRCUMSTANCES TO WORKER ACTIVITIES.

32. HIGH RISK CONSTRUCTION WORKER ACTIVITIES
 PROJECT OFFICER: RONALD L STANEVICH (FTS-923-4574) START DT: 10/84 END DT: 09/85
 OBJECTIVE: IDENTIFY SPECIFIC OCCUPATION HIGH RISK WORK ACTIVITIES.
33. STATE ENERGY CONTROL STUDY
 PROJECT OFFICER: MICHAEL B MOLL (FTS-923-4805) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO ESTIMATE THE EFFECTIVENESS OF SPECIFIC HAZARDOUS ENERGY CONTROL
 PROCEDURES (LOCKOUT, TAGOUT, ETC.) IN VARIOUS INDUSTRIES.

OTHER PERSONAL PROTECTIVE EQUIPMENT

34. PHYSIOLOGICAL RESPONSES PROJECT-PHASE III-COOLING GARMENT EFFECTIVENESS
 PROJECT OFFICER: MARY K WHITE (FTS-923-4801) START DT: 12/84 END DT: 09/86
 OBJECTIVE: TO DEVELOP RECOMMENDATIONS ON THE EFFECTIVENESS OF COOLING GARMENTS
 USED IN COMBINATION WITH PROTECTIVE CLOTHING AND RESPIRATORS.
35. PHYSIOLOGICAL RESPONSE TO WEARING PROTECTIVE CLOTHING AND RESPIRATORS
 PROJECT OFFICER: MARY K WHITE (FTS-923-4801) START DT: 04/83 END DT: 09/85
 OBJECTIVE: TO DEVELOP RECOMMENDATIONS FOR THE SAFE SELECTION AND USE OF
 PROTECTIVE CLOTHING USED IN COMBINATION WITH RESPIRATORS.
36. CPC EVALUATION METHODS DEVELOPMENT
 PROJECT OFFICER: MICHAEL M RODER (FTS-923-4339) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO PROVIDE EFFECTIVE METHODS FOR PREDICTING THE PERFORMANCE OF
 PROTECTIVE CLOTHING AGAINST CHEMICAL EXPOSURES.
37. CPC INFORMATION COLLECTION/DISSEMINATION
 PROJECT OFFICER: MICHAEL M RODER (FTS-923-4339) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO OBTAIN PRODUCT EVALUATION DATA, PUT INTO A USER ORIENTED FORMAT AND
 DISSEMINATE TO USER.
38. CPC INTERMANUFACTURERS PERFORMANCE VARIABILITY
 PROJECT OFFICER: RONALD L MICKELSEN (FTS-923-4339) START DT: 10/84 END DT: 12/86
 OBJECTIVE: DETERMINE THE PERFORMANCE VARIABILITY OF CPC MATERIAL BEARING THE SAME
 GENERIC NAME BUT PRODUCED BY DIFFERENT MANUFACTURERS.
39. CPC QUICK EMPIRICAL METHODS
 PROJECT OFFICER: STEPHEN P BERARDINELLI (FTS-923-4337) START DT: 10/84 END DT: 12/85
 OBJECTIVE: TO PROVIDE A VALIDATED METHOD OF EASILY USING COLLECTED TEST DATA TO
 PREDICT CHEMICAL PROTECTIVE CLOTHING (CPC) PERFORMANCE.

40. CHEMICAL PROTECTIVE CLOTHING IN CHEMICAL WASTE-DUMPS
PROJECT OFFICER: STEPHEN P BERARDINELLI (FTS-923-4337) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO VALIDATE TWO CHEMICAL RESISTANCE TEST METHODS AND TO EVALUATE OTHER
FIELD TEST METHODS UNDER ACTUAL USAGE.

41. SAFETY IN HAZARDOUS MATERIALS INCIDENTS
PROJECT OFFICER: RICHARD M RONK (FTS-923-4809) START DT: 10/81 END DT: C
OBJECTIVE: TO DEVELOP SAFETY AND HEALTH INFORMATION FOR USE DURING HAZARDOUS
MATERIALS INCIDENTS.

INFORMATION DISSEMINATION/DOCUMENT DEVELOPMENT

42. ED. SAF. PROGRAMS FOR SMALL GRAIN HANDL. FAC. AND ON-FARM OPERATIONS
PROJECT OFFICER: RICHARD M RONK (FTS-923-4809) START DT: 10/83 END DT: 09/85
OBJECTIVE: TO DEVELOP AND DISSEMINATE INFORMATION ON THE PREVENTION OF GRAIN
ELEVATOR FIRES AND EXPLOSIONS.

43. COAL MINE DUST PERSONAL SAMPLER UNIT CERTIFICATION
PROJECT OFFICER: JOSEPH R WILLIAMS (FTS-923-4864) START DT: 05/72 END DT: C
OBJECTIVE: EVALUATE THE PERFORMANCE OF COAL MINE DUST SAMPLING EQUIPMENT USED IN
THE MSHA MINE ATMOSPHERE SAMPLING PROGRAM.

MUSCULOSKELETAL INJURIES

44. MUSCULOTENDINOUS INJURIES RELATED TO MUSCLE FATIGUE
PROJECT OFFICER: ROGER M NELSON (FTS-923-4810) START DT: 10/82 END DT: 09/86
OBJECTIVE: TO RELATE LOW LEVELS OF MUSCLE CONTRACTION HELD TO FATIGUE TO
MUSCULOTENDINOUS INJURIES IN THE WORKPLACE.

45. OBJECTIVE EVALUATION OF LOW BACK INJURIES
PROJECT OFFICER: ROGER M NELSON (FTS-923-4810) START DT: 10/83 END DT: C
OBJECTIVE: TO DEVELOP A STANDARDIZED METHOD TO EVALUATE INDUSTRIALLY RELATED LOW
BACK INJURIES FOCUSING ON THE MOVEMENT DYSFUNCTION SYNDROME.

46. STUDY OF FALLS INVOLVED WITH PUSHING AND PULLING TASKS
PROJECT OFFICER: TIMOTHY J PIZATELLA (FTS-923-4807) START DT: 10/80 END DT: 09/85
OBJECTIVE: TO REDUCE THE RISK OF MUSCULOSKELETAL INJURIES DUE TO FALLS AND
OVEREXERTIONS BY MINIMIZING STRESS DURING PUSHING AND PULLING TASKS.

47. IDENTIFICATION OF MUSCULOSKELETAL STRESS DURING ASYMMETRIC LIFTING
 PROJECT OFFICER: TIMOTHY J PIZATELLA (FTS-923-4807) START DT: 10/84 END DT: 09/87
 OBJECTIVE: TO PREVENT MUSCULOSKELETAL INJURIES TO MANUAL MATERIALS HANDLING BY
 IDENTIFYING STRESS DURING ASYMMETRIC LIFTING TASKS.
48. DEV. OF JOB AND SURV. TOOLS TO EVAL. AND CONTROL UPPER EXTREM. INJURIES
 PROJECT OFFICER: JAMES D MCGLOTHLIN (FTS-923-4808) START DT: 10/84 END DT: 09/85
 OBJECTIVE: TO DEVELOP JOB ANALYSIS AND EPIDEMIOLOGIC SURVEILLANCE INSTRUMENTS TO
 REDUCE MICRO AND MACRO TRAUMA INJURIES IN THE WORKPLACE.
49. HEALTH CARE INDUSTRY--LOW BACK EPIDEMIOLOGIC STUDY
 PROJECT OFFICER: ROGER C JENSEN (FTS-923-4809) START DT: 10/84 END DT: 09/87
 OBJECTIVE: IDENTIFY HOSPITAL TASKS WITH HIGH RISK OF BACK INJURY AND DEMONSTRATE
 BIOMECHANICAL TECHNIQUES FOR DETERMINING SAFEST WORK METHOD.

DIVISION ADMINISTRATION

50. SAFETY DIVISION MANAGEMENT
 PROJECT OFFICER: JOHN B MORAN (FTS-923-4595) START DT: 06/77 END DT: C
 OBJECTIVE: ADMINISTER AND DIRECT THE DIVISION OF SAFETY RESEARCH.

HEALTH HAZARD EVALUATIONS/TECHNICAL ASSISTANCE

51. FATAL ACCIDENT CIRCUMSTANCES AND EPIDEMIOLOGY PROGRAM
 PROJECT OFFICER: LEE M SANDERSON (FTS-923-4804) START DT: 10/83 END DT: 09/88
 OBJECTIVE: TO PROVIDE TECHNICAL ASSISTANCE AND RISK FACTOR ASSESSMENTS OF
 ELECTROCUTIONS AND CONFINED SPACE FATALITIES THROUGH EPI. EVAL.

DIVISION OF STANDARDS DEVELOPMENT AND TECHNOLOGY TRANSFER

The Division of Standards Development and Technology Transfer (DSDTT) develops, from existing scientific and technical information, documents containing (a) criteria for recommended occupational safety and health standards, and (b) technical and scientific information relevant to a variety of occupational safety and health issues. In cooperation with the U.S. Department of Labor, DSDTT coordinates NIOSH testimony at the Department of Labor hearings on proposed standards to support scientific and technical considerations, and prepares and annually revises the legislatively mandated toxic substances list. DSDTT manages a clearinghouse for receiving, storing, retrieving, and disseminating technical information on occupational safety and health, and provides a statistical methodology review for NIOSH research activities.

DSDTT compiles and analyzes the results of research and investigations pertaining to selected occupational safety and health hazards for the purpose of preparing recommended standards. These standards include environmental limits, requirements for medical examinations for workers, labeling, personal protective equipment and clothing, employee notification of hazards, safe work practices, sanitation, monitoring, and recordkeeping. The division prepares special occupational hazard reviews and risk assessments of potential workplace hazards where new evidence of a particular hazard is received, and prepares recommended emergency temporary standards as appropriate.

DSDTT identifies information on worker exposure, chemical hazard severity, and other data through profile development, and maintains a system for determining the status of projects in other federal agencies and the private sector for quick response in identification of potential workplace hazards. The division establishes liaison with government and non-government sources to obtain technical data, and develops and maintains the NIOSH computer-based technical information system and other computer-oriented information resources.

The division identifies, in priority order, those substances, industries, and occupations which pose an unacceptable safety and health hazard, and prepares priority lists of substances, processes, industries, etc., for which document development and Institute research should be developed or revised. DSDTT also analyzes information on the exposure of workers to safety and health hazards, and assesses the adequacy of studies, research, and data collection activities to provide the basic information needed for decisions on document development, priorities establishment, and other actions coming from essential information.

DSDTT is located at the Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, Ohio 45226. The Division Director is Mr. Richard A. Lemen, telephone (513) 684-8302, FTS 684-8302.

INFORMATION DISSEMINATION/DOCUMENT DEVELOPMENT

1. STANDARDS COMPLETION PROGRAM (SCP) GUIDELINES
PROJECT OFFICER: MAURICE GEORGEVICH (FTS-684-8311) START DT: 10/82 END DT: C
OBJECTIVE: DEVELOP OCC. HEALTH GUIDELINES ON ASBESTOS FOR CHEM. HAZARDS. UPDATE
GUIDELINES AND POCKET GUIDE TO CHEM. HAZARDS, AS APPROPRIATE.
2. CONSULTATION AND BRANCH ADMINISTRATION
PROJECT OFFICER: WILLIAM D WAGNER (FTS-684-8319) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE ADMINISTRATIVE SUPPORT TO THE DOCUMENT DEVELOPMENT BRANCH
PROGRAMS AND CONSULTATIVE ASSISTANCE TO THE DSDTT AND OTHER REQUESTS.
3. DOCUMENT DEVELOPMENT
PROJECT OFFICER: RALPH D ZUMWALDE (FTS-684-8311) START DT: 10/70 END DT: C
OBJECTIVE: DEVELOP DOCUMENTS DURING FY 85 THAT WILL PROVIDE SAFETY AND HEALTH
RECOMMENDATIONS TO OSHA, MSHA, EPA, INDUSTRY, AND LABOR.
4. DIVISION MANAGEMENT
PROJECT OFFICER: RICHARD A LEMEN (FTS-684-8302) START DT: 10/70 END DT: C
OBJECTIVE: PROVIDES DIRECTION AND GUIDANCE TO THE DSDTT PROGRAMS.
5. QUANTITATIVE RISK ASSESSMENT
PROJECT OFFICER: THEODORE J MEINHARDT (FTS-684-8302) START DT: 10/70 END DT: C
OBJECTIVE: PROJECT WILL PROVIDE ASSESSMENT OF PERTINENT HEALTH DATA TO SUPPORT
TWO RECOMMENDED OCCUPATIONAL HEALTH AND SAFETY STANDARDS.
6. DOL (OSHA/MSHA) REGULATORY RESPONSES
PROJECT OFFICER: LAWRENCE F MAZZUCKELLI (FTS-684-8302) START DT: 10/83 END DT: C
OBJECTIVE: PROVIDE TECH. SUPPORT TO OSHA/MSHA IN RESPONSE TO REQUESTS FOR NIOSH
ASSIST. IN RULEMAKING EFFORTS AND COORDINATE DEVELOP. OF INST. TESTIMONY.
7. LIBRARY SERVICES
PROJECT OFFICER: VIVIAN K MORGAN (FTS-684-8323) START DT: 10/83 END DT: C
OBJECTIVE: THIS PROJECT PROVIDES FOR THE BUILDING, MAINTENANCE AND TRANSFER OF
INFORMATION FROM THE NIOSH LIBRARY COLLECTION TO NIOSH STAFF.

8. PUBLISHING AND DISSEMINATION OF NIOSH PUBLICATIONS
 PROJECT OFFICER: VIVIAN K MORGAN (FTS-684-8323) START DT: 10/83 END DT: C
 OBJECTIVE: PROVIDES FOR PUBLISHING AND DISSEMINATING DOCUMENTS RELATING TO NIOSH RESEARCH AND THE TEN LEADING WORK-RELATED DISEASES AND INJURIES.
9. TECHNOLOGY TRANSFER
 PROJECT OFFICER: THEODORE F SCHOENBORN (FTS-684-8326) START DT: 10/83 END DT: C
 OBJECTIVE: THIS PROJECT PROVIDES FOR THE MARKETING OF NIOSH-DEVELOPED DATA BASES, NEW APPROACHES TO TECHNOLOGY TRANSFER, AND INSTITUTE EXHIBIT PROGRAMS.
10. INFORMATION RETRIEVAL AND ANALYSIS
 PROJECT OFFICER: RODGER L TATKEN (FTS-684-8328) START DT: 10/70 END DT: C
 OBJECTIVE: PROVIDES FOR ACQUISITION AND DISSEMINATION OF OSH INFORMATION IN SUPPORT FOR NIOSH RESEARCH AND IN RESPONSE TO PUBLIC INQUIRIES.
11. PRIORITIES DEVELOPMENT
 PROJECT OFFICER: SANFORD S LEFFINGWELL (FTS-684-8306) START DT: 10/70 END DT: C
 OBJECTIVE: TO ANALYZE INSTITUTE RESEARCH OUTPUT AND DEVELOP PRIORITIES FOR NIOSH DOCUMENTS AND RESEARCH.
12. REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)
 PROJECT OFFICER: DORIS V SWEET (FTS-684-8317) START DT: 10/70 END DT: C
 OBJECTIVE: PROVIDES FOR THE COLLECTION, VERIFICATION AND INPUT OF TOX. DATA IN A COMPUTERIZED FILE USED TO PRODUCE LEGISLATIVELY MANDATED PUBLICATIONS.
13. NIOSHTIC
 PROJECT OFFICER: WILLIAM D BENNETT (FTS-684-8317) START DT: 10/70 END DT: C
 OBJECTIVE: PROVIDE FOR THE COLLECTION, VERIFICATION, AND INPUT OF TECH. LIT. INTO NIOSH'S COMPUTERIZED OSH BIBLIOGRAPHY DATA BASE.
14. NIOSH INFORMATION SYSTEMS
 PROJECT OFFICER: RICHARD J LEWIS (FTS-684-8317) START DT: 10/70 END DT: C
 OBJECTIVE: PROVIDES FOR THE DEVELOPMENT OF INFORMATION SYSTEMS TO SUPPORT THE DATA NEEDS OF PRAB, DSDTT, OTHER NIOSH DIVISIONS, AND THE PUBLIC.
15. INFORMATION SUPPORT/TECHNOLOGY TRANSFER FOR HAZARDOUS WASTE PROGRAM
 PROJECT OFFICER: THEODORE F SCHOENBORN (FTS-684-8326) START DT: 10/83 END DT: C
 OBJECTIVE: THIS PROJECT PROVIDES INFORMATION SUPPORT FOR THE HAZARDOUS WASTE PROGRAM AND ENSURES DISSEMINATION OF THE COMPLETED GUIDANCE MANUALS.

SAMPLING/ANALYSIS

16. STATISTICAL REVIEW AND CONSULTATION

PROJECT OFFICER: KENNETH A BUSCH (FTS-684-8302)

START DT: 10/83

END DT: C

OBJECTIVE: PROVIDES SENIOR-LEVEL STATISTICAL CONSULTATION; REVIEWS STUDY DESIGNS
FOR EFFICIENCY AND RELIABILITY.

DIVISION ADMINISTRATION

17. DIVISION MANAGEMENT

PROJECT OFFICER: RICHARD A LEMEN (FTS-684-8302)

START DT: 10/84

END DT: C

OBJECTIVE: PROVIDE ADMINISTRATIVE DIRECTION FOR THE WORK FORCE DEVELOPMENT
PROGRAM INVOLVING NIOSH OFFICES/DIVISIONS, AND OUTSIDE AGENCIES.

DIVISION OF TRAINING AND MANPOWER DEVELOPMENT

The Division of Training and Manpower Development (DTMD) implements Section 21 of the Occupational Safety and Health (OSH) Act, which mandates the training and education functions. DTMD develops programs to increase the numbers and competence of the OSH professional and paraprofessional work force. This continuing education program provides short-term technical training courses, including seminars, independent study packages, and specialized workshops, to federal, State and local government, private industry, labor unions, and other organizations in the OSH field. The curriculum development program designs and produces course packages and other training materials for Institute-sponsored training programs including those presented by in-house faculty as well as those conducted by universities and other outside training organizations.

The educational resource development program continually assesses manpower needs for OSH practitioners and researchers on a nationwide basis. To help meet the demand, DTMD administers a major training grant program to foster the development of academically-based training programs for occupational physicians, occupational health nurses, industrial hygienists, toxicologists, epidemiologists, and safety professionals including engineers and managers. DTMD also develops specific criteria and sets standards for the selection of qualified organizations to conduct and evaluate the effectiveness of Institute-initiated programs.

DTMD is located at the Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, Ohio 45226. The Division Director is Alan D. Stevens, DVM, telephone (513) 684-8221, FTS 684-8221.

*** DIVISION OF TRAINING AND MANPOWER DEVELOPMENT ***

TRAINING

1. CONTINUING EDUCATION

PROJECT OFFICER: EDWARD D LEININGER (FTS-684-8228) START DT: 10/77 END DT: C
OBJECTIVE: TO PROVIDE TRAINING COURSES, CONSULTATION, AND TECHNICAL ASSISTANCE TO ORGANIZATIONS AND INDIVIDUALS INVOLVED IN THE OSH FIELD.

2. EDUCATIONAL RESOURCE DEVELOPMENT

PROJECT OFFICER: THOMAS C PURCELL (FTS-684-8241) START DT: 10/77 END DT: C
OBJECTIVE: TO ADMINISTER TRAINING GRANTS; TO ASSESS MANPOWER SUPPLY/DEMAND AND TO INFLUENCE THE CURRICULA OF NON-OSH ACADEMIC PROGRAMS.

3. CURRICULUM DEVELOPMENT

PROJECT OFFICER: NORBERT J BERBERICH (FTS-684-8229) START DT: 10/77 END DT: C
OBJECTIVE: TO DESIGN AND DEVELOP EDUCATIONAL CURRICULUM, TRAINING COURSES, AND AUDIOVISUAL SUPPORT MATERIALS FOR OSH PROFESSIONALS AND TECHNICIANS.

4. HAZARDOUS WASTE TRAINING PROGRAM

PROJECT OFFICER: EDWARD D LEININGER (FTS-684-8228) START DT: 10/84 END DT: 09/85
OBJECTIVE: TO MANAGE ERC TRAINING COURSES AND FINALIZE CURRICULUM MATERIALS ACCORDING TO IA WITH EPA FOR CERCLA/SUPERFUND.

DIVISION ADMINISTRATION

5. PROGRAM MANAGEMENT AND SUPPORT

PROJECT OFFICER: ALAN D STEVENS (FTS-684-8221) START DT: 10/84 END DT: 09/85
OBJECTIVE: TO PROVIDE ADMINISTRATIVE DIRECTION FOR THE WORKFORCE DEVELOPMENT PROGRAM INVOLVING NIOSH OFFICES/DIVISIONS, AND OUTSIDE AGENCIES.

INSTITUTE ADMINISTRATION

Institute Administration includes the Office of the Director and all of the offices and branches responsible for management of the operations of the Institute. Management activities include the leadership and coordination of the Institute's planning, evaluation, resource allocation, regulation, legislation, and administrative management functions. Liaison is maintained with the U.S. Department of Labor, U.S. Department of the Interior, other federal agencies, PHS Regional Offices, State and local government agencies, industry, and organized labor with regard to promotion of occupational safety and health. Information and technical assistance are also provided to other nations in establishing and implementing occupational safety and health programs. Institute Administration includes identification of major policy issues, analysis of legislative proposals, and the development of the strategy and philosophy of the Institute's mission and objectives. Responsibilities such as preparation of policies and procedures, operations, fiscal services, and personnel management, as well as management of Grants, International Health, and Health Risk Appraisal programs are included.

Institute Administration conducts or coordinates special technical studies, including evaluation of technical information, on potentially hazardous substances in the occupational environment including toxicity for man and animals, and the potential population at risk. Institute Administration alerts the occupational health community, other government agencies, management, labor, and public interest groups to new information on potential occupational health hazards.

Institute Administration develops the strategy and philosophy of the Institute's mission and objectives. This necessitates establishing goals and objectives, implementing HHS planning mechanisms, directing operation of the Institute's internal program planning system, and recommending funding and manpower resource levels for program activities. Also required is coordination of the research and scientific exchange conducted under multilateral and bilateral international agreements and contact with professional associations, academic institutions, and safety and health professionals, to assure Institute compliance with ethical scientific research procedures.

In carrying out the foregoing functions, the Institute Administration seeks to direct the development of a national program recommending occupational safety and health interventions and standards to assure safe and healthful working conditions for every working person.

*** OFFICE OF THE DIRECTOR ***

INSTITUTE ADMINISTRATION

1. INSTITUTE POLICY
PROJECT OFFICER: J DONALD MILLAR (FTS-236-3771) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE MANAGEMENT AND POLICY DIRECTION FOR THE INSTITUTE.
2. SENIOR SCIENTIFIC ADVISORY STAFF
PROJECT OFFICER: ELLIOTT HARRIS (FTS-236-3773) START DT: 10/84 END DT: C
OBJECTIVE: ADVISE THE INSTITUTE DIRECTOR ON STRATEGY FOR POLICY DEVELOPMENT ON
ISSUES RELATING TO OCCUPATIONAL SAFETY AND HEALTH RESEARCH.
3. CONGRESSIONAL AND INFORMATION ACTIVITIES
PROJECT OFFICER: DIANE E DUNKIN (FTS-236-3061) START DT: 10/84 END DT: C
OBJECTIVE: CONDUCT NIOSH INFORMATION/COMMUNICATIONS PROGRAM.
4. STATE AND REGIONAL OPERATIONS--HEADQUARTERS
PROJECT OFFICER: PHILLIP W STRINE (FTS-236-3190) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE POLICY GUIDANCE AND COORDINATION TO REGIONAL OFFICE STAFF
ON PROGRAM DEVELOPMENT AND IMPLEMENTATION OF NIOSH PROGRAMS.
5. RESEARCH AND DEMONSTRATION GRANTS
PROJECT OFFICER: ROY M FLEMING (FTS-236-3343) START DT: 10/84 END DT: C
OBJECTIVE: DEVELOP GRANT PROGRAMS, REVIEW APPLICATIONS, AND MONITOR RESEARCH
AND DEMONSTRATION GRANTS IN PRIORITY AREAS OF SCIENTIFIC INVESTIGATIONS.

*** OFFICE OF ADMINISTRATION AND MANAGEMENT SERVICES ***

INSTITUTE ADMINISTRATION

1. OFFICE OF THE DIRECTOR, OAMS
PROJECT OFFICER: J BRIAN DUGAN (FTS-236-3691) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE MANAGEMENT AND DIRECTION TO ALL OAMS BRANCHES.
2. NIOSH-WIDE INFORMATION AND MANAGEMENT SYSTEMS
PROJECT OFFICER: ANDREW T SUMNER (FTS-236-3895) START DT: 10/84 END DT: C
OBJECTIVE: PROVIDE LEADERSHIP AND SERVICES AS NIOSH-WIDE FOCUS FOR INFORMATION
AND MANAGEMENT SYSTEMS COORDINATION AND DEVELOPMENT.

*** OFFICE OF PROGRAM PLANNING AND EVALUATION ***

1. OFFICE OF THE DIRECTOR, OPPE
PROJECT OFFICER: MELVIN L MYERS (FTS-236-3794) START DT: 10/83 END DT: C
OBJECTIVE: PROVIDE MANAGEMENT FOR INSTITUTE PLANNING, EVALUATION, AND
INTERNATIONAL PROGRAMS.
2. HEALTH PROMOTION
PROJECT OFFICER: CHARLES A ALTHAFER (FTS-236-3794) START DT: 10/84 END DT: C
OBJECTIVE: INCORPORATE OCCUPATIONAL RISK FACTORS INTO HRAS AND USE THEM IN
DEVELOPING WORKSITE HEALTH PROMOTION PROGRAMS.