Program of the
National Institute for Occupational Safety and Health

Program Plan by Program Areas for FY 1984-89

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Edited By:

Melvin L. Myers, MPA
Engineer Director
Director, Office of Program
Planning and Evaluation

P. Craig Withers, MHA, MBA
Team Leader, Program Planning
Office of Program Planning
and Evaluation

Joyce A. Johnson, B.S.
Program Analyst
Office of Program Planning
and Evaluation

PREFACE

The National Institute for Occupational Safety and Health (NIOSH) is the Federal "lead agency" in health for preventing occupational diseases and injuries. Because NIOSH is a scientific institute, not a regulatory agency, its influence on the prevention of occupational health problems depends, to a large extent, upon the scientific quality of its findings and recommendations. In short, NIOSH fulfills its leadership mission through suasion based on scientific integrity.

This is the third Program Plan to be published since I was appointed Director of NIOSH in July, 1981. It represents the culmination of a systematic process for improving the planning of the Institute's scientific research. This year's Plan differs from its predecessors in a very important way; it covers a period of five years rather than one year as in the past. Though the Plan will be amended and updated annually, its broader scope enables us to widen our vision and allow for expected developments in this field.

The Program Plan for Fiscal Year 1983 reflected our efforts to respond to the Objectives for the Nation in Occupational Safety and Health, of the U. S. Public Health Service[1]. The Program Plan for FY 1984-89 is faithful to the Objectives for the Nation, but also incorporates longer range objectives for controlling the suggested "Ten Leading Work-Related Diseases and Injuries" previously published by NIOSH[2]. The Plan incorporates our continuing efforts to support Federal regulatory agencies, especially the Occupational Safety and Health Administration (OSHA), and the Mine Safety and Health Administration (MSHA), of the U.S. Department of Labor. Together, they form the national regulatory arm of occupational safety and health; the Plan includes projects developed in specific response to requests from each.

In directing the Institute during the past two years, I have concentrated on four tasks, the accomplishment of which I believed essential to the vitality and credibility of NIOSH as a scientific leader:

1. Strengthening mechanisms to assure scientific excellence in the research and recommendations of NIOSH.

   We have accomplished this task. We established the Science Advisory Staff to provide internal scientific review of research projects and operations. We have strengthened the peer review system by requiring peer review of all research protocols. In 1983, the Mine Health Research Advisory Committee examined our peer review requirements and found them more rigorous than those of the National Institutes of Health[3]. We established the Institute's first Board of Scientific Counsellors, to advise the Director on all aspects of research conducted by NIOSH, and selected ten outstanding scientists to comprise the Board. I believe it is now fair to say that our existing means for safe-guarding the scientific quality of the work of NIOSH, are as good as those of any other Federal scientific institution.

2. Focusing the scientific activity of the Institute on the most important diseases and injuries caused by work.

   We have accomplished this task. In the Morbidity and Mortality Weekly Report of January 21, 1983, we published our suggested list of the Ten Leading Work-Related Diseases and Injuries. Groups of the Institute's experts in these problems have begun to develop papers describing proposed national strategies for the control of each. In 1984, we will present these proposed prevention strategies to a major national public meeting to facilitate discussion of what really needs doing to prevent these problems. For each of the "Ten Leading" we have also developed visionary long range "goals" intended to serve as beacons for our future planning efforts.

3. Defining an appropriate role for NIOSH in health promotion in the workplace.

   We have accomplished this task. We formed the Health Motivation Working Group of NIOSH scientists to examine the Institute's activities relevant to health promotion, and to propose initiatives. They produced a proposed strategy which provides a framework for the development of a sound program in this area. They are now developing an implementation plan for this strategy.

   We appointed an internationally recognized health educator, with specific expertise in Individual Health Risk Appraisal (the principal clinical tool of health promotion). He spoke out on the need to incorporate occupational risks in health risk appraisal instruments, and to make individual health risk appraisals accessible to hourly-wage workers.

   We now see that NIOSH has a unique capability, and responsibility, to emphasize the need for simultaneous application in the workplace, of both health protection (control of environmental hazards) and health promotion (improvement of personal health behaviors). This will make possible a "synergism of prevention" to improve the health of workers through comprehensive risk reduction.

4. Enabling greater participation of State and local health departments, the backbone of the American Public Health system, in occupational safety and health.

   We have not accomplished this task, but we have made a good beginning. We have surveyed the State Health Officers to determine existing capabilities and interests of the States in occupational safety and health. Our Regional Office representatives have worked with the State Health Departments to formulate initiatives which, with limited funding, would encourage more health department activity in work-related health problems. Interest has been keen. We have established cooperative agreements with five State Health Departments for surveillance of occupational diseases and injuries. We have assisted

one State Health Department in assuming responsibility for conducting all Health Hazard Evaluations requested within its borders. We have assigned an experienced epidemiologist from the staff of NIOSH to a major State Health Department, and we are trying to get Epidemic Intelligence Service Officers, on assignment to State Health Departments for general epidemiological duties, involved in occupational health problems.

The Conference of State and Territorial Epidemiologists, in response to our encouragement, decided to add silicosis to the list of diseases tele-reportable weekly to CDC as soon as an appropriate disease definition can be developed. This is the first purely occupational problem to be included in the list. We have encouraged health departments in all the States to require more specific information about occupation on death certificates, and occupational data in ongoing morbidity surveillance activities. We have, through a cooperative agreement between CDC and the Association of Schools of Public Health, encouraged greater collaboration between the schools and several State Health Departments on occupational safety and health.

Because of the vitality and capabilities of State and local health departments, much more could be done, much remains to be done, and much more will be done, in time. But our encouragement and leadership in these developments must increase if the potentially enormous benefits of full participation by State and local health departments in occupational safety and health are to be realized.

While NIOSH has made great progress, we are not yet satisfied. Excellence in science, appropriate focus, intelligent role-definition, effective planning, improved collaboration with others active in occupational safety and health, all are attributes of which to be proud--but they are not enough. We are also committed to sustaining the tradition of service, which has always endeared NIOSH to workers and their representative organizations. NIOSH is perhaps unique among Federal research institutes in its ready response to requests by workers for investigation of hazards as perceived by them. We consider it our job to respond promptly to requests, whether or not there is any "research potential" apparent in the problem as presented to us.

New Tasks for a Dynamic NIOSH

To further improve our ability to protect workers, we must now begin to address needs made obvious by the work we have done so far. Thus, we now add two new tasks for the years immediately ahead.

5. Improving the national surveillance of occupational diseases and injuries.

Perhaps the greatest need in occupational safety and health today is for comprehensive systems of national surveillance of occupational diseases and injuries.[4] Many systems are operating; each providing overlapping and often noncomparable fragments of the total epidemiologic situation. To improve this situation, we will encourage the use of an innovative concept in surveillance, "sentinel health events." These are cases of preventable diseases, injuries, or untimely deaths, which reflect a breakdown in preventive mechanisms; they demand rapid intervention to protect the public. For example, a single case of poliomyelitis is a "sentinel health event" which demands immediate public health action to avert an epidemic in the community. We believe that the occurrence of certain occupational injuries and diseases, i.e., occupational "sentinel health events," should similarly prompt rapid and aggressive intervention. A suggested list of 50 "sentinel health events (occupational)" has recently been published.[5] We intend to press for the widespread application of this and other innovations in the surveillance of work-related diseases and injuries.

6. Building an expanded partnership in occupational safety and health.

In addition to stressing excellence and responsiveness in our own performance, we want to broaden our interaction with other groups with similar interests in protecting the health of workers. This broadened interaction will be both national and international in scope. At the national level, we seek greater involvement with several groups of colleagues including, but not limited to: associations of practitioners of occupational safety and health; risk control practitioners in the insurance industry; associations of safety managers; associations of relevant State and local agencies (e.g., ASTHO, USCCHO, NACHO, National Association of Mayors, OSHPA); and concerned voluntary agencies, such as the American Lung Association, the American Cancer Society, The Mother's March, etc.

At the international level, we want to work with multilateral organizations, as well as individual countries, especially those in the developing world. There is much to be learned in assisting developing countries to solve the pressing problems they face in rapid industrialization, and we hope to take advantage of some of these opportunities. We are already at work with The World Health Organization, the International Labor Organization, the International Social Security Association, as well as the governments of China, Egypt, Finland, and Sweden. We seek to focus these efforts, and to develop some limited new initiatives in Africa, the Americas, and Asia, all with the aim of improved protection of working people.

In Conclusion

An important ingredient, perhaps the most important ingredient of our Plan, is the commitment to establish and sustain a professional staff of uniform excellence. In this way, the nation will always have the expert scientific organization envisioned by those who conceived The National Institute for Occupational Safety and Health, and the pioneers who, since 1914, patiently built occupational health and safety skills in the Federal organizations that preceded NIOSH. Lord Horatio Nelson, before the Battle of Trafalgar, was handed the List of the Navy containing the names of every British naval officer, and asked by the First Lord of the Admiralty to hand pick his officers for an upcoming crucial engagement. Despite this almost unheard-of privilege, Nelson demurred, returned the book to his superior, and said, "No, my Lord, choose yourself. The same spirit activates the whole profession. You cannot choose wrong."[6] It is my intention as Director, to so build, nourish, and encourage the excellent personnel of NIOSH, that one may rightly say the same about this Institute.

Finally, it is well to put the Plan in the following perspective. All our accomplishments, all our efforts, and all the hopes manifest in this document, are for one purpose: to protect and preserve something of inestimable value, the good health of the American worker.

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

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2. "Leading Work-Related Diseases and Injuries--United States," Morbidity and Mortality Weekly Report. Vol. 32, No. 2, January 21, 1983.

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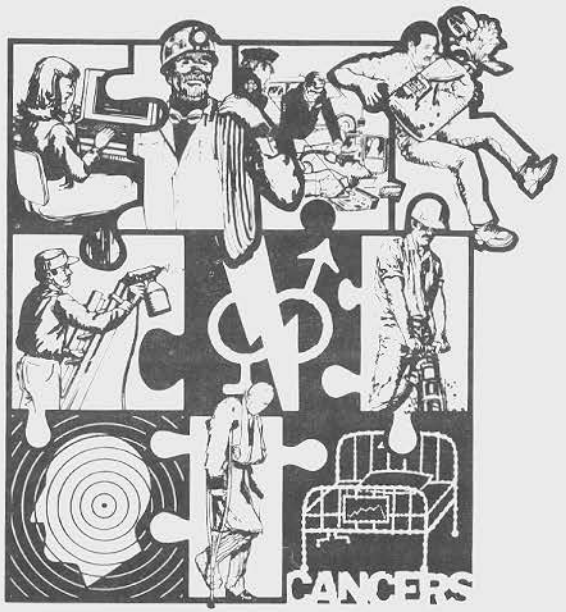

This program plan is the result of several years of evolution toward the purpose of "doing the thing right." Some marked changes have taken place this year to focus our plan on "doing the right thing." This year you will see the plan emphasizing the Ten Leading Work-Related Diseases and Injuries[1]. We are orienting the program at the National Institute for Occupational Safety and Health (NIOSH) toward the control of these diseases and injuries.

In fact, this is our goal. The goal is the first of four elements of any complete plan followed by objectives, a strategy, and tactics. NIOSH monitors performance against its plan through two more elements, program control and evaluation. An introduction to all six of these elements of NIOSH's system for program planning and evaluation follows.

THE GOAL OF THE PROGRAM:

A goal is a "timeless statement of aspiration[2]." Because NIOSH reports through CDC to the Public Health Service, the NIOSH goal is subordinate to the goals of the Centers for Disease Control (CDC) and the U.S. Public Health Service. CDC's goal is to prevent unnecessary morbidity and premature mortality and to improve the quality of life[3]. At the next level up in the organization, the Public Health Service has established five national goals[4]:

1. To continue to improve infant health...
2. To improve child health, foster optimum childhood development...
3. To improve the health and health habits of adolescents and young adults...
4. To improve the health of adults...
5. To improve the health and quality of life for older adults...

To develop its goal, NIOSH first set out to define the problem to be solved. In a caucus among NIOSH top management in January 1982, the NIOSH Director decided to orient priorities toward the ten leading occupational safety and health problems in the United States. At a meeting of NIOSH management in February 1982, he asked the seven NIOSH Division Directors and one Office Director to reach a consensus on these problems based on three criteria: the disease's or injury's frequency of occurrence, its severity in the individual case, and its amenability to prevention.

This effort in defining the problem resulted in the articulation of the NIOSH goal: To Control The Ten Leading Work-Related Diseases and Injuries. These diseases and injuries are:

1. Occupational Lung Diseases
2. Musculoskeletal Injuries
3. Occupational Cancers
4. Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths
5. Cardiovascular Diseases
6. Disorders of Reproduction
7. Neurotoxic Disorders
8. Noise-Induced Loss of Hearing
9. Dermatologic Conditions
10. Psychologic Disorders

By modifying each of the ten on the list with the same action verb modifying the NIOSH goal, we get a set of sub-goals. An example is, To Control Occupational Lung Diseases. These sub-goals will become important in developing objectives.

Box 1. The NIOSH Functional Statement.

It is also important to state the mission of NIOSH. Based on its functional statement*, NIOSH "plans, directs, and coordinates the national program effort to develop and establish recommended occupational safety and health standards and to conduct research, training, and related activities to assure safe and healthful working conditions for every working man and woman:

(1) Administers research in the field of occupational safety and health, including the psychological factors involved; (2) develops innovative methods and approaches for dealing with occupational safety and health problems; (3) provides medical criteria which will ensure, insofar as practicable, that no employee will suffer diminished health, functional capacity, or life expectancy as a result of his (or her) work experience, with emphasis on ways to discover latent disease, establishing causal relationship between diseases and work conditions; (4) serves as a principal focus for training programs to increase the number and competence of persons engaged in the practice of occupational safety and health; (5) develops and coordinates the appropriate reporting procedures which assist in accurately describing the nature of the national occupational safety and health problems; and (6) consults with the U.S. Department of Labor, other federal agencies, State and local government agencies, industry and employee organizations, and other appropriate individuals, institutes, and organizations with regard to promotion of occupational safety and health."

*"Statement of Organizations, Functions, and Delegations of Authority," Federal Register. June 30, 1971.

THE OBJECTIVES IN THE PROGRAM:

A NIOSH objective "is a statement of proposed achievement during a specified period and describes a measurable amount of progress toward a goal or the maintenance of a measurable level as required by a goal[5]." NIOSH objectives have four features: they are measurable (or are at least verifiable), they have a target date, they recognize constraints, and they reflect action with an action verb. They are also supportive of higher level objectives.

The Public Health Service has five objectives that correspond with its goals[4] which were listed earlier. The goals and corresponding objectives are:

1. To continue to improve infant health, and, by 1990, to reduce infant mortality by at least 35 percent, to fewer than nine deaths per 1,000 live births.

2. To improve child health, foster optimal childhood development, and, by 1990, reduce deaths among children ages one to 14 years by at least 20 percent, to fewer than 34 per 100,000.

3. To improve the health and health habits of adolescents and young adults, and, by 1990, to reduce deaths among people ages 15 to 24 by at least 20 percent, to fewer than 93 per 100,000.

4. To improve the health of adults, and, by 1990, to reduce deaths among people ages 25 to 64 by at least 25 percent, to fewer than 400 per 100,000.

5. To improve the health and quality of life for older adults and, by 1990, to reduce the average annual number of days of restricted activity due to acute and chronic conditions by 20 percent, to fewer than 30 days per year for people aged 65 and older.

The 226 Objectives for the Nation[6] are subordinate to the above goals and objectives. Twenty of these Objectives address Occupational Safety and Health and are shown in Figure 1. At CDC a system of measurable objectives is used. The objectives reported to CDC by NIOSH in this system support the Objectives for the Nation. At NIOSH, we consider three levels of objectives.

At one level NIOSH considers the Objectives for the Nation in Occupational Safety and Health in setting its own objectives and provides national leadership in their attainment. To date, this has been done on two fronts. On the federal front, NIOSH selected priority objectives with implementation steps to be achieved[7]. Priorities have been changed recently during a review of progress by the Assistant Secretary for Health[8]. Progress in achieving the Objectives for the Nation is also being monitored by the National Center for Health Statistics based on data provided by NIOSH[9]. NIOSH has also provided questions for that Center's Health Interview Survey to monitor programs in meeting two of these Objectives.

Box 2. Management by Objectives at NIOSH.

NIOSH used a planning cycle for Fiscal Year 1984 that is consistent with the concept of "Management by Objectives." This concept* is a system of management which allows subordinates to participate in setting their own objectives and methods of measuring their accomplishment. The cycle began with the Director issuing the annual program guidance to the Division Directors at NIOSH. This includes budget guidance. It also allowed each Division Director discretion to program 15 percent of his effort independent of the direction but consistent with the mission.

The Director emphasized that the plans should be consistent with the goal to control The Ten Leading Work-Related Diseases and Injuries, and should consider the Objectives for the Nation. Each Division Director then proposed his program based upon the guidance, and the Deputy Director set up "one-on-one" meetings with each Division Director to review general expectations. At the meetings mutual agreement was reached on both long-term and near-term objectives.

*Odewaha, Charles A. "Organization Management by Objectives," Sixteenth Annual Meeting of the Society of Research Administrators, Atlanta, Georgia, September 12-15, 1982.

On another front, NIOSH participated in a CDC seminar[10] to work with States on the Objectives for the Nation. Representatives from several States attended including California, Michigan, Pennsylvania, Texas, and Utah. Some, such as California, were reporting against the Objectives for the Nation, and others, such as Texas, have started since the symposium. In the Texas effort, an interesting feature "pops" out. The State has set an objective for doing 25 Health Hazard Evaluations per year. This effort, among others in other States, may make achievable the Objective for the Nation; by 1990, the number of health hazard evaluations should increase tenfold (or to 1500).

At the next level, NIOSH sets long-term objectives. We call these program objectives. In 1982, three-year objectives were established by Division Directors for the program plan. In 1983, five-year objectives were set by the Division Directors and concurred with by the Deputy Director. The five-year perspective will be maintained as NIOSH goes through the next two years of adapting objectives based on its goal to control the Ten Leading Work-Related Diseases and Injuries.

At a third level, NIOSH sets near-term objectives. These are our project objectives. NIOSH has maintained project objectives for several years. They have been generated "bottom-up" in response to general guidance by the Director. Over time, these objectives will be replaced with project objectives that are subordinate to long-term objectives at NIOSH. A set of objectives reflect a strategy. What one needs to do is determine who will meet them and how they will be met.

Box 3. Grants from NIOSH.

If NIOSH requires additional research in specified areas, it issues Requests-for-Applications (RFA's) for investigator-initiated research. Examples of RFA's include one on Reproductive Effects and one on Occupational Dermatology, both issued in 1980, and one on Respirator Research issued in 1982. The Institute has also issued two RFA's to broaden the research interest in occupational safety and health by stimulating less-experienced scientists to prepare research grant proposals. One RFA was announced in 1982 for people who were just beginning their research careers, and another RFA in 1983 directed at investigators with at least two years of experience but still in the early stages of their careers. Thus, NIOSH has a way to target research grants in critical areas.

NIOSH has also targeted its training grants with the use of RFA's. As a result of an RFA issued in 1977, NIOSH established a concept of Educational Resource Centers.

THE STRATEGY FOR THE PROGRAM:

The system for deciding how objectives will be met is a strategy. These decisions need to be made with the knowledge of their possible consequences in the future. A management task at NIOSH is to develop a strategy to control The Ten Leading Work-Related Diseases and Injuries. In developing this strategy, we are taking a four-step approach. First, control strategies for the Nation are being or will be drafted by internal working groups for each of the ten diseases or injuries. Second, the list and the proposed strategies will be aired publicly at a National Symposium. Third, we will propose a national strategy for research for each control strategy. And fourth, we will generate objectives for NIOSH as a part of a national strategy for both control and research.

As a first step, the NIOSH Director named an internal working group in December 1982 to develop a strategy for the control of occupational lung diseases, the problem top-ranked on the list. You will notice that this corresponds to a sub-goal which we noted earlier. The working group adopted the Objective for the Nation related to silicosis, asbestosis, byssinosis, and coal workers' pneumoconiosis.

In August 1983, he established working groups for the next three problems on the list; musculoskeletal injuries, occupational cancers, and amputations, fractures, eye loss, lacerations, and traumatic deaths. A fifth group for cardiovascular diseases will be established in March 1984. The strategies that result from efforts of the first five working groups will be a major topic of discussion at the National Symposium. Working groups for the remaining five problems will be established over the next year.

As a second step, NIOSH will sponsor a National Symposium on the Suggested List of the Ten Leading Work-Related Diseases and Injuries[11] to address the purposes of the list. The purposes, published in 1983, are: "(1) to encourage deliberation and debate among professionals about the major problems in this field of public health, (2) to assist in setting national priorities for efforts to prevent health problems related to work, and (3) to convey to a diverse audience the concerns of the leadership of NIOSH and the focus of the Institute's activities[1]." The list is dynamic. The Symposium may provide evidence for changing what is on the list or the ranking of the diseases and injuries on the list. The Symposium will also bring potential partners together to develop a national strategy for the control of these diseases and injuries.

Third, as each working group at NIOSH completes its respective national strategy, it will be charged to reconvene for the purpose of developing a national strategy for research[12]. This "strategy" will aim at filling information "gaps" which need to be filled to control the relevant diseases or injuries. The working groups will also suggest research that is necessary to push the scientific frontier of the field ahead.

After the National Symposium, NIOSH's fourth step will be to gauge its role in the national strategies. It is in the context of a national strategy for control, a national strategy for research, and NIOSH capacities that NIOSH will generate objectives in response to its goal. NIOSH will consider its opportunities and threats, and its strengths and weaknesses, in developing a set of objectives and, thus, a strategy for the Institute.[13]

Box 4. A Focus on the Vital Few.

An important concept to be considered in NIOSH's strategy and resource allocation is focusing on the vital few*. This concept is called Pareto's Law. In the 1890's an Italian economist, Vilfredo Pareto, observed that, "The significant items in a given group normally constitute a relatively small portion of the total." An example stated by an insurance company is that 67 percent of all injuries account for 6 percent of total injury costs--the "trivial many." More important, 33 percent of all injuries account for 94 percent of total injury costs--the "vital few."

*Juran, T. M., Managerial Breakthrough, McGraw-Hill, New York, 1964.

THE TACTICS FOR THE PROGRAM:

Tactics is the system of fitting means to the ends. The system at NIOSH is based on project planning. The project plan provides a road map to accomplishing the project objective. It is a predetermined course of action used as a basis for controlling actions in the Institute.

In 1972, NIOSH established a system of project planning[5] that survives to the present day. The project plan was called the "quintessence" of the planning scheme then, and this remains true. Four sections of the project plan define precisely the actions and means by which objectives will be met. These sections are (1) an executive summary, (2) a schedule (3) a financial summary, and (4) a personnel summary. The executive summary includes accounting codes, resource totals, a target date, a narrative, and the project title, director, and objective. It is displayed in Figure 2a. A unique Common Accounting Number (CAN) is assigned to each project, which remains with the project through its life. The project is also the exclusive property of a Division to assure one-to-one accountability between a project and a Division Director. For the most part, each Division Director maintains this same one-to-one relationship between Branches and projects.

The narrative contains four parts:

1. Statement of the established operational objective to which the project attempts to relate, and its priority.

2. A brief description of the total project (if it extends beyond 1 year) and its ultimate objective. Included should be an explanation of how the project relates to and will aid in accomplishing the relevant operational objective.

3. The specific project objectives to be accomplished during the planning year. The strategy and methodology of operation should be detailed here with appropriate justification of major expenses; for example, equipment, consultants, and use of contracts.

4. If the project is ongoing, significant accomplishments made during the preceding years should be itemized.

The schedule contains milestones[14]; the accomplishment of which can be verified. An example is displayed in Figure 2b. A critical milestone is selected by the Division Director for each quarter and should be on the critical path[15] so as to indicate progress along the longest chain in a network of actions toward meeting the project objective. In other words, if there is a slip along the critical path, it is likely to cause a slip in the project objective.

The financial summary accounts for funds budgeted to the project for the current fiscal year. An example is shown in Figure 2c. The summary is a spread sheet of funds categorized by the "object classification" code of the Federal Government, such as travel expense. It is spread over four quarters. The yearly totals for all projects in the Division add up to the budget of the Division.

The personnel summary accounts for the planned time of each individual in the Institute who contributes to the project. It is displayed in Figure 2d. Like the budget the total person-years assigned to the project add up, for all of the projects in the Division, to the allocation of person-years to the Division.

Based on this activity, NIOSH prints three variations of a program plan. Two are printed as internal documents. One is sorted by Division and the other by Program. They both summarize information from the executive summary and milestone schedule. An example is shown in Figure 3a. The two internal Program Plans code each project in five ways. These codes can be seen in Figures 3b,c, and d.

The third variation of the Program Plan is intended to be shared with other Federal agencies to plan coordinated activities. An example of the content of this version can be seen in Figure 4. It represents the Institute's program goals and objectives for preventing occupational diseases and injuries.

This constitutes the Institute's plans and intentions, through FY 1989, to consider steps in meeting the Objectives for the Nation and to focus programs on "the problem," The Ten Leading Work-Related Diseases and Injuries. The plans do not reflect recommendations of the various working groups on each of the "Ten" which were established recently. Our plans may, thus, be changed in the future as information from the groups becomes available.

THE CONTROL OF VARIANCES FROM THE PLAN:

There are three kinds of management which together comprise a program at NIOSH. First, there is the management of inputs such as the budget; second, there is the management of activities or "doing things right," and third, there is the management of objectives which is "doing the right things." Our approach is to take corrective action before the project objective is in jeopardy.

In order to deal with over 350 projects, the Institute uses the concept of management by exception[16]. We do this by analyzing variances using the format as shown in Figure 5.

NIOSH management conducts no fewer than two face-to-face reviews each year. Further, each Division Director meets with either the NIOSH Director or Deputy Director no less than every two weeks on current problems. In addition, the Director, Deputy Director, and Executive Officer conduct "rounds" with the Divisions to review particular programs. The rounds are modeled after the "working" rounds or visits that a physician makes in the hospital to check on the status of his or her patients.

Box 5. The NIOSH Program Structure.

NIOSH, has been "operating" under a set of five major elements. The first three Program Elements are modeled after an industrial hygiene model wherein one identifies a problem, then evaluates the problem, and finally controls the problem. The next Element is separated from the others because NIOSH legislative authorities emphasize the dissemination of findings and recommendations. The fifth Program Element covers the administration of the Institute programs.

IDENTIFY WORK-RELATED DISEASES AND INJURIES SO AS TO DETECT AND DEFINE SIGNIFICANT CHANGES IN THE STATUS OF OCCUPATIONAL SAFETY AND HEALTH.

- Surveillance
- Health Hazard Evaluation and Technical Assistance

EVALUATE WORK-RELATED DISEASES AND INJURIES AND OCCUPATIONAL HAZARDS SO AS TO UNDERSTAND THEIR CAUSES AND TO DETECT THEIR VULNERABILITIES TO PREVENTION.

- Occupational Lung Diseases
- Musculoskeletal Injuries
- Occupational Cancers
- Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths
- Cardiovascular Diseases
- Disorders of Reproduction
- Neurotoxic Disorders
- Noise-Induced Loss of Hearing
- Dermatologic Conditions
- Psychologic Disorders

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.

- Respirators
- Control Systems
- Other Personal Protective Equipment
- Sampling and Analysis
- Instrument and Methods Development

DISSEMINATE SCIENTIFIC FINDINGS AND APPROPRIATE RECOMMENDATIONS TO ALL ORGANIZATIONS AND INDIVIDUALS WITH THE NEED TO KNOW TO ASSIST THEM TO ACT TO REDUCE WORK-RELATED DISEASES AND INJURIES; TRAINING AND DEVELOPING PERSONNEL FOR THE FIELD ARE ESSENTIAL ELEMENTS OF THIS PROGRAM.

- Information Dissemination and Document Development
- Work Force Development

ADMINISTER THESE PROGRAMS IN A SENSE OF TOTAL COMMITMENT TO THE HIGHEST PRINCIPLES OF PUBLIC STEWARDSHIP.

- Division Administration
- Institute Administration

Box 7. The Review of Research Grant Applications at NIOSH.

NIOSH maintains a unique system for reviewing grants for approval and funding. The first step is a primary review by a Study Section for Occupational Safety and Health. This Study Section is part of a system at the National Institutes of Health, which is supported by NIOSH through an interagency agreement. The Study Section scores each grant for quality. NIOSH then conducts a secondary review related to filling program needs. In the past, this was done by the five Directors of NIOSH's research Divisions. Currently, NIOSH's Mine Health Research Advisory Committee reviews those grants related to mine health, and the Senior Advisory Staff in the NIOSH Office of the Director conducts these reviews on the remaining grants. The scores indicate whether a grant is fundable. If it is, the list of fundable grants, along with the scores, is presented to the NIOSH Director for selecting those to be awarded.

THE EVALUATION OF PERFORMANCE:

The purpose of evaluation is to assure that the results achieved by the Institute are as expected and to provide a basis for corrective action in the future. Inherent in any evaluation is the need to make a comparison so relative value can be determined. NIOSH maintains an ongoing effort of retrospective evaluation of its programs. These evaluations are stimulated in part by the requirement of NIOSH to spend one percent of its budget under the Public Health Service Act on evaluations.

In addition to retrospective evaluations NIOSH recognizes evaluation as an important ongoing function at the level of the research project, the program, the Division, as well as at the Institute level. Inherent in the NIOSH planning process of program guidance, setting of objectives, and the development of project and program plans, is an evaluative process focusing on previous performance, current capability, and future directions.

We recognize that the real value of evaluation may be in the process itself rather than the resulting recommendations. Many times, by the time we complete an evaluation, the problems that were found have been corrected as a result of the effort.

Box 8. What is an Evaluation?

To evaluate is to place value on. The purpose of evaluation is to assure that the results achieved by the Institute are as expected and to provide a basis for corrective action in the future. Conversely, the purpose of control is to provide a basis for corrective action now.

NIOSH has conducted several evaluations of the effectiveness of its programs. Among these are one on the Criteria Documents Program in 1979, one on the Health Hazard Evaluation program in 1979, and one on the Educational Resource Centers in 1981.

Box 9a. Primary Legislative Authorities for NIOSH.

NIOSH's current responsibilities were established by the following Legislative authorities:

1. The Occupational Safety and Health Act of 1970 (Public Law 91-596) created NIOSH in the Department of Health and Human Services (then HEW) to conduct research in occupational safety and health and OSHA in the Department of Labor (DOL) to establish and enforce related standards. NIOSH is authorized to develop and establish recommended occupational safety and health standards and to conduct education and training programs in order to provide for an adequate supply of qualified personnel in the field of occupational safety and health. The Presidential Document, Executive Order 12196 of February 26, 1980, extended the benefits of the Occupational Safety and Health Act to Federal employees.

2. The Federal Mine Safety and Health Amendments Act of 1977 (Public Law 91-164) amended the Federal Coal Mine Health and Safety Act of 1969 (Public Law 91-173), in effect merging the 1969 Act and the Federal Metal and Nonmetal Mine Safety Act of 1966 (Public Law 89-577). The 1977 Act created the MSHA in DOL and gave the Public Health Service authority to 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, includes (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 who are engaged in programs of biomedical research, and (d) assistance to the States to meet health emergencies of problems involving or resulting from disasters or disease.

A DIGEST AND PROLOGUE:

This introduction is an attempt to put into one place the complex features of NIOSH's program planning system. We have considered NIOSH history, as related to the present system, and current policies. In addition to policies at the NIOSH level, we considered policies at the CDC, the Public Health Service, and the Department of Health and Human Services levels. Additionally, we considered three elements of a program (input, activities, and output), four elements of planning (goals, objectives, strategies, and tactics), and two elements of performance monitoring (control and evaluation). References to the management principles used at NIOSH as specified in the 1983 Program Plan[17] were incorporated.

This document outlines NIOSH's Program Plan for Fiscal Years 1984 to 1989--starting on October 1, 1983, and will serve as a tool for ongoing internal planning and control by the Institute management. NIOSH will make modifications in individual projects as necessary to ensure prompt and appropriate response to emerging problems.

NIOSH has regained some financial resources for FY 1984 in the areas of training, industrywide studies, and research grants. The amount of appropriated funds dropped from $80 million in FY 1980 to $68 million in FY 1981, and to $62 million in FY 1982, with the NIOSH training program incurring the most severe reductions. The FY 1983 budget was $56 million. The FY 1984 budget is $66 million. This budget is distributed across components of NIOSH as indicated in Figure 6. The history of appropriations for NIOSH is displayed in Figure 7, and the funding history for research grants is shown in Figure 8. The FY 1985 Budget may be as low as $56 million.

In contrast, NIOSH has not regained staff resources in FY 1984. NIOSH had 932 positions in FY 1980, 841 in FY 1981, and plateaued at 784 in FY 1982, 783 in FY 1983, and 785 in FY 1984. Reductions to date have been taken in the Administration program element. The NIOSH position allocation in FY 1985 will be 785, but cuts will be taken in the area of temporary employees.

Emphasis will be placed on continuing efforts to identify the needs of users of NIOSH's research findings. For example, the Program Plan for FY 1984 includes specific research projects to meet requests from MSHA and OSHA. Similarly, continuing efforts will be made to identify needs of other users of NIOSH's programs and products--individual workers, organized labor and management, the general population, other Federal agencies such as EPA, and State and local governments.

We also continue the tradition of attempting to forecast problems[5]. This attempt is the content of the next chapter in this plan, "Outlook for 1990." Following that chapter are five more chapters corresponding to each of the program elements discussed earlier with their respective program areas.

We will want to continue to improve our annual Program Plan in both content and presentation and in usefulness to readers both within and outside the Institute. Dr. Michael R. Gondek wrote us in December of 1983 with a request in response to our FY 1983 Program Plan. We would like to thank him for his comments. He was interested in knowing how to "obtain information about which projects will have published reports, when these will be available, and how (to) obtain them." The request was received after the start of the FY 1984 Program Plan, so we are examining how to add this information into the Program Plan for FY 1985.

In the meantime, however, we suggest that the project officer be contacted to answer these questions. His or her phone numbers are indicated with each project in the FY 1983 plan.

Moreover, we have a systematic approach in compiling all NIOSH reports. These are printed annually in the NIOSH Publications Catalog, and can be ordered by contacting the NIOSH Clearinghouse at the address, Publications Dissemination, DSDTT, NIOSH, 4676 Columbia Parkway, Cincinnati, Ohio 45226. We currently do not have a system for cataloging upcoming reports.

Your suggestions for change toward improvement would be appreciated, too. Such suggestions, and any questions regarding this document, should be addressed to me at NIOSH, CDC, Building 1, Room 3040, 1600 Clifton Road, Atlanta, GA 30333.

Melvin L. Myers
Engineer Director
Director, Office of Program
Planning and Evaluation

REFERENCES:

1. "Leading Work-Related Diseases and Injuries--United States," Morbidity and Mortality Weekly Report. Volume 32, Number 2, January 21, 1983.

2. Model Standards for Community Preventative Health Services. A Report to the U.S. Congress from the Secretary of Health, Education, and Welfare, August 1979, pp. 4.

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4. Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention. U.S. Department of Health, Education, and Welfare, Public Health Service, HEW (PHS) Publication No. 79-55071, 1979.

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14. Brady, Rodney H. "MBO goes to Work in the Public Sector," Harvard Business Review. March-April 1973, pp. 69.

15. Martino, R.L. Finding the Critical Path. American Management Association, New York, 1964.

16. Bittel, Lester R. Management by Exception. McGraw-Hill, New York, 1964.

17. NIOSH Program Plan: Fiscal Year 1983. National Institute for Occupational Safety and Health, HHS (NIOSH) Publication Number 83-102, February 1983, pp. 113-114.

Figure 1. Objectives for the Nation in Occupational Safety and Health

OUTCOME:

- Improved health status

  A. By 1990, workplace accident deaths for firms or employers with 11 or more employees should be reduced to less than 3,750 per year.

  B. By 1990, the rate of work-related injuries should be reduced to 8.3 cases per 100 full time workers.

  C. By 1990, lost workdays due to injuries should be reduced to 55 per 100 workers annually.

  D. By 1990, the incidence of compensable occupational dermatitis should be reduced to about 60,000 cases.

  E. By 1990, among workers newly exposed after 1985, there should be virtually no new cases of four preventable occupational diseases--asbestosis, silicosis, and coal workers' pneumoconiosis.

  F. By 1990, the prevalence of occupational noise-induced hearing loss should be reduced to 415,000 cases.

  G. By 1990, occupational heavy metal poisoning (lead, arsenic, zinc) should be virtually eliminated.

PROCESS:

- Reduced risk factors

  H. By 1985, 50 percent of all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.

  I. By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.

- Improved public/professional awareness

  J. By 1990, at least 25 percent of workers should be able, prior to employment, to state the nature of their occupational health and safety risks and their potential consequences, as well as be informed of changes in these risks while employed.

  K. By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injuries.

  L. By 1985, all workers should receive routine notification in a timely manner of all health examinations or personal exposure measurements taken on work environments directly related to them.

  M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.

  N. 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.

  O. 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.

- Improved services/protection

  P. By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as: chronic lung hazards, neurological hazards, carcinogenic hazards, mutagenic hazards, teratogenic hazards, and medical monitoring requirements.

  Q. By 1990, the number of health hazard evaluations being performed annually should increase threefold.

- Improved surveillance/evaluation

  R. By 1985, an ongoing occupational health hazard/illness/injury coding system, survey and surveillance capability should be developed, including identification of workplace hazards and related health effects, including cancer, coronary heart disease, and reproductive effects. This system should include adequate measurements of the severity of work-related disabling injuries.

  S. By 1985, at least one question about lifetime work history and known exposures to hazardous substances should be added to all appropriate existing health data reporting systems, e.g., cancer registries, hospital discharge abstracts, and death certificates.

  T. By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

Figure 2a. An Example of a Project Plan: EXECUTIVE SUMMARY

FY	COST	PROG	CAN	STDTE	ENDDTE	CONTRT$	PYR	FTP	PERSCST
84	VEA	Xyy	062	0484	0387	0	0.8	1	25410

FREFNDS	TOTFNDS	REMFNDS	TOT$FY+1	TOT$FY+2	TOTPROJ$	PREVIOUSPROJ.
7900	33310		46000	50000	129310	

PROJECT TITLE: Work Environment Impact Analysis

PROJECT OBJECTIVE:(2 LINES MAXIMUM)

Establish a process whereby all projects reviewed under the National Environmental Policy Act will have a plan of hazard control.

PROJECT DIRECTOR: Dobbin, D., OPPE 236-3794
(LAST NAME, FIRST INITIAL, DIV.) (PHONE NO.)

PROJECT NARRATIVE: (25 LINES MAXIMUM)

CDC reviews 350 Environmental Impact Statements per year. The Center for Environmental Health has the lead responsibility for this review for DHHS. No more than 6 of these Statements are referred to NIOSH for comment per year. The statements are reviewed under the National Environmental Policy Act which is administered by EPA. A statement is required for major construction projects undertaken by the Federal government.

The project officer will increase the reviews to no fewer than 15 of these statements per month allowing for a review to be incorporated by the relevant Regional Office and one NIOSH division. He will prepare criteria to be used by reviewers, and will review a document of the World Bank used for this purpose on their loans to other Nations. He will assist them in updating this document and modify it for use by the Pan American Health Organization (PAHO). The United States is a member of PAHO, and this document may, in turn, be useful in the United States.

The project relates directly to the two Objectives for the Nation under "reduced risk factors." It will emphasize the prevention of work-related diseases and injuries resulting from both the construction phase and the utilizaton phase of Federal projects.

SIC CDE	SIC CDE	SIC CDE
1540	1600	1700

SIGNATURE DATE

Figure 2b. An Example of a Project Plan: SCHEDULE

COST PROG CAN: VEA-Xyy-062

MILESTONES (MAXIMUM 4 PAGES)	COMPLETION DATES											
	O	N	D	J	F	M	A	M	J	J	A	S
1. Meet with OPPE staff and CEH to initiate a memo-of-understanding				o								
2. Meet with EPA to learn of their process					o							
3. Establish memo-of-understanding with CEH							o					
4. Submit review comments to CEH							2	17	32	47	67	92
5. Complete uniform criteria for reviews												o
6. Complete review of World Bank Criteria (1Q85)			o									
7. Complete review of criteria for use by PAHO (1Q85)												
8. Submit review comments to CEH on 50% of those reviewed by DHHS (2Q85)												
9. Submit review comments to CEH on 90% of those reviewed by DHHS (4Q85)												
10. Draft changes in the Environmental Impact Statement (EIS) regulation to incorporate OSH review (1Q86)												
11. Assure that all EIS's submitted to EPA receive a review for OSH (2Q87)												

Figure 2c. An Example of a Project Plan: FINANCIAL SUMMARY

COST PROG CAN: VEA-Xyy-062 SHOW ONLY NUMBERS IN FINANCIAL COLUMNS
DO NOT USE COMMAS OR PERIODS IN FINANCIAL COLUMNS

CONTRACTS/IA/CO-OP AG	OBJCLASS	QTR1	QTR2	QTR3	QTR4	YR TOT
CONTRACT SUBTOTAL						

COST PROG CAN: VEA-Xyy-062 SHOW ONLY NUMBERS IN FINANCIAL COLUMNS
DO NOT USE COMMAS OR PERIODS IN FINANCIAL COLUMNS

TRAVEL	OBJCLASS	QTR1	QTR2	QTR3	QTR4	YR TOT
Cincinnati	21.11			350		350
Morgantown	21.11			350		350
Washington, D.C.	21.11				350	350
Atlanta	21.11		350	6000		6350
TRAVEL SUBTOTAL			350	6700	350	7400

COST PROG CAN: VEA-Xyy-062 SHOW ONLY NUMBERS IN FINANCIAL COLUMNS
DO NOT USE COMMAS OR PERIODS IN FINANCIAL COLUMNS

OTHER (List equipment purchases over $500 separately)

	OBJCLASS	QTR1	QTR2	QTR3	QTR4	YR TOT
Computer Time (TELE)	25.67				200	200
Supplies	26.6L			50	50	100
Publications	26.6M			100	100	200
OTHER SUBTOTAL				150	350	500
TOTAL FREE FUNDS			350	6850	700	7900

Figure 2d. An Example of a Project Plan: PERSONNEL SUMMARY

COST PROG CAN: VEA-Xyy-062 (TO BE USED AT O/D DIRECTORS' DISCRETION)

POS #	LAST NAME FIRST INITIAL	GRADE/ STEP	PLANNING PERS COST	FRACTIONAL FTE TO PROJECT	ESTIMATED PERS COST
1.	Dobbin, R.	CO-05	40693	0.5	20347
2.	Flowers, B.J.	GS-06/10	22667	0.1	2267
3.	Baker, P.	GS-04/1	13980	0.2	2796
TOTALS				0.8	25410

PROJECT PROTOCOL: (TO BE USED AT O/D DIRECTORS' DISCRETION)

HOW TO USE THE NIOSH PROGRAM PLAN BOOK
(Use with Keys to Coding on following pages)

Figure 3 a

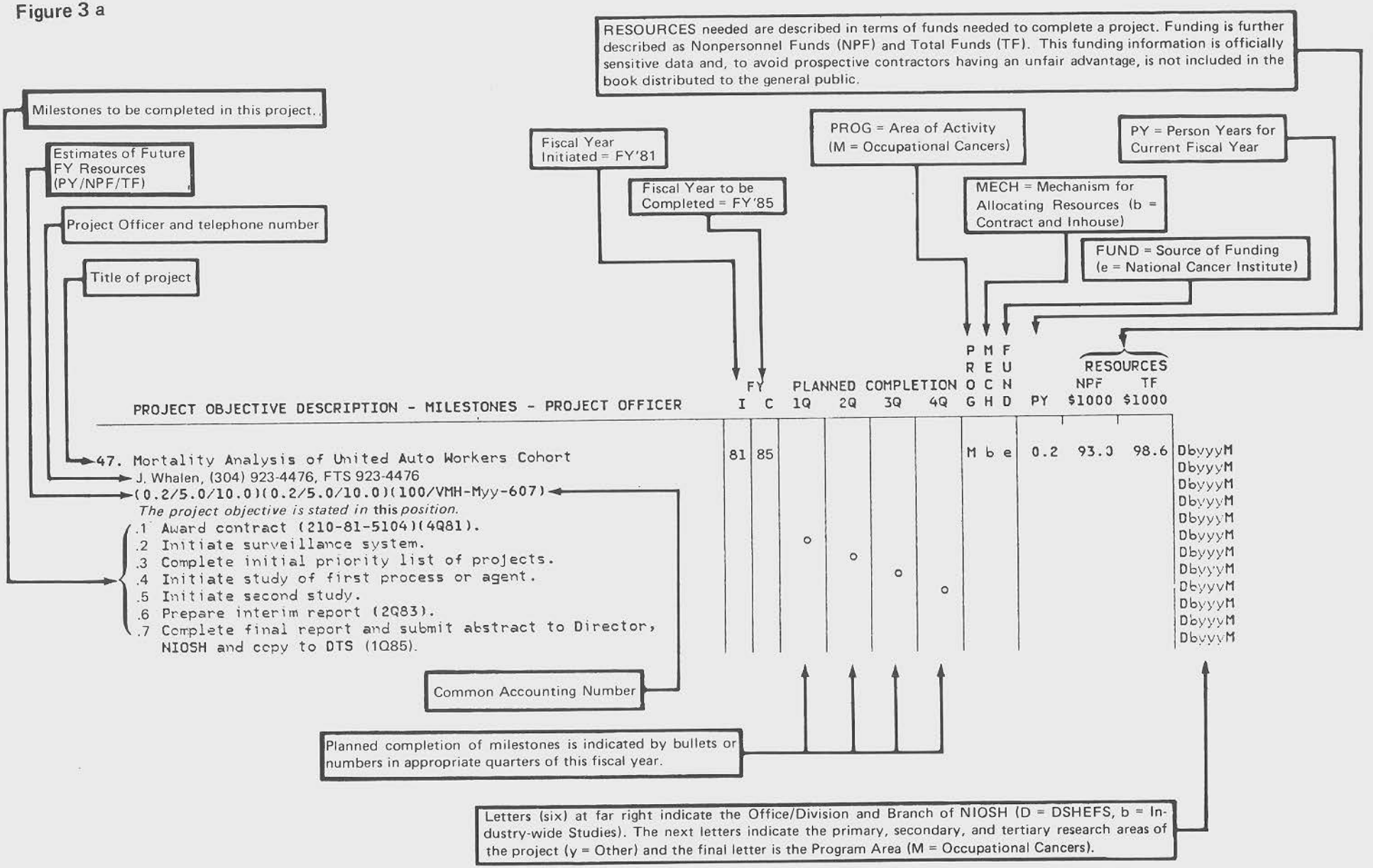


Figure 3b.

FY 1984
KEYS TO CODING

Program Areas (PROG) - Columns 96 and 124

IDENTIFY OCCUPATIONAL SAFETY AND HEALTH PROBLEMS

B -- Surveillance
V -- Health Hazard Evaluations/Technical Assistance

EVALUATION OF OCCUPATIONAL SAFETY AND HEALTH PROBLEMS

I -- Occupational Lung Diseases
O -- Musculoskeletal Injuries
M -- Occupational Cancers (other than lung)
F -- Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths
L -- Cardiovascular Diseases
A -- Disorders of Reproduction
C -- Neurotoxic Disorders
P -- Noise-induced Loss of Hearing
J -- Dermatologic Conditions
Q -- Psychologic Disorders

CONTROL OCCUPATIONAL SAFETY AND HEALTH PROBLEMS

D -- Respirators
E -- Control Systems
G -- Other Personal Protective Equipment
N -- Sampling/Analysis
U -- Instrument/Methods Development

DISSEMINATE OCCUPATIONAL SAFETY AND HEALTH FINDINGS AND RECOMMENDATIONS

H -- Information Dissemination/Document Development
K -- Training

ADMINISTER INSTITUTE PROGRAMS

R -- Institute Administration
S -- Division Administration

Operation Mechanism (MECH) - Column 98

a -- Contract Only
b -- Contract and Inhouse
c -- Inhouse Only
d -- Interagency Agreement
f -- Cooperative Agreement
h -- Contract and Interagency Agreement
i -- Contract and Cooperative Agreement
j -- Contract and Other
k -- Interagency and Cooperative Agreement
m -- Research Grant
n -- Training Grant

Source of Funding (FUND) - Column 100

a -- Base Program
b -- Coal Mining
c -- Environmental Protection Agency
d -- Metal and Nonmetal Mining
e -- National Cancer Institute
f -- U. S. Department of Agriculture
g -- U. S. Department of Defense
h -- Non-Governmental
j -- P.L. 480
y -- Other

Figure 3c. FY 1984-89

Research Areas

Primary, Col. 121; Secondary, Col. 122; Tertiary, Col. 123

N = NIOSH Planning Group in the Department of Labor

P = 1990 Prevention Objectives for the Nation

EXPOSURE - SPECIFIC STUDIES

a - Radiation
d - Biohazards
e - Pesticides
f - Heat, Cold, Noise, Vibrations, and Pressure
g - Fibers
h - Solvents
i - Energy
j - Cotton Dust
k - Asbestos
m - Coal Dust
n - Silica
p - Lead
q - Arsenic
r - Zinc
s - Falls from Elevations
t - Caught In, Under, or Between
u - Hazardous Wastes
y - Other
x - Alcohol
z - Smoking

Offices/Divisions and Branches -- Columns 119 and 120

A - Division of Biomedical and Behavioral Science
- a - Applied Psychology and Ergonomics
- b - Experimental Toxicology
- c - Technical Support
- d - Physical Agents Effects

B - Division of Physical Sciences and Engineering
- a - Engineering Control Technology
- b - Measurements Research Support
- c - Methods Research
- d - Monitoring and Control Research

C - Division of Respiratory Disease Studies
- a - Epidemiological Investigations
- b - Environmental Investigations
- c - Clinical Investigations
- d - Laboratory Investigations
- e - Examination Processing

D - Division of Surveillance, Hazard Evaluations and Field Studies
- a - Hazard Evaluations and Technical Assistance
- b - Industrywide Studies
- c - Surveillance
- d - Support Services

E - Division of Safety Research
- a - Safety Surveillance
- b - Accident and Injury Epidemiology
- c - Standards and Consultation
- d - Testing and Certification

G - Division of Standards Development and Technology Transfer
- a - Program Management
- b - Document Development
- c - Priorities and Research Analysis
- d - Technical Information

H - Division of Training and Manpower Development
- a - Direct Training
- b - Curriculum Development
- c - Educational Resource Development

J - Office of Administrative and Management Services
- a - Management Systems Branch
- b - Administrative Services Branch, Morgantown
- c - Administrative Services Branch, Cincinnati

K - Office of the Director
- a - Grants Administration and Review
- b - Regional Operations

L - Office of Program Planning and Evaluation
- a - Program Development
- b - Program Planning
- c - Program Control
- d - Program Evaluation
- e - Health Risk Appraisal
- f - International

Figure 4. Example of the Program Goals and Objectives

Program Area: Respirators

Goal: 1. Prevent work-related diseases and injuries.
2. 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.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers.	E. 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 workers' pneumoconiosis.		
Focus: Occupational Lung Diseases Population in need: Miners.	E.38 By 1985, provide criteria to improve methods of control and prevention of respiratory disease through appropriate use of respirators. (DSR) CROSS REFERENCE: Control Systems		

EXPLANATION OF FORMAT:

Program Area:	One of 21 Program Areas at NIOSH	Goal:	1. A strategic goal for the Institute. 2. A tactical goal of which there are five in NIOSH representing program elements.
Focus:	An Objective for the Nation and one or more of The Ten Leading Work-Related Diseases and Injuries.	Indicators:	This year these indicate project or milestone completions consistent with the objectives. Over time, these may become more quantitative in nature.
Population in Need:	The population(s) that benefit from the eventual outcome of the objective.		
Objectives:	Each Objective for the Nation has a unique letter consistent with those published by the Public Health Service. Each program objective at NIOSH has a unique number under an Objective for the Nation.	Fiscal Year:	This is a calendar that shows the start and end points of an objective or indicator. The format is a Gantt Chart.

NOTE: This format was adapted from, "Model Standards for Community Preventative Health Services." A Report to the U.S. Congress from the Secretary of Health, Education, and Welfare, August 1979.

Figure 5. Example of Progress Report and Analysis of Variance
(This simulates a third quarter report.)

PROJECT OBJECTIVE DESCRIPTION - MILESTONES - PROJECT OFFICER	FY I	FY C	PLANNED COMPLETION 1Q	2Q	3Q	4Q	PROG	MECH	FUND	RESOURCES PY	NPF $1000	TF $1000	
47. Mortality Analysis of United Auto Workers Cohort							M	b	e	0.1*	70.0*	74.3*	DbyyyM
J. Whalen, (304) 923-4476, FTS 923-4476										0.2	93.0	98.6	DbyyyM
(0.2/5.0/10.0)(0.2/5.0/10.0)(100/VMH-Myy-607)													DbyyyM
The project objective is stated in this position.													DbyyyM
.1 Award contract (210-81-5104)(4Q81).													DbyyyM
.2 Initiate surveillance system.			x										DbyyyM
.3 Complete initial priority list of projects.				o-	--x								DbyyyM
.4 Initiate study of first process or agent.					x-	--o							DbyyyM
.5 Initiate second study.						o							DbyyyM
.6 Prepare interim report (2Q83)													DbyyyM
.7 Complete final report and submit abstract to Director, NIOSH and copy to DTS (1Q85).													DbyyyM
													DbyyyM
**********													DbyyyM
* In the second quarter the initial priority list *													DbyyyM
* slipped because of turnover in personnel. This *													DbyyyM
* resulted in the slip in initiating the study to the *													DbyyyM
* fourth quarter. We have recruited a replacement and *													DbyyyM
* completed the priority list and expect to catch up *													DbyyyM
* with no more slippages. *													DbyyyM
**********													DbyyyM

LEGEND:

o	uncompleted milestones
x	completed milestones
o---o	slipped milestone
x---o	milestone completed early
o---x	milestone slipped and then completed

*This represents funds committed or obligated through the third quarter.

NIOSH
Summary of Resources by Divisions
Fiscal Year 1984
($000)

Research Divisions	FTEs*	Discretionary Funds	Total Direct Funds	Reimbursable Estimate	Direct & Reimbursable Total
Division of Biomedical and Behavioral Sciences	105.0	$ 1,749.5	$ 5,683.5	$ 960.0	$ 6,643.5
Division of Physical Sciences and Engineering	99.0	2,410.6	5,856.6	-0-	5,856.6
Division of Respiratory Disease Studies	128.0	1,686.0	5,915.0	305.8	6,220.8
Division of Surveillance, Hazard Evaluations, and Field Studies	169.0	1,922.0	7,533.0	1,093.6	8,626.6
Division of Safety Research	67.5	1,340.9	3,598.9	8.0	3,606.9
Regional Offices	31.8	165.6	1,503.6	150.0	1,653.6
Non-Research Divisions					
Division of Standards Development and Technology Transfer	76.5	1,631.8	4,024.8	71.0	4,095.8
Division of Training and Manpower Development	29.75	482.8	1,472.8	90.0	1,562.8
Office of Administrative and Management Services	77.5	5,300.0	7,072.0	-0-	7,072.0
Office of the Director	41.0	1,072.0	2,573.0	-0-	2,573.0
Office of Program Planning and Evaluation	18.0	491.0	1,082.0	-0-	1,082.0
TOTALS	843.05	$18,252.2	$46,315.2	$2,678.4	$48,993.6

*As of January 20, 1984

RESOURCES BY OFFICE/DIVISION
FY 1984 FUNDS

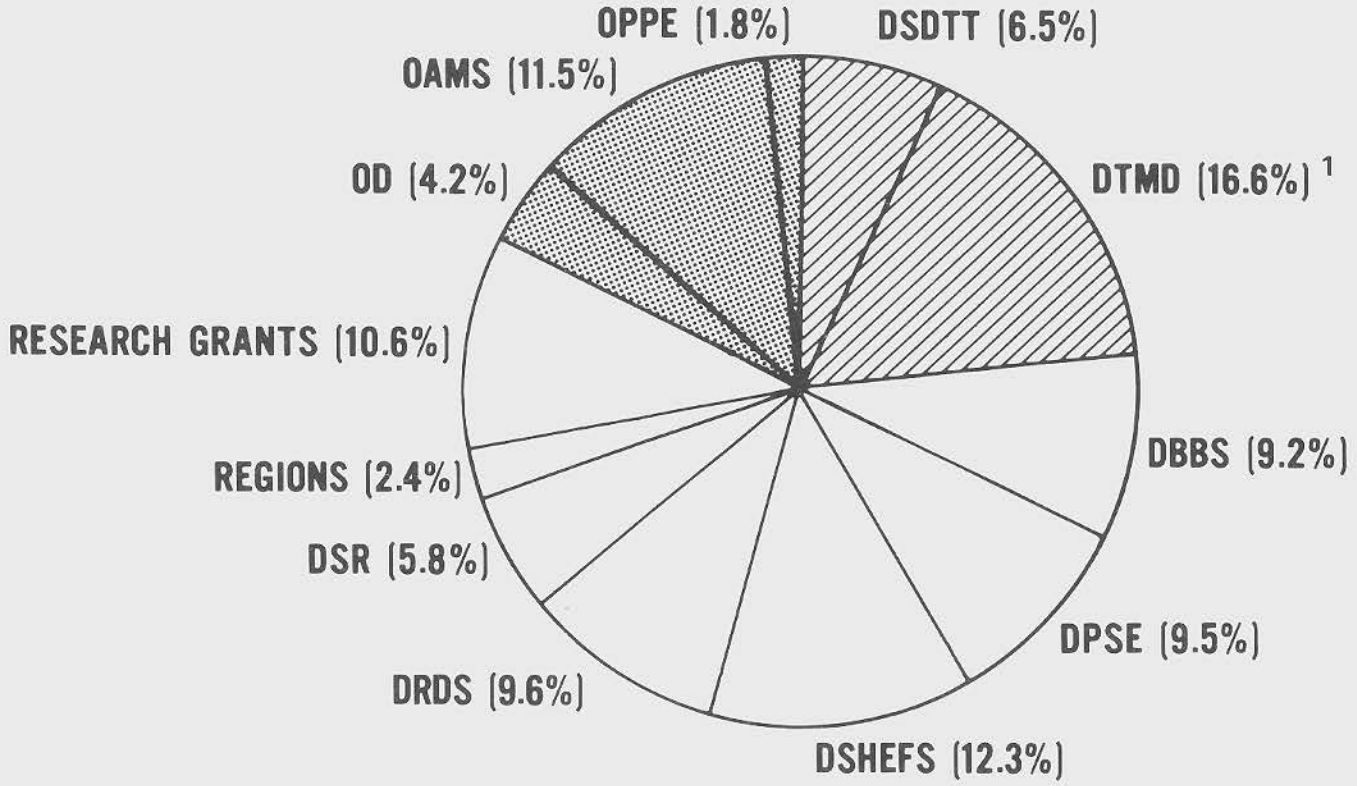
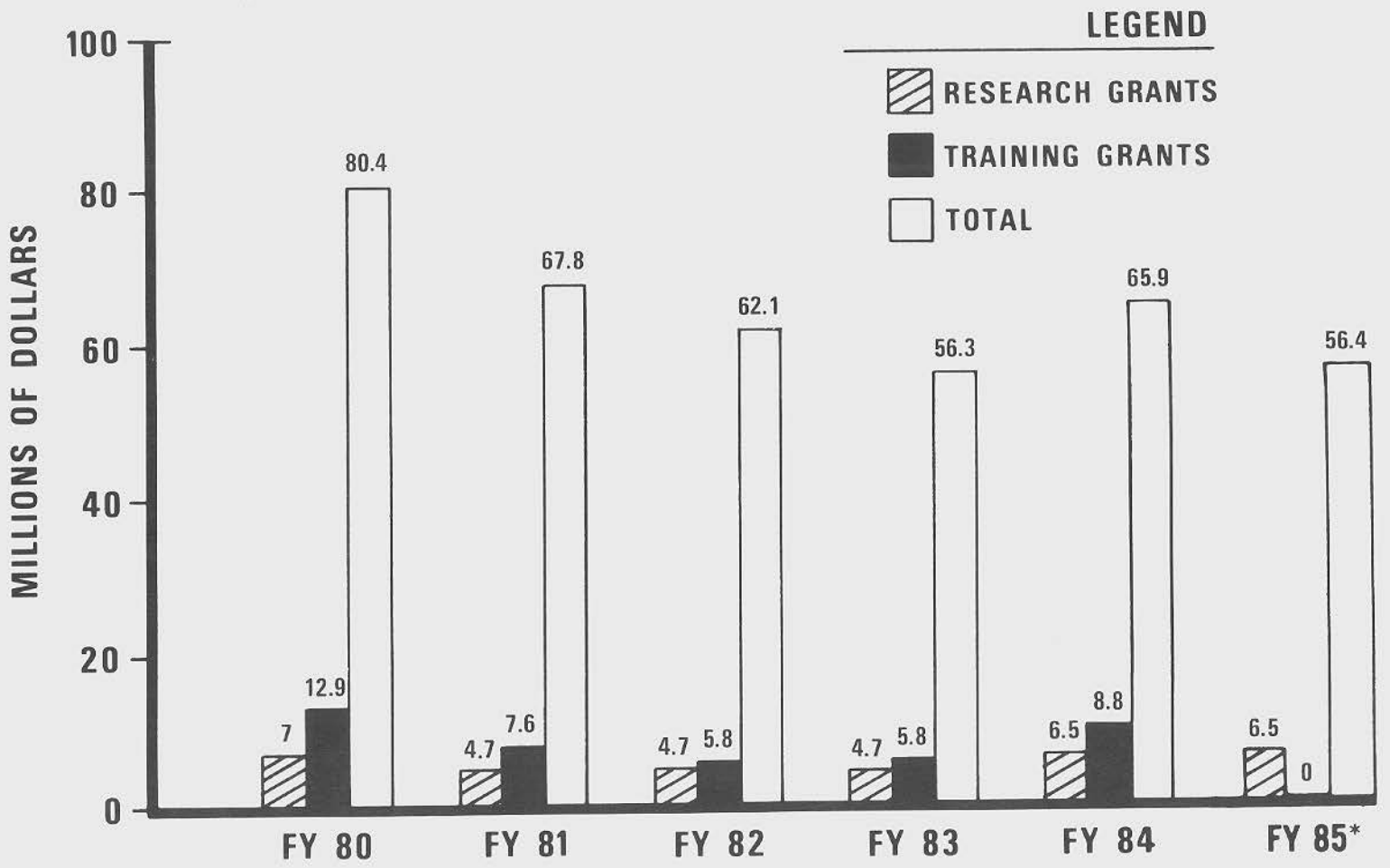


Figure 6

[1]Includes Training Grants

NIOSH APPROPRIATIONS

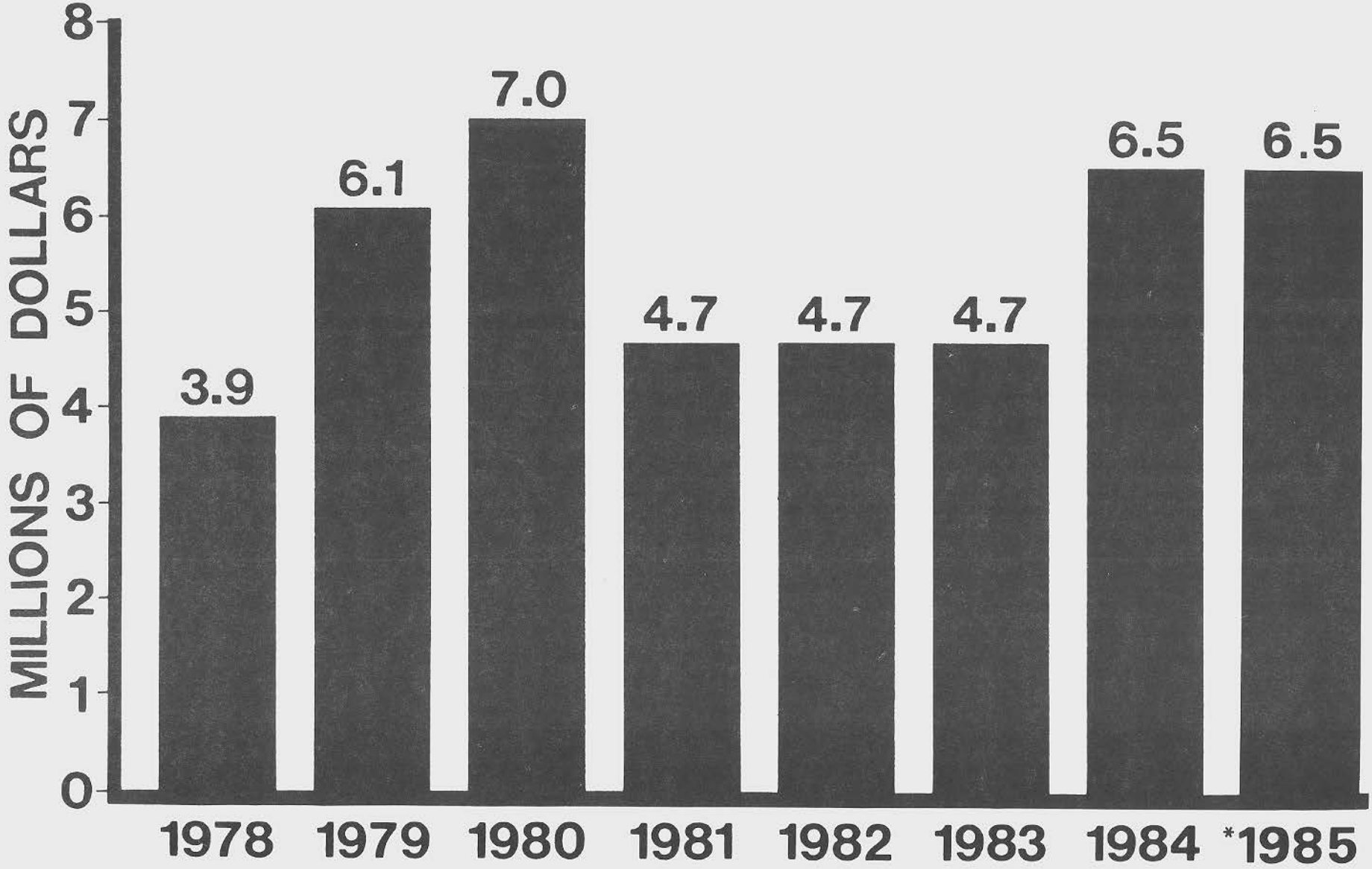
Figure 7



*President's Budget

Figure 8

NIOSH RESEARCH GRANTS FUNDING HISTORY



*Administration Request.

OUTLOOK FOR 1990

The U.S. Bureau of Labor Statistics projects that many trends observed in the workplace and the workforce during the 1970's will continue through the 1980's. Knowing these trends is useful to NIOSH program planning. With this knowledge, the Institute can anticipate and prepare for the impact these trends will have on the occupational safety and health of the Nation's workforce and respond accordingly. The challenge to NIOSH is to incorporate these trends into the Institute's planning, while maintaining a focus on the "Objectives for the Nation" for occupational safety and health.

Characteristics of the Work Force

According to the Bureau of Labor Statistics, the labor force is expected to rise from 102.9 million in 1979 to 128.1 million in 1990.

The number of women in the labor force is expected to grow from 43.4 million in 1975 to 59.9 million in 1990 and will constitute 46 percent of the work force compared with 42 percent in 1979. Women will account for roughly two-thirds of the total growth in the labor force between 1975 and 1990. The proportion of men in the labor force will therefore decline from representing almost 58 percent of the work force in 1979, to 54 percent by 1990.

By 1990, over 70 percent of the labor force will be composed of persons 25 to 54 years of age, an increase of 61 percent in that age group compared with 1979. A more mature and experienced labor force is projected by 1990. During the 1980's, an increase of 8.1 million workers, roughly two-thirds of which are women, is expected, as persons born in the period immediately following World War II will have reached the prime working ages.

A number of projections are based on these trends. For example, since unemployment is apt to be lowest in the 25-54-year age group, the Nation's unemployment rate should decrease.

From 1972 to 1980, an employment increase of 15.6 million persons occurred. About half this number was in two white collar groups--professional and technical workers. In fact, the proportion of workers employed in white collar occupations reached 50 percent in 1976 for the first time and exceeded 52 percent in 1980.

Table 1.

WORK FORCE DISTRIBUTION BY AGE
(in percentages)

Age Group	MEN		WOMEN		Combined Change 1979-1990
	1980	1990	1980	1990	
Total	57.5	53.8	42.5	46.1	
16 to 24	12.7	9.2	10.9	9.2	−22.0
25 to 34	15.9	15.0	11.5	13.5	+ 4.0
35 to 44	11.1	13.6	8.1	11.9	+32.8
45 to 54	9.3	9.0	6.5	6.7	− .6
55 and over	8.5	6.9	5.5	4.6	−17.9

Table 2.

WORKFORCE DISTRIBUTION BY SEX
(in millions)

	1975	1980	1990
MEN	55.6	57.5	68.2
WOMEN	37.0	42.5	59.9
Total	92.6	100.0	128.1

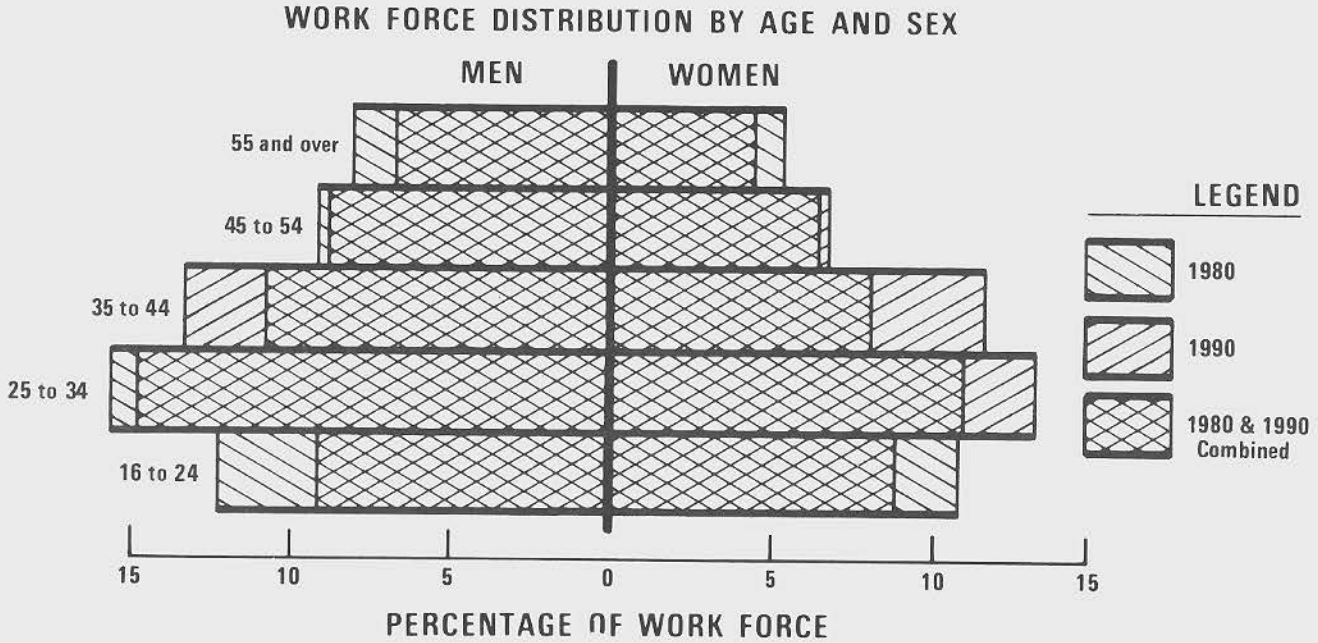


Figure 9

Source: Bureau of Labor Statistics

Nature of the Workplace

The computer field has generated thousands of jobs, and the legal profession will continue to grow rapidly in response to the increasing number and complexity of legislative acts. The Nation has seen increases take place among engineers, scientists, accountants, and economists, as well as a dramatic increase in the number of health care workers. The latter is attributed, in part, to a larger, older population, and more affordable health care programs.

The shift to capital intensive occupations has led to reductions in the number of agricultural workers to under 3 percent. Labor intensive industries, such as the production of goods, have seen a steady decline in labor force representation from 50 percent in 1943 to 20 percent in 1979.

Service workers' jobs have increased since 1970; they can be found in all major industry groups and now represent almost three-fourths of the Nation's employment. Industries employing these workers include banking, communications, education, electric power, fire fighting, food service, health care, hotel, household, police, sanitation, trade, and transportation. One profession consistently in demand is clerical work, which today accounts for over 18 percent of all workers.

Among the industries projected to be the fastest growing in the 1980's are: (1) the manufacture of computers and peripheral equipment (7.6 percent growth); (2) coal mining (6.0 percent growth); (3) transportation services (4.3 percent growth), (4) the manufacture of electronic components (3.9 percent growth); (5) chemical, fertilizer, and mineral mining (3.8 percent growth); and (6) manufacture of construction, mining, and oilfield machinery (3.8 percent growth).

Among the industries projected to be the slowest growing or declining in the 1980's are: (1) petroleum refinery and related products (1.6 percent decline); (2) copper ore mining (0.3 percent decline); (3) nonferrous metal ores mining (0.3 percent decline); (4) logging (no growth); and (5) railroad equipment (0.1 percent growth).

The impact of economic shifts and pressures toward capital intensive industries, by the year 1990, is projected to be:

1. The manufacturing work force will grow at an annual rate of 2.3 percent to 13.2 million workers.

2. Employment for construction workers and freight and stock handlers will grow at an annual rate of 2.2 percent to 7.1 million workers.

3. Jobs in transportation, such as driving trucks, forklifts, buses, taxis, etc., will grow 26 percent to 4.4 million workers.

4. The professional and technical ranks will grow by 26 percent to 20.7 million people, with health professionals leading the way.

5. The number of managers and administrators will grow at an annual rate of 2.1 percent to 11.3 million.

6. The number of clerical workers will increase by 27 percent to almost 24 million.

7. The work force for retail and wholesale sales will grow by 28 percent to 8.8 million.

As the work force matures and moves into more service-related occupations, the incidence of cumulative trauma, musculoskeletal disorders, cardiovascular diseases, and psychologic disorders can be expected to increase.

With about 24 million clerical workers expected in the work force by 1990, more health problems related to office work will manifest themselves. For instance, there may be an increase in the number of people suffering from acute and chronic pneumonitis--a primary cause being poor ventilation in air-tight, energy conserving buildings. The trend toward more office workers combined with the effort to make buildings more air-tight to conserve energy, represents a threat to workers' health. This threat, indoor-pollution, is due to less ventilation of hazardous substances such as secondary smoke, formaldehyde, molds, accumulated dust, and infectious agents.

The increased number of women in the work force has implications for ergonomics and job design, especially with women taking jobs traditionally held by males. Issues of fitting such jobs to women workers can be significant, especially for jobs requiring more physical effort.

The length of a "normal" workweek, which has not changed significantly over the last 35 years, is not expected to change by 1990. The normal workweek is now about 41.8 hours. Working Americans now spend 36 percent of their lives "on the job." Over one-third of each adult's life is spent working, representing a significant possibility for exposure to occupational risks that can cause disease or injury.

Changes in Health Care

The health care system has been in the midst of two decades of rapidly rising expenditures. Since 1960, the share of Gross National Product spent on health care rose from 5.3 percent to 10.5 percent in 1982. Health care spending is still rising at two to three times the inflation rate. Hospital expenses per patient day have risen from $16.00 in 1960 to $210.00 in 1979 (1300 percent increase). Per capita costs have risen from $146 to $1,365 for a total of $322 billion in 1982.

These shifts in the workplace, the work force, and the economics of health care make a strong case for prevention. As the trend toward a higher incidence of chronic diseases and disabilities continues, costs can be expected to increase; as the work force ages, health care will be applied for longer periods; and as the work force enters new service and technical workplaces, the number of risks that result in chronic diseases and disabilities broadens. Control techniques can contribute significantly toward controlling or preventing these health problems. Prevention is more cost effective, and healthy workers are generally more productive.

Melvin L. Myers
Engineer Director
Director, Office of Program
Planning and Evaluation

P. Craig Withers
Team Leader, Program Planning
Office of Program Planning
and Evaluation

Sources:

1. "The U.S. Economy in 1990," Monthly Labor Review, August 1981, pp 9-55.

2. Fullerton, Howard N., "The 1995 Labor Force: A First Look," Monthly Labor Review, December 1980, pp 11-21.

3. Public Health Service, "Occupational Safety and Health," Promoting Health/Preventing Disease: Objectives for the Nation, U.S. Department of Health and Human Services, Fall 1980, pp 39-43.

4. Leon, Carol B., "Occupational Winners and Losers: Who They Were During 1972-1980," Monthly Labor Review, June 1982, pp 18-28.

5. "Healthy but Unwise," The Economist, February 4, 1984, pp 26-31.

6. Bureau of the Census, Statistical Abstract of the United States, 1982, U.S. Department of Commerce, December 1982.

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. Under this goal NIOSH defines the state of Occupational Safety and Health (OSH) through the disciplines of medicine, industrial hygiene, epidemiology, and safety, and through statistics. NIOSH investigators derive priorities for research and public health action, and measure progress in preventing impairments. Facts are generated from national data bases and from requests by workers and employers for health hazard evaluations (HHEs). Scientific hypotheses are generated from these facts.

Efforts to achieve the Institute's goal 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 methods used to identify OSH problems are as follow:

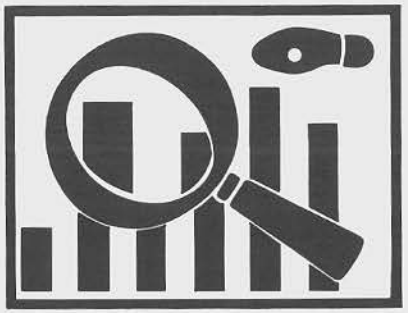
PROGRAM AREAS: Surveillance
Health Hazard Evaluations/Technical Assistance

[1]"Leading Work-Related Diseases and Injuries--United States," Morbidity and Mortality Weekly Report. Vol. 32, No. 2, January 21, 1983.

PROGRAM AREA: SURVEILLANCE

PROGRAM AREA GOAL:

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



RELEVANT OBJECTIVES FOR THE NATION:

o Improved surveillance/evaluation

- By 1985, an ongoing occupational health hazard/illness/injury coding system, survey and surveillance capability should be developed, including identification of workplace hazards and related health effects, including cancer, coronary heart disease, and reproductive effects. This system should include adequate measurements of the severity of work-related disabling injuries.

- By 1985, at least one question about lifetime work history and known exposures to hazardous substances should be added to all appropriate existing health data reporting systems, e.g., cancer registries, hospital discharge abstracts and death certificates.

- By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVES:

- By FY 1986, fund up to 12 cooperative agreements with States. NIOSH funded five in FY 1983.

- By FY 1986, have in place national and State data systems to identify....

- In FY 1984, initiate trade-name clarification. It is estimated that 75-85 percent of the analyses will be complete by FY 1985.

- In FY 1984, begin the National Occupational Hazard Survey-Mining. Data collection will be completed during FY 1986.

- By FY 1986, have in place disease reporting requirements for coal worker's pneumoconiosis, heavy metal poisoning, and dermatitis.

PROGRAM DESCRIPTION:

NIOSH has the responsibility for developing national surveillance systems that identify workplace hazards and work-related injuries, disability or death as follows:

Hazard Surveillance in General Industry

NIOSH will continue to develop and improve a national hazard information base that will identify potential hazards in the workplace. These hazards will continue to be identified through information on: (a) the types of industries where the potential hazards are found; (b) the occupational groups exposed to the potential hazards; and (c) the chemical components of tradename products found in the workplace.

By the end of the 3-5 year time period, most of the data from the National Occupational Exposure Survey (NOES) and the other hazard surveillance projects will be analyzed and available for use by NIOSH researchers, other governmental agencies, other occupational health research specialists, workers and their representatives, and health care providers.

Specifically, large-scale periodic national probability sample surveys of approximately 5,000 of the nation's five million workplaces provide the foundation for NIOSH's program of hazard surveillance in general industry.

The first such survey, National Occupational Hazard Survey (NOHS), was conducted in 1972-1974. Information from this survey has been used to help establish NIOSH research priorities, locate groups of workers potentially exposed to agents of particular interest, and provide a data base of the chemical ingredients of some 65,000 trade-name products found in the workplace. The field data gathering phase of the second national survey, the National Occupational Exposure Survey (NOES), is now complete and NIOSH will begin to compile ingredient information on the nearly 100,000 trade-name products which were recorded by contacting their respective manufacturers.

NOHS AND NOES constitute the centerpiece of the general industry hazard surveillance program which also includes:

1. The development and maintenance of a data base which describes ingredients of trade named products found in the workplace.

2. The use of computer-generated State and county level maps of the United States which depict the distribution of high-interest chemical agents at the worksite.

3. The linking of NOHS and NOES information to data compiled in NIOSH's Registry of Toxic Effects of Chemical Substances (RTECS) in an effort to identify industries and occupations at high risk because of potential exposures to toxic compounds.

4. The utilization of structure-activity techniques to predict potential toxicity of chemicals in the workplace for which no experimental toxicity information exists.

Disease Surveillance in General Industry and Mining

NIOSH plans to develop, maintain, and improve a nationwide system for the identification and monitoring of occupationally-related disease, disability, and mortality; and continue medical examinations of underground coal miners.

The development and use of this system 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, occupationally-related disease, disability, and mortality; and (d) the need to disseminate the surveillance information. A major emphasis of the system during this time period will be placed on occupational dermatitis, lung diseases, and heavy metal poisoning as stated in the Objectives for the Nation.

Hazard Surveillance in Mining

Continue to develop, maintain, and improve a national hazard information base that will identify potential hazards in mines.

The hazard data base includes the National Occupational Hazard Survey of Mines (NOHSM) which 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 addition, (1) numerous targeted environmental investigations of potential health hazards identified by MSHA, BOM, and through literature reports, have been completed; (2) several significant sources of previously developed NIOSH and State environmental data have been identified and a portion of these records obtained for computer entry; (3) MSHA environmental data records have been accessed and portions retrieved as requested for use in various projects and hazard evaluations; and (4) progress has 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.

Safety Surveillance

Continue to assess through basic descriptive epidemiology the distribution of occupational injuries by occupation, industry, age, sex, and related demographic and causal categories; to analyze these factors for effective problem definition and priority setting; and to conduct studies of high-risk worker populations to quantify and evaluate specific causal risk factors.

In FY 1984, DSR surveillance will continue to identify high-risk worker groups and problems in the musculoskeletal and traumatic injury areas. In the latter group, construction fatalities and amputations will receive special emphasis.

NIOSH develops descriptive statistics based on estimates developed from the Consumer Product Safety Commission's National Electronic Injury Surveillance System (NIESS) and The Department of Labor Statistic's Supplementary Data System (SDS).

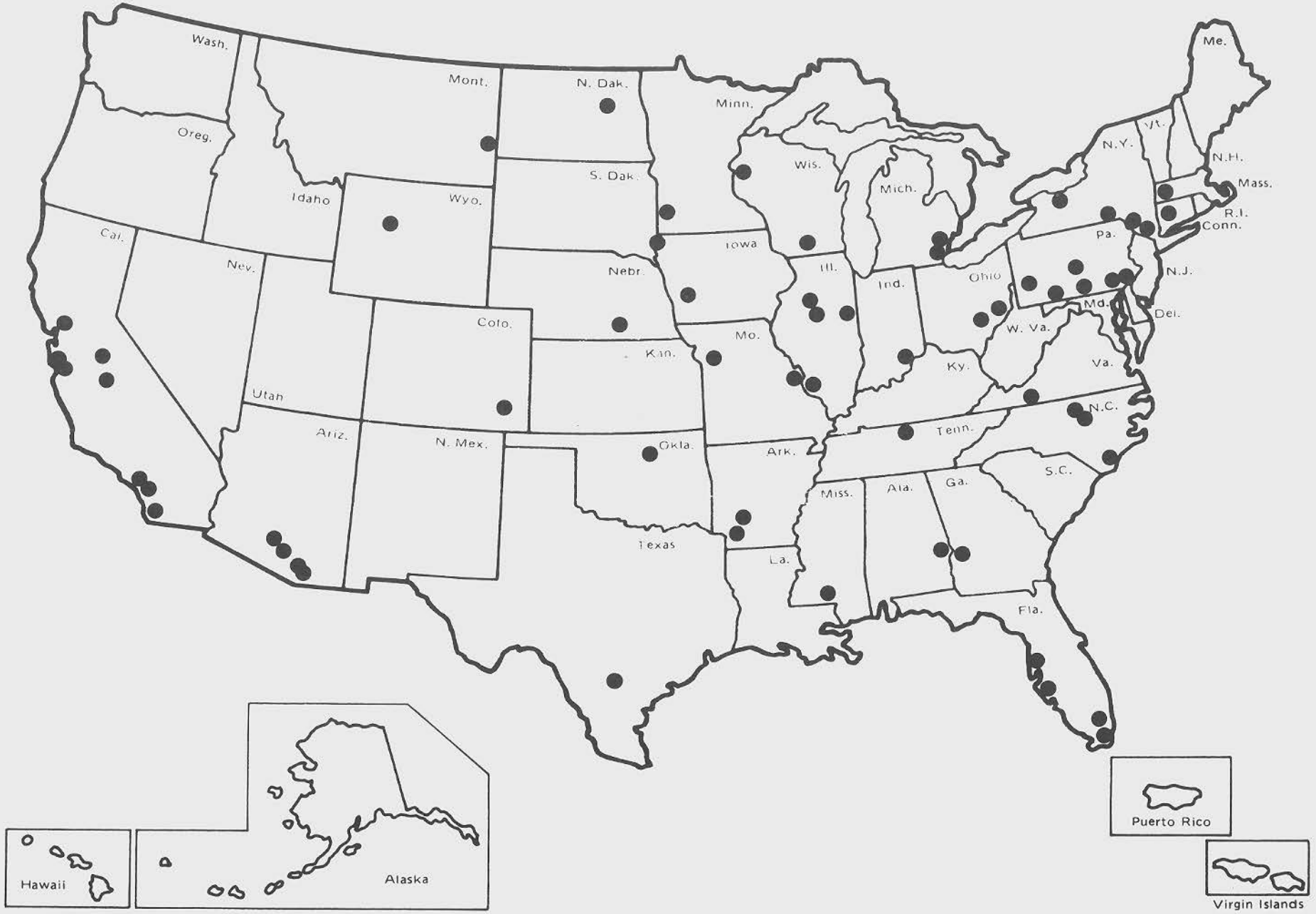
Institute Priorities

DSDTT presently 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 62,000 substances which have been linked to NOHS.

Working in concert and with data input 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.

NEISS HOSPITALS
MAY 1982

Figure 10



FOCUS: WORK-RELATED DISEASES AND INJURIES

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. Together, these four diseases constitute the target for national 1990 objectives.

DSHEFS prepared NCHS mortality tapes that permit NIOSH to display graphically (time trends and county-based maps) mortality from occupationally-related causes of death. DSHEFS recommended further research of respiratory cancer among vehicle drivers and among plumbers and pipefitters.

In FY 1983, DSHEFS conducted an analysis of social security disability data. Permanent disability awards for the period 1969-1973 and 1975-1976 were examined for elevated morbidity among selected occupational subgroups. A similar analysis was conducted for the 1975-1976 period relative to industry subgroups. Statistically significant excess disability due to respiratory disease was observed in the coal mining and metal/non-metal mining sectors of industry.

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.

DRDS reported on "Pneumoconiosis in Coal Mines: NIOSH Research and Surveillance," in the MMWR Surveillance Summaries of February 1983. The report described the results of the three rounds of the National Coal Study which indicated a lower prevalence with each round and a continued pattern of decreased prevalence based on the geographic location of mines going east to west. This finding supports the theory that CWP is more severe where the coal is older and has more fixed carbon and less volatile matter.

MUSCULOSKELETAL INJURIES: In FY 1983, DSHEFS recommended to NIOSH researchers the study of musculoskeletal disease among agricultural workers. Statistically significant excess disability due to musculoskeletal disease (osteoarthritis, slipped disc) was observed in the oil and gas extraction sector of the mining industry. Individuals working in "boring, drilling, and cutting" occupations were highlighted by the occupational analyses.

NOES surveyors recorded a number of chronic trauma hazards during the course of their plant investigations. For the first time, NIOSH will be able to make national estimates of worker populations potentially exposed to chronic trauma hazards, and to describe the industries and occupations involved.

OCCUPATIONAL CANCERS: In FY 1983, DSHEFS chaired the Subcommittee on Occupational Cancer Risk. A report was submitted to the Chairman, CCERP. DSHEFS also completed an extensive literature search on bladder cancer in connection with the surveillance project "Estimation of Occupationally-Related Mortality and of Morbidity," and compiled information through the 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.

AMPUTATIONS, FRACTURES, EYE LOSS, LACERATIONS, AND TRAUMATIC DEATHS: In FY 1983, DSHEFS and DSR published the surveillance report "Job Injury Among Loggers" and the NIOSH Surveillance Report article "Job Injuries Among Loggers." NIOSH also reported on "Occupational Injuries and Deaths among Loggers, United States," in the August, 1983 MMWR CDC Surveillance Summaries. The report discussed the results of a study of the period 1969-1974 which indicated that lumber and wood products workers had an injury rate 38 percent higher than all other types of workers combined.

CARDIOVASCULAR DISEASES: In FY 1983, DSHEFS presented to NIOSH researchers the link between cardiovascular disease and stress among labor mediators.

DISORDERS OF REPRODUCTION: In FY 1983, DSHEFS completed an analysis of 1980 National Natality Survey data. The analysis was limited to an examination of employment characteristics of mothers during pregnancy. Employment characteristics before delivery differ substantially according to live-birth order, maternal age, race, education, and interval since previous live birth. Part of this analysis appears in one of 12 Selected Health Topics that were presented in the 1983 DHHS publication Health, United States and Prevention Profile.

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.

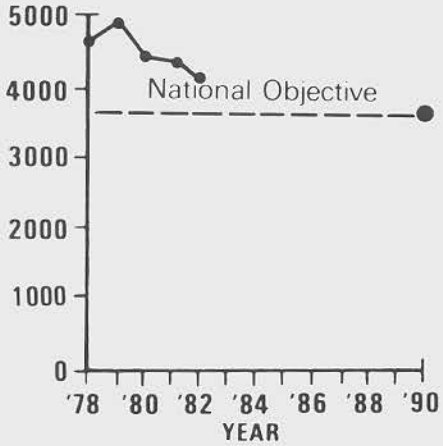
NEUROTOXIC DISORDERS: In FY 1983, DSHEFS combined data from the National Occupational Hazard Survey (NOHS) with data from the National Health and Nutritional Examination Survey (NHANES), which clearly demonstrated that blood lead levels were significantly higher among adults working in occupations with potential lead exposure than in occupations without such potential exposures. Chronic occupational exposure to lead has been shown to cause peripheral neuropathy. Using data from NOES, NIOSH will be able to extend the type of analysis referred to above to other occupation and industry groups in which there is the potential for exposure to agents linked to neurotoxic illness.

NOISE-INDUCED LOSS OF HEARING: In FY 1983, NOHS data identified industries that have low, medium, and high environmental noise levels. These results were then 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 DRDS/DBBS 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).

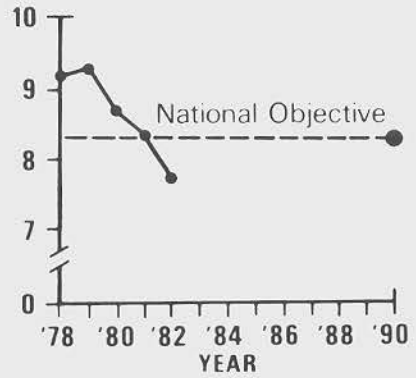
DERMATOLOGIC CONDITIONS: Using NOHS and NOES data, NIOSH will be able to estimate the number of U.S. workers potentially exposed to chemical agents that are known to cause dermatological problems, and to describe the industries and occupations involved. Also, DSR, through NEISS, receives reports of dermatologic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

PROGRESS IN MEETING FOUR OF THE OBJECTIVES

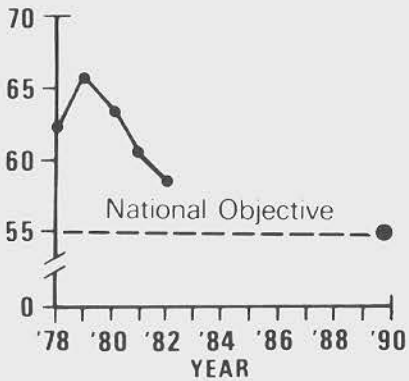
Figure 11



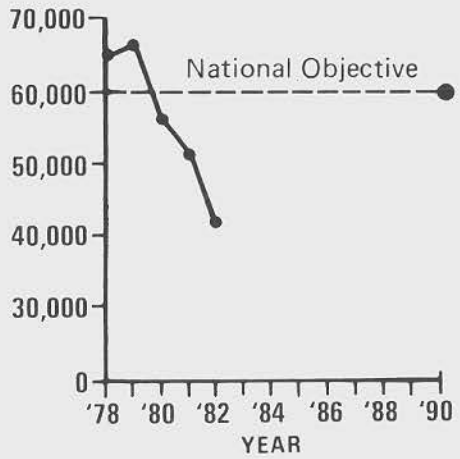
WORKPLACE ACCIDENTAL DEATHS



INJURY INCIDENCE PER 100 WORKERS



LOST WORKDAYS PER 100 WORKERS



INCIDENCE OF DERMATOLOGIC DISORDERS PER 100 WORKERS

Source Bureau of Labor Statistics

Program Area: Surveillance

Goal: 1. Prevent work-related diseases and injuries.
2. Identify work-related diseases and injuries so as to detect and define significant changes in the status of occupational safety and health.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers.	F. By 1990, the prevalence of occupational noise-induced hearing loss should be reduced to 415,00 cases. (PREFERRED: By 1990, reduce hearing loss to 75 percent in workers, based on 1975 baseline rates.)		├──────────────────────────────┤
Focus: Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers.	F.01 By 1986, 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. (DBBS)		├──────────┤
		a. By 1986, include hearing loss data in the NCHS questionnaire.	├──────────┤

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	R. By 1985, an ongoing occupational health hazard/illness/injury coding system, survey and surveillance capability should be developed, including identification of workplace hazards and related health effects, including cancer, coronary heart disease, and reproductive effects. This system should include adequate measurements of the severity of work-related injuries. (DSHEFS) CROSS REFERENCE: Information Dissemination/ Document Development Work Force Development		[_____]
		a. By 1984, complete series of training for State health department personnel for industry/occupation coding of death certificates and establishment of quality control programs. (DSHEFS)	[___]
		b. By 1984, complete baseline prevalence measures and identification of unusual patterns of disease and disability by occupation and industry using the NCHS Health Interview Survey data. (DSHEFS)	[___]
		c. By 1984, complete adoption of the Sentinel Health Events (Occupation) (SHE(O)) for use in SCANS and other State-related projects. (DSHEFS)	[___]

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	R.01. By 1988, develop and improve (beyond 1983 capabilities) a national hazard information data base that identifies potential hazards to the workplace. (DSHEFS)		
		a. By 1984, publish initial documents for NOES. (DSHEFS)	
		b. By 1984, contact 10,000 manufacturers to begin to compile a base of ingredients on approximately 100,000 NOES-identified trade name products. (DSHEFS)	
		c. By 1984, take initial steps to link the NOES data into the existing NOHS/RTECS risk ranking algorithm. (DSHEFS)	
		d. By 1984, complete 2,500 NOHS/trade name data requests. (DSHEFS)	
		e. By 1984, generate 75 sets of hazard data for computer mapping or exposure/industry patterns. (DSHEFS)	
		f. By 1984, utilize the 10,000 entries in the Material Locator System to identify, for specific unions, individual plants that have potential exposures to a number of hazardous substances. (DSHEFS)	
		g. By 1985, complete NOHS/RTECS ranking of industries and occupations for NOES analyses and publication. (DSHEFS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		h. By 1985, complete resolution of NOES trade name. (DSHEFS)	
		i. By 1985, complete an expansion of the Material Locator System. (DSHEFS)	
		j. By 1986, complete a set of NOES publications on industries and occupations. (DSHEFS)	
		k. By 1986, complete an update of NOES trade names. (DSHEFS)	
		l. By 1986, complete link between the NOES trade name file and the national poison control network. (DSHEFS)	
		m. By 1987, complete a set of NOES publications on industries and occupations. (DSHEFS)	
		n. By 1987, complete an update of NOES trade names. (DSHEFS)	
		o. By 1987, complete an expansion of the Material Locator System. (DSHEFS)	
		p. By 1988, complete a set of NOES publications on industries and occupations. (DSHEFS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		q. By 1988, complete an update of NOES trade names (DSHEFS)	
		r. By 1988, complete an expansion of the Material Locator System. (DSHEFS)	
Miners.		s. By 1986, a complete data collection phase of NOHSM. (DRDS)	
Focus: Occupational Lung Diseases (Asbestosis, Lung Cancer)	R.02 By 1988, develop a national surveillance and reporting system for asbestos-associated diseases. (DRDS)		
Population in need: Asbestos workers and utilizers. Miners and millers.		a. By 1985, develop strategy for surveillance system. Develop diagnostic criteria for asbestosis. Identify high risk populations. Complete analysis of environmental data bases including, but not limited to OSHA, MSHA, and 10 States. (DRDS)	
		b. By 1986, initiate pilot surveillance and reporting system. (DRDS)	
		c. By 1987, evaluate pilot surveillance and reporting system. (DRDS)	
		d. By 1988, initiate national surveillance and reporting system. (DRDS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases (Silicosis)	R.03 By 1987, determine prevalence (by job) of silicosis versus other pneumoconiosis. (DRDS)		
Population in need: Coal miners.		a. By 1985, analyze and publish autopsy data. (DRDS)	
		b. By 1986, conduct trials regarding differences in radiographic appearances. (DRDS)	
		c. By 1987, from NCS data, attempt to sort out and publish effects of progression of disease depending on quantity of silica in mixed dusts. (DRDS)	
Focus: Occupational Lung Diseases (Silicosis)	R.04 By 1989, determine the prevalence of silicosis and the extent of exposure to silica. (DRDS)		
Population in need: Coal miners--surface and underground.		a. By 1988, determine the extent of exposure to silica estimated from the data collected by the NOHSM. (DRDS)	
		b. By 1986, assess the silicosis risk among coal workers. Examine cases in the NCWAS, in particular, for the presence of silicotic lesions. (DRDS)	
		c. By 1986, develop an unambiguous definition of silicosis. (DRDS)	
		d. By 1987, add silicosis to the MMWR list of reportable diseases. (DRDS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Coal Workers' Pneumoconiosis Population in need: Underground coal miners.	R.05 By 1985, complete evaluation of x-ray monitoring (underground workers) and autopsy programs. (DRDS)		├──────┤
		a. In 1984, recommend regulatory changes regarding systems for definitive diagnoses and film-screen combinations. (DRDS)	├──┤
		b. By 1985, make recommendations for ways to increase participation in autopsy programs. (DRDS)	├──────┤
		c. Maintain interaction with UMWA and MSHA safety inspectors. (DRDS)	
Focus: Occupational Lung Diseases (Coal Workers' Pneumoconiosis) Population in need: Surface coal miners.	R.06 By 1986, establish health monitoring surveillance (x-ray) for surface miners. (DRDS)		├──────────┤
		a. By 1985, form task group with MSHA to write draft regulations. (DRDS)	├──────┤
		b. By 1985, provide final recommendations and criteria to MSHA. (DRDS)	├──────┤
		c. By 1986, implement x-ray monitoring program. (DRDS)	├──────────┤
		d. By 1987, finish epidemiologic strip mine study. (DRDS)	├──────────────┤
		e. By 1987, report results of x-ray surveillance. (DRDS)	├──────────────┤

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		f. By 1987, report results of epidemiologic strip mine study. (DRDS)	
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders	T. By 1985, a program should be developed to: (1) follow-up individual findings from health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and (2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational diseases and injury. CROSS REFERENCE: Disorders of Reproduction Neurotoxic Disorders		
Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.		a. By 1985, develop and improve (over 1983 activities) procedures for establishing research priorities. (DSHEFS)	
		b. By 1984, complete development of system for inputting priority outputs from union record data, NTP, surveillance, PRAB, etc. (DSHEFS)	
		c. By 1985, complete development of inventory of union records for use in identifying high risk occupations/ industries. (DSHEFS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders	T.01 By 1988, develop and improve (beyond 1983 capabilities) a national hazard information data base that identifies potential hazards to the workplace. (DSHEFS)		├──────────────────────┤
Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.		a. By 1985, complete NOHS/RTECS ranking of industries and occupations for NOES analyses and publications. (DSHEFS)	├──────┤
		b. By 1985, complete resolution of NOES trade name ingredient information. (DSHEFS)	├──────┤
		c. By 1985, complete an expansion of the Material Locator System. (DSHEFS)	├──────┤
		d. By 1986, complete a set of NOES publications on industries and occupations. (DSHEFS)	├──────────┤
		e. By 1986, complete an update of NOES trade names. (DSHEFS)	├──────────┤
		f. By 1986, complete link between the NOES trade name file and the national poison control network. (DSHEFS)	├──────────┤
		g. By 1987, complete a set of NOES publications on industries and occupations. (DSHEFS)	├──────────────┤
		h. By 1987, complete an update of NOES trade names. (DSHEFS)	├──────────────┤

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		i. By 1987, complete an expansion of the Material Locator System. (DSHEFS)	
		j. By 1988, complete a set of NOES publications on industries and occupations. (DSHEFS)	
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders	T.02 By 1988, develop, maintain, and improve (beyond 1983 capabilities) a nationwide system for the identification and monitoring of occupationally-related disease, disability, and mortality. (DSHEFS)		
Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.		a. By 1984, have in place six SCANS States and expand the scope of the activities to include mining and safety data. (DSHEFS)	
		b. By 1984, complete 15 correlated maps for disease/death measures at the county or Standard Economic Areas level. (DSHEFS)	
		c. By 1984, complete analyses of SSA disability trends for the 1977/78 data. (DSHEFS)	
		d. By 1984, complete series of training for State health department personnel for industry/occupation coding of death certificates and establishment of quality control programs. (DSHEFS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		e. By 1984, complete baseline prevalence measures and identification of unusual patterns of disease and disability by occupation and industry using the NCHS Health Interview Survey data. (DSHEFS)	
		f. By 1984, complete adoption of the Sentinel Health Events (Occupation) (SHE(O) for use in SCANS and other State-related projects. (DSHEFS)	
		g. By 1984, complete development of procedures for evaluating and monitoring births and fetal deaths for parental industry or occupation associations. (DSHEFS)	
		h. By 1984, complete development of central repository for data related to the "Leading Work-Related Diseases and Injuries" and use in all subsequent years. (DSHEFS)	
		i. By 1985, complete development and implementation of methodologies to estimate occupationally-related mortality and morbidity which will be the major tool that is used for evaluating the "Leading Work-Related Diseases and Injuries." (DSHEFS)	
		j. By 1985, complete an expansion of the industry/occupation coding standardization. (DSHEFS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		k. By 1985, complete an identification of counties for death certificates case/control studies. (DSHEFS)	
		l. By 1985, complete data analysis from the original four SCANS States and expand SCANS to 12 States that demonstrate follow-up capability. (DSHEFS)	
		m. By 1985, complete mapping of SHE(O) and related hazards. (DSHEFS)	
		n. By 1985, complete publication of revision of September 1983 SHE(O)) paper. (DSHEFS)	
Focus: Occupational Lung Diseases (Silicosis Coal Workers' Pneumoconiosis)		o. By 1985, in conjunction with DRDS, complete criteria and standards for reporting Coal Workers' Pneumoconiosis and silicosis as preventable occupational diseases for the PHS 1990 Prevention Objectives. (DSHEFS)	
Population in need: Miners and millers.		p. By 1986, complete modification of HIS to obtain data needed for the PHS 1990 Prevention Objectives. (DSHEFS)	
		q. By 1986, complete occupation-specific years life lost analyses and identify counties for death certificates/case control studies. (DSHEFS)	
		r. By 1986, maintain SCANS States at 12. (DSHEFS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		s. By 1986, complete multilocational surveillance data file access. (DSHEFS)	
		t. By 1986, complete promotion of use of SHE(O) list by primary health care providers per the PHS 1990 Prevention Objectives. (DSHEFS)	
Focus: Occupational Lung Diseases (Byssinosis) Population in need: Cotton industry. Textile industry.		u. By 1986, in conjunction with DRDS, complete criteria and standards for reporting byssinosis as a preventable occupational disease for the PHS 1990 Prevention Objectives. (DSHEFS)	
		v. By 1987, complete an identification of counties for death certificates case/control studies. (DSHEFS)	
		w. By 1987, complete expansion of SCANS to 18 States. (DSHEFS)	
		x. By 1987, complete 4 publications of of surveillance reports with SCANS States. (DSHEFS)	
		y. By 1987, complete publication of 1985 SHE(O) paper. (DSHEFS)	
Focus: Occupational Lung Diseases (Asbestosis) Population in need: Asbestos industry and utilizers.		z. By 1987, in conjunction with DRDS, complete criteria and standards for reporting asbestosis as a preventable occupational disease for the PHS 1990 Prevention Objectives. (DSHEFS)	

Surveillance (continued)

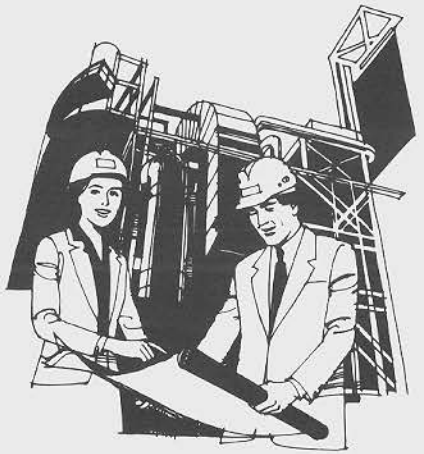
Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases (Asbestosis, Byssinosis, Silicosis, Coal Workers' Pneumoconiosis)		aa. By 1988, complete adoption of surveillance registries to meet PHS 1990 Prevention Objectives re: Coal Workers' Pneumoconiosis, asbestosis, byssinosis, silicosis, and NOES/mortality mapping. (DSHEFS)	
Population in need: Miners and millers. Asbestos industry and utilizers. Cotton industry. Textile industry.		bb. By 1988, complete an identification of counties for death certificates case/control studies. (DSHEFS)	
		cc. By 1988, maintain SCANS at 18 States. (DSHEFS)	
		dd. By 1988, complete four publications of surveillance reports with SCANS States. (DSHEFS)	
		ee. By 1988, complete promotion of use of SHE(O) list in medical schools. (DSHEFS)	
		ff. By 1988, complete development work for analyses of reportable disease data. (DSHEFS)	

Surveillance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.03 By 1986, implement a NIOSH-wide priority setting mechanism to priorities for research and document development taking into consideration The Ten Leading Diseases and Injuries, and the 1990 Objectives for the Nation. (DSDTT) CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance		

PROGRAM AREA: HEALTH HAZARD EVALUATIONS AND 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.



RELEVANT OBJECTIVES FOR THE NATION:

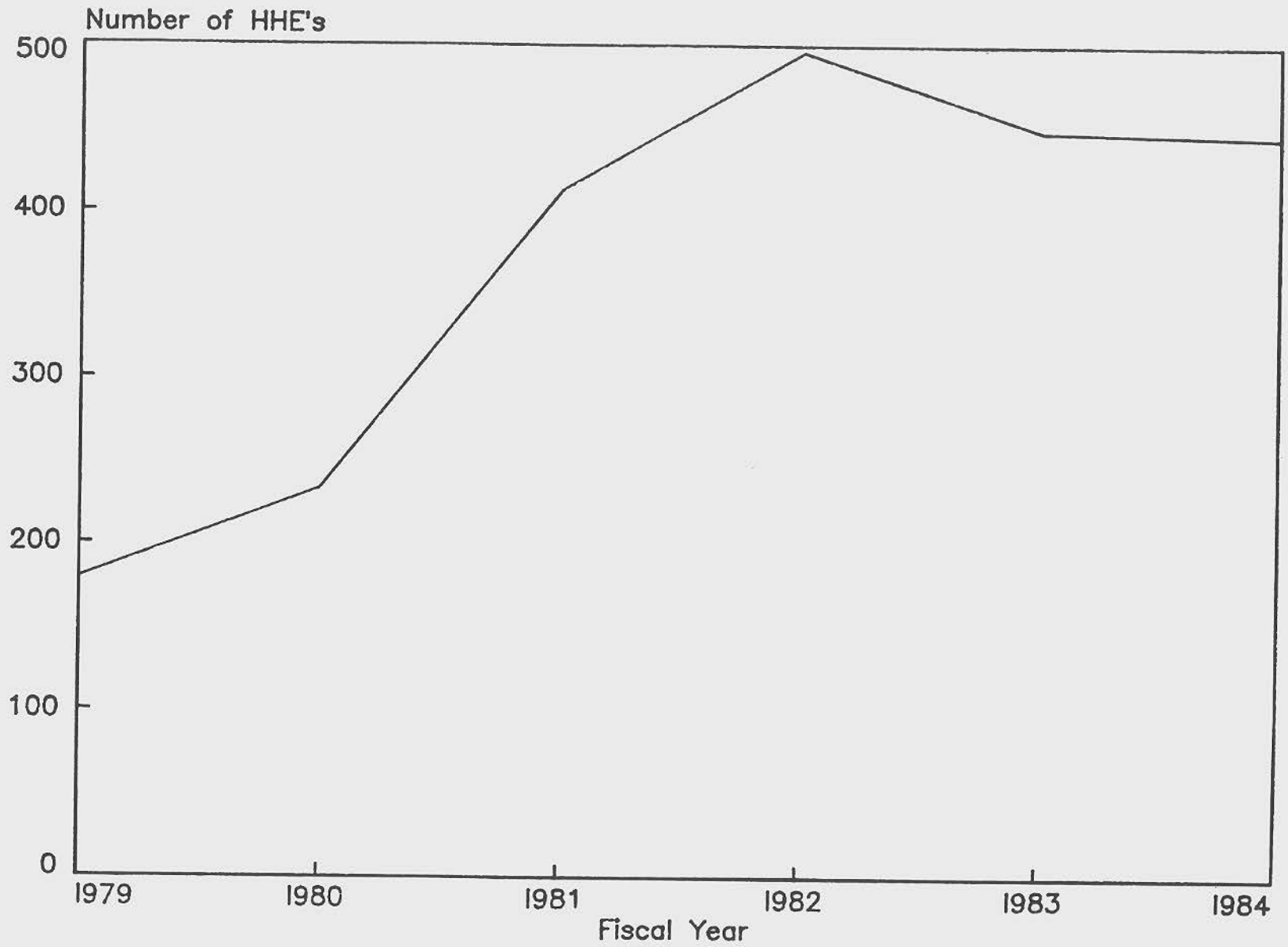
- o Improved public/professional awareness
  - By 1985, all workers should receive routine notification in a timely manner of all health examinations or personal exposure measurements taken on work environments directly related to them.

  Improved services/protection
  - By 1990, the number of health hazard evaluations being performed annually should increase tenfold....
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions, and management, and other existing surveillance sources of clinical and epidemiological data; and use the findings to determine the etiology, national history, and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVES:

- By 1986, perform between 500 to 550 Technical Assistance/HHEs per year.
- By 1986, identify major disease/hazard categories that result from HHEs.
- By 1986, publish HHE results in at least 12 MMWR articles and 20 technical journal articles annually.
- By 1986, increase HHE assistance to State and local agencies.

Figure 12


Number of HHE's
FY1979–FY1984
Number of HHE's
500
400
300
200
100
0
1979
1980
1981
1982
1983
1984
Fiscal Year

PROGRAM DESCRIPTION:

The purpose of this activity in NIOSH 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 used or found in the workplace. To accomplish this, medical, epidemiologic, and industrial hygiene investigations are conducted at the workplaces of concern.

These investigations evaluate the substances, processes, work practices, etc., found in the workplace and come to conclusions about related health effects based on the most recently published criteria (i.e., OHSA 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.

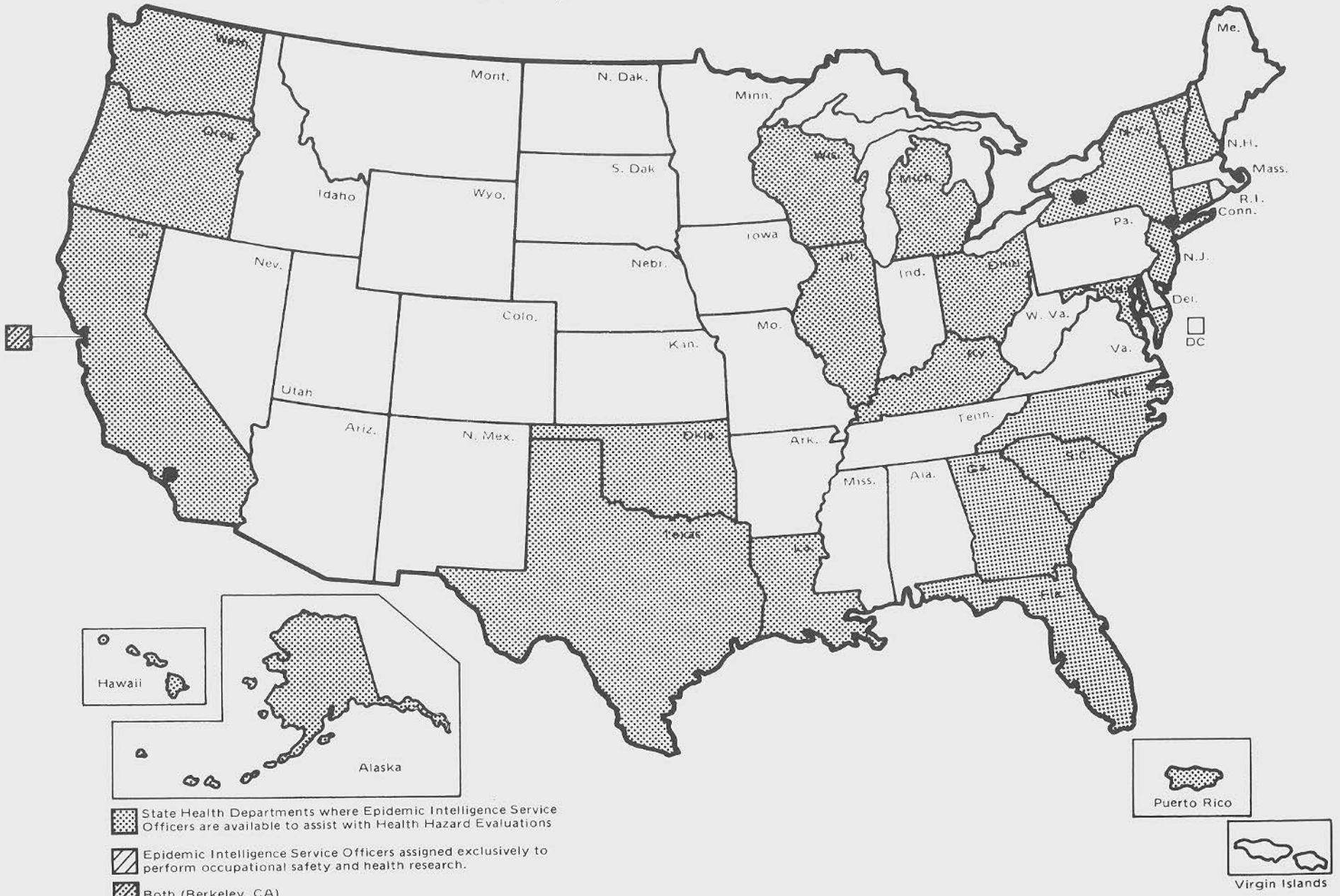
A major effort over the next 3-5 years will be to develop methods to work more closely with State Health Departments in conducting occupational health hazard evaluations. This will include: (a) participation of State-based EIS officers and other health department personnel in field evaluations; (b) increased 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.

NIOSH expects that over the next 3-5 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 Prevention Objectives. 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 in the Program and at identifying significant occupational health problems appropriate for further evaluation by these other groups. We also will increase our dissemination efforts through MMWR articles, trade name and technical journal articles, and other publications.

Figure 13

Epidemic Intelligence Service Officers in Occupational Safety and Health Activities



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 is required in the PHS 1990 Prevention Objectives.

In response to the problem of occupational fatalities and the lack of existing data suitable for risk assessment, NIOSH's Division of Safety Research is conducting the Fatal Accident Circumstances and Epidemiology (FACE) project. This project is a pilot study for an epidemiologic 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 West Virginia medical examiner in the collection of this information, and plans to extend the effort to portions of Pennsylvania and Ohio in the near future.

FOCUS: WORK-RELATED DISEASES AND INJURIES

OCCUPATIONAL LUNG DISEASES: During FY 1983, the general industry Health Hazard Evaluation Program (HHE) completed investigations involving silicosis among foundry workers and acute respiratory symptoms among workers exposed to sulfur dioxide during a cleaning operation. In addition, an evaluation of workers exposed to petroleum coke found evidence of pulmonary function changes in these workers. A similar study at another petroleum coke plant is currently underway. Several health hazard evaluations are currently underway concerning occupational asthma.

MUSCULOSKELETAL INJURIES: Two completed HHEs found a high incidence of carpal tunnel syndrome among assembly workers. Several other musculoskeletal evaluations are currently underway in collaboration with DBBS.

OCCUPATIONAL CANCERS: An HHE at a printing facility found a high prevalence of bone marrow abnormalities among workers exposed to glycol ethers. Another evaluation found high levels of nitrosamines at a rubber production facility. Several other HHEs are currently underway evaluating clusters of cancer cases in various industries. The initial phase of bladder cancer screening was completed in our notification project involving workers with past exposures to bladder carcinogens at a plant in Atlanta, Georgia; an interim report on this project was distributed.

AMPUTATIONS, FRACTURES, EYE LOSS, LACERATIONS, AND TRAUMATIC DEATHS: DSHEFS, in cooperation the Washington State Department of Social and Health Services, conducted on HHE of Irrigation-Pipe-Associated Electrocution Deaths. During 1950 - 1979, there were 42 farmers killed due to electrocution when 18 deaths could have been expected for such an age and sex group. The results were reported in the April, 1983 MMWR.

CARDIOVASCULAR DISEASES: Two HHEs are currently underway evaluating clusters of heart disease at two industrial facilities (a phosphate plant and a chemical plant).

DISORDERS OF REPORDUCTION: Two HHEs were completed evaluating reproductive abnormalities at a research laboratory and at an assembly plant. Another study was completed showing a high incidence of reproductive abnormalities among the spouses of workers at an oil refinery water treatment facility. Other evaluations included examination of anesthetic gas exposures in hospital operating rooms and dental offices.

NEUROTOXIC DISORDERS: Several HHEs revealed a high incidence of symptoms indicative of central nervous system disorders among workers exposed to solvents at a shoe manufacturing facility, histopathology laboratories, and several other workplaces. In collaboration with DBBS, an evaluation of peripheral neuropathy among workers at a herbicide manufacturing facility is being conducted.

NOISE-INDUCED LOSS OF HEARING: In collaboration with DBBS, DSHEFS conducted a study concerning noise-induced hearing loss in fire fighters. A follow-up study at a larger fire department is currently underway. Another HHE found high noise exposures for airline maintenance workers at an airport.

DERMATOLOGIC CONDITIONS: An HHE was conducted on phototoxic dermatitis among workers exposed to petroleum coke and coal tar pitch. Several other evaluations of occupational skin disease were completed including: dermatitis among hospital workers exposed to phenolic cleansing agents; dermatitis among workers exposed to formaldehyde at a uniform manufacturing facility; phototoxic dermatitis among workers exposed to pesticides at a mushroom cultivation facility; irritant dermatitis among workers exposed to an amine compound added to the humidification system at a university museum; and skin cancer among outdoor maintenance workers at a dam. Another recently completed health hazard evaluation concerned two Colorado forestry workers who developed severe dermatitis. In both workers, the dermatitis occurred after they removed the plastic sheets covering piles of pine logs which had been treated with ethylene dibromide (EDB) to kill pine beetles. Analysis of condensate under the plastic sheets and of the pine bark revealed high levels of EDB. NIOSH recommended that protective clothing and eye protection be worn by people handling the wood, and that steps taken to alert the public to the hazards of handling the plastic covers and the wood.

Program Area: Health Hazard Evaluation/Technical Assistance

Goal: 1. Prevent work-related diseases and injuries.
2. Identify work-related diseases and injuries so as to detect and define significant changes in the status of occupational safety and health.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	A. By 1990, workplace accident deaths for firms or employers with 11 or more employees should be reduced to less than 3,750 per year.		
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers.	A.01 By 1985, conduct 15 fatality and injury investigations (FACE). (DSR)		

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Cardiovascular Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	1. By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installation.		├──────────────────────────────┤
		a. By 1985, 50 percent of all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.	├──────┤
		b. By 1985, develop a hazard control plan for use by industry to assure that all control elements are appropriately considered in final plan. (DPSE)	├──────┤
		c. By 1987, demonstrate efficiency of hazard control plan for industry. (DPSE) CROSS REFERENCE: Control Systems (I.00.c) Information Dissemination/ Document Development (I.00.c)	├──────────────┤
		d. By 1985, document control practices in two growing or emerging processes. (DPSE) CROSS REFERENCE: Control Systems (I.00.d) Work Force Development (I.00.b)	├──────┤

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Population in need: Blue-collar workers. Service workers. White-collar workers. Hazardous waste-site cleanup workers.	I.01 By 1986, provide industrial hygiene and medical support for hazardous waste evaluations conducted under the Interagency Agreement with EPA's Superfund Group. (DSHEFS)		[redacted]

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Hazardous waste-site cleanup workers.	I.02 By 1986, perform 50 evaluations of superfund sites for EPA. (OD)									

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q. By 1990, the number of health hazard evaluations (and technical assistance) being performed annually should increase tenfold; the number of industrywide studies being performed annually should increase threefold. (OD)		
		a. By 1990, NIOSH will perform annually 1,500 health hazard evaluations. (OD)	
		b. By 1990, NIOSH will perform annually 150 industrywide studies. (OD)	
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q.01 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. (DSHEFS)		
		a. By 1986, handle 550 requests. (DSHEFS)	
		b. By 1986, collaborate with State health departments by conducting:	
		(i) 30 site visits involving State health department personnel, including EIS Officers; (DSHEFS)	

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		(ii) responding to at least 90 requests from State and local health departments; (DSHEFS)	
		(iii) assigning at least two NIOSH employees to a State health departments; (DSHEFS)	
		(iv) continuing three HETA Cooperative Agreements to State health departments. (DSHEFS)	
		c. By 1986, conduct at least 25 joint investigations with other NIOSH programs and with other CDC Centers to improve coordination of the Program. (DSHEFS)	
		d. By 1986, publish at least: CROSS REFERENCE: Information Dissemination/ Document Development (J.00.e)	
		(i) 16 MMWR articles; (DSHEFS)	
		(ii) three quarterly summaries; (DSHEFS)	
		(iii) 12 professional or trade journal articles; and (DSHEFS)	
		(iv) four documents aimed specifically at State and local health departments mainly dealing with dermatitis, heavy metal poisoning, and lung diseases. (DSHEFS)	
		e. Maintain turnaround time on full reports at between 10-12 months and letter reports at 4-5 months. (DSHEFS)	

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
		f. By 1988, handle 600 requests. (DSHEFS)	———							
		g. By 1988, collaborate with State health departments by:								
		(i) conducting 40 site visits involving State health department personnel, including EIS Officers; (DSHEFS)	———							
		(ii) responding to at least 100 requests from State and local health departments; (DSHEFS)	———							
		(iii) assigning at least two NIOSH employees to State health departments; (DSHEFS)	———							
		(iv) continuing three HETA Cooperative Agreements to State health departments (DSHEFS)	———							
		h. Conduct at least 25 joint investigations with other NIOSH programs and other CDC Centers to improve coordination of the program. (DSHEFS)	———							
		i. By 1988, publish at least: CROSS REFERENCE: Information Dissemination/ Document Development (J.00.f)								
		(i) 18 MMWR articles; (DSHEFS)	———							
		(ii) three quarterly summaries; (DSHEFS)	———							
		(iii) 15 professional or trade journal articles; (DSHEFS)	———							

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		(iv) six documents aimed specifically at State and local health departments, mainly dealing with dermatitis, heavy metal poisoning and lung diseases. (DSHEFS)	
		j. Maintain turnaround time on full reports at between 10-12 months and letter reports at 4-5 months. (DSHEFS)	
Focus: Occupational Lung Diseases Population in need: Miners.	Q.02 By 1985, conduct 30 health hazard evaluations of mines and mine-related industries. (DRDS)		
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q.03 By 1987, extend visibility of respirator complaint system to users through use of advertising and standard formats for complaints. (DSR)		
		a. By 1984, identify and resolve 75 percent of the life and health threatening problems which arise from defective design or misuse of MSHA/NIOSH approved respirators. (DSR)	
		b. By 1985, identify and resolve 85 percent of the life and health threatening problems which arise from defective design or misuse of MSHA/NIOSH approved respirators. (DSR)	
		c. By 1985, respond to 24 complaints regarding MSHA/NIOSH approved respirators. (DSR)	

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q.04 By 1988, develop and improve (over 1983 levels) epidemiologic studies involving biological monitoring and screening. (DSHEFS)		├──────────────────────┤
		a. By 1984, complete International Conference on Screening and Biological Monitoring. (DSHEFS)	├──┤
		b. By 1986, complete biological monitoring/screening studies. (DSHEFS)	├──────────┤
		c. By 1988, complete ten biological monitoring/screening studies. (DSHEFS)	├──────────────────────┤
Focus: Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q.05 By 1988, investigate nature and extent of the cancer risk 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. (DSHEFS) CROSS REFERENCE: Occupational Lung Diseases Occupational Cancers		├──────────────────────┤
		a. By 1986, complete 42 cancer epidemiologic studies and evaluate 20 emerging problems for the feasibility of proceeding. (DSHEFS)	├──────────┤

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		b. By 1988, complete 70 cancer epidemiologic studies and evaluate 20 emerging problems for the feasibility of processing. (DSHEFS)	
Focus: Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q.06 By 1988, expand (over 1983 levels) the epidemiologic study of the cardiovascular, reproductive, neurotoxic, and dermatologic 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 workplace hazards. (DSHEFS)		
		a. By 1984, expand staff through EIS program to include epidemiologists in the area of neurotoxicology, cardiovascular diseases, and dermatologic conditions. (DSHEFS)	
		b. By 1986, complete 12 studies and evaluate 12 emerging problems for the feasibility of proceeding. (DSHEFS)	
		c. By 1988, complete 20 epidemiologic studies and evaluate 20 emerging problems for the feasibility of proceeding. (DSHEFS)	

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q.07 By 1985, develop and improve (over 1983 activities) procedures for establishing research priorities. (DSHEFS)		
		a. By 1984, complete development of system for imputting priority outputs from union record data, NTP, surveillance, etc. (DSHEFS)	
		b. By 1985, complete development of inventory of union records for use in identifying high risk occupations/ industries. (DSHEFS)	

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T. By 1985, a program should be developed to: (1) follow-up individual findings from health hazard and health evaluations, reports from unions, management and other existing surveillance sources of clinical and epidemiological data; and (2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.		

Health Hazard Evaluation/Technical Assistance (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.03 By 1986, implement a NIOSH-wide priority setting mechanism to select priorities for research and document development taking into consideration the ten leading work-related diseases and injuries. (DSDTT) CROSS REFERENCE: Surveillance		[ ]							

EVALUATE WORK-RELATED DISEASES AND INJURIES

The core of the Institute's scientific research is the evaluation of work-related diseases and injuries. Under this goal, NIOSH tests scientific hypotheses through the disciplines of epidemiology, toxicology, kinesiology, and the physical and behavioral sciences. Our tactical goal for this program is to evaluate work-related diseases and 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)
- Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths
- Cardiovascular Diseases
- Disorders of Reproduction
- Neurotoxic Disorders
- Noise-Induced Loss of Hearing
- Dermatologic Conditions
- Psychologic Disorders

PROGRAM AREA: 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.

RELEVANT OBJECTIVES FOR THE NATION:

- o Improved health status
  - 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 workers' pneumoconiosis.
- o Improved services/protection
  - By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as: chronic lung hazards,...medical monitoring requirements.
  - By 1990,...the number of industrywide studies being performed annually should increase threefold.
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVES:

- By FY 1986, determine whether the $2mg/m^3$ dust level in underground coal mines is effective.
- By FY 1986, advise MSHA about the health effects of the use of diesel engines in underground mines.

- By FY 1986, address the significance of nonmalignant pleural abnormalities such as plaques and pleural thickening.

- By FY 1986, form a worker registry and obtain health data for emerging energy industries.

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 hence obscure the association between work 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 U.S. Public Health Service has established the following national objective for the prevention of occupational lung diseases: "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 workers' pneumoconiosis." These diseases, as well as lung cancer and occupational asthma, are briefly discussed below.

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 non-malignant respiratory disease research, and 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. 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 1984. Further, 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, and cohorts of coal workers from past morbidity studies.

FOCUS: WORK-RELATED DISEASES

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 ventilation 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 $2mg/m^3$ dust standard during FY 1984, 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.

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; there is no specific treatment. The latent period is 10-20 years. Smoking appears to increase the risk of death from asbestosis by a factor of two to three. Longitudinal studies of groups of asbestos insulation workers and shipyard workers have revealed that 10%-18% may be expected to die of asbestosis.

Figure 14

Coal Deposits in the United States

Source: Adapted from U.S. Geological Survey, 1975.

The pulmonary effects of asbestos fibers less than 5 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.

BYSSINOSIS: This condition, characterized by both acute (reversible) 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 1984, DBBS, using a primate model, is assessing the relative potency of suspect etiologic agents of byssinosis. Ultimately, by FY 1986, NIOSH wants to establish the etiology of byssinosis.

SILICOSIS: Although the ill effects of exposure to free crystalline silica have been known for centuries, the prevalance 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 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. The data are now being evaluated. The Institute is making an effort to expand its research effort with UAR in FY 1984. DBBS will continue the in-vivo evaluation of the fibrogenic potential of coal and mineral slags used as substitites for abrasive blasting. Preliminary results indicate such slags are less toxic and less fibrogenic than silica.

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 developing 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.

The results of several studies completed by DSHEFS during FY 1984 will provide important information regarding the carcinogenicity of short fibers (less than 5 microns in length). This information comes from mortality studies of goldminers exposed to short fiber amphibole fibers, workers exposed to clay fibers (attapulgite), and workers exposed to fibrous glass. The conclusions from these studies will assist in the planned reevaluation of the OSHA and MSHA asbestos standards. 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 ongoing or planned for FY 1984 which are designed to investigate occupational exposure and the risk of respiratory cancer mortality, including investigations of workers exposed to formaldehyde and beryllium. Studies in FY 1984 include investigations of welders (not exposed to asbestos) and of workers exposed to silica (granite workers), lead chromate paints, toluene diisocyanate (TDI), sulfuric acid mist, and coal tar pitch from coating of pipes.

In FY 1984 lung cancer studies assessing the carcinogenic potential of foundry pyrolysis effluents will be completed in addition to the in vitro assessment of (co-mutagenic) effects resulting from surface modification of asbestos by fluoride.

DBBS has been conducting a chronic inhalation study of four geometrically different glass fibers. This study is designed to evaluate the effects--such as mortality, hematology, pulmonary function, and opthalmology. The results should be known this year.

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 such as silica and cotton dusts. 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, both organic and inorganic respirable dusts, can vary from grain dusts, cotton dusts, coal dusts, fibrous minerals (asbestiform fibers), and non-fibrous minerals (silica), 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. The latter is especially relevant to mutagenesis studies which will be ongoing in FY 1984.

DBBS is evaluating workplace agents which induce hypersensitive pulmonary reactions. A study of the asthmatic potential of platinum demonstrated reproducible airway obstruction in monkeys when challenged; and the incidence of responders was greater with concurrent ozone exposure. This suggests that pulmonary irritants may exacerbate pulmonary hypersensitivity. Studies of the asthmagenic potential of vanadium pentoxide are continuing.

Program Area: Occupational Lung Diseases

Goal: 1. Prevent work-related diseases and injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E. 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 workers' pneumoconiosis.		————————————
Focus: Asbestosis Population in need: Asbestos workers and utilizers. Demolition workers. Miners.	E.01 By 1989, assess the adequacy of the current asbestos standard. (DRDS)		————————
		a. By 1985, make recommendations to MSHA regarding the appropriate standard for asbestos. (DSDTT) CROSS REFERENCE: Information Dissemination/ Document Development (E.56)	———
		b. By 1986, make recommendations concerning the adequacy of the OSHA/NIOSH definition of a fiber. (DRDS)	————
		c. By 1987, make recommendations concerning the adequacy of a single standard for all asbestos types. (DRDS)	—————

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		d. By 1988, in conjunction with DSDTT re-evaluate data pertinent to the current asbestos standard and make recommendations to OSHA. (DRDS)	
Focus: Asbestosis	E.02 By 1988, increase knowledge of the natural history of asbestos associated diseases. (DRDS)		
Population in need: Asbestos workers and utilizers.		a. By 1986, conduct epidemiologic studies on workers exposed to fibrous minerals combined with other mineral dusts. (DRDS)	
		b. By 1987, complete and publish results on the relationship between pleural changes, mesothelioma, and smoking in asbestos workers. (DRDS)	
		c. By 1988, complete and publish results on the progression of asbestosis after leaving an asbestos exposed environment. (DRDS)	
Focus: Asbestosis	E.03 By 1989, determine concentrations of asbestos fibers in autopsy lungs from occupationally exposed, non-occupationally exposed, and rural populations. (DRDS)		
Population in need: Asbestos workers and utilizers.			
		a. By 1986, evaluate microanalytical methods for assessing lung fiber concentrations and make determination concerning optimum method. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		b. By 1987, complete microanalytical studies on autopsy populations. (DRDS)	
		c. By 1988, publish review of literature and data on pulmonary asbestos fiber concentrations. Make recommendations concerning the diagnostic usefulness of quantitative and qualitative measures of lung fibers. (DRDS)	
Focus: Asbestosis Lung Cancer Mesothelioma Population in need: Asbestos workers and utilizers.	E.04 By 1988, conduct autopsy studies to establish lung fiber concentrations and characteristics of fibers associated with asbestosis, mesothelioma, and lung cancer. (DRDS)		
		a. By 1987, complete microanalytical studies on asbestos workers with asbestosis, mesothelioma, and lung cancer. (DRDS)	
		b. By 1988, publish review of literature and data on pulmonary fiber concentrations. Make recommendations to DSDTT concerning the diagnostic usefulness of quantitative and qualitative assessment of lung fibers in these diseases. (DRDS)	
Focus: Asbestosis Population in need: Asbestos workers and utilizers.	E.05 By 1989, evaluate the relative toxicities of commercially available asbestos types. (DRDS)		
		a. By 1985, Develop and apply short-term bioassays to identify fibrous minerals with fibrogenic potential. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		b. By 1986, develop methods for producing fibers of known size for experimental studies. (DRDS)	
		c. By 1987, complete and publish results on relative cytotoxicities of all commercially important fibrous minerals. Complete studies on biologic effects of cleavage fragments. (DRDS)	
		d. By 1988, complete and publish results on the relationship between fiber size and cytotoxicity for 2 asbestos types. (DRDS)	
Focus: Lung Diseases Population in need: Miners. Anthropogenic fiber workers.	E.06 By 1989, identify anthropogenic and naturally occurring (non-asbestos) fibrous minerals and the extent to which these pose health hazard to workers. (DRDS)		
		a. By 1985, develop programs to monitor, collect, and disseminate data on production, work force size, and exposures. (DRDS)	
		b. By 1986, complete *in vitro* cytotoxicity studies on major asbestos substitute minerals.(DRDS)	
Miners.		c. By 1986, determine prevalence of fibrous minerals in mine ores and mining environment and evaluate potential worker exposure. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Vermiculite workers. Wollastonite workers.		d. By 1987, complete environmental/ morbidity/mortality study of vermiculite workers. Complete mortality study of wollastonite workers. (DRDS)	├──────┤
		e. By 1988, complete two micro-analytical/autopsy studies on workers exposed to asbestos substitute minerals. Complete two additional epidemiologic studies on workers exposed to asbestos substitute minerals where public health significance has been defined. (DRDS)	├──────────┤
Focus: Byssinosis	E.07 By 1987, define the specific causal agent(s) and disease mechanisms of byssinosis. (DRDS)		├──────┤
Population in need: Textile workers. Cotton industry workers.		a. By 1985, catalog the effects of possible causative agents (plant extracts and related chemicals) on isolated airway smooth muscle. (DRDS)	├──┤
		b. By 1986, complete inhalation studies of animals exposed to cotton dust(s) for the purpose of developing an animal model of the disease. (DRDS)	├────┤
		c. By 1987, complete an animal modeling study of the potencies of byssinosis-inducing agents. (DBBS)	├──────┤
		d. By 1985, determine the metabolic consequence of enzymatic processing of possible causative agents by the lung. (DRDS)	├──┤

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		e. By 1984, quantitatively correlate human exposure to cotton dust. (DRDS)	
		f. By 1984, complete additional studies relating acute human ventilatory response to hypothesized etiologic agents. (DRDS)	
Focus: Silicosis Population in need: Quarrymen, abrasive blasters, silica processors, mining, metal, and ceramic industries.	E.08 By 1988, assess the adequacy of the current NIOSH recommended standard for crystalline silica. (DRDS)		
		a. During 1984, provide input into criteria document on silica in mining (coal). (DRDS)	
		b. By 1985, complete a criteria document for MSHA on Crystalline Silica in Mines. (DSDTT) CROSS REFERENCE: Information Dissemination/ Document Development (E.57)	
		c. By 1986, complete analysis of PL 480 data collected by the Egyptian High Institute which has medical/environmental data on over 4000 workers. (DRDS)	
		d. By 1987, complete a mortality analysis of industrial workers employed in the U.S. since 1945. Past environmental data will be used to estimate quartz exposure and will be related through sampling to assess present standards. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		e. By 1986, complete animal inhalation studies on mixtures of silica bearing dusts. In these studies we will investigate the mechanism(s) of lung response to inhaled silica to improve extrapolations of animal data to human expected response. (DRDS)	
Focus: Silicosis Population in need: Quarrymen, abrasive blasters, silica processors, mining, metal, and ceramic industries.	E.09 By 1989, make recommendations to improve methods for control or prevention of silicosis. (DRDS) CROSS REFERENCE: Control Systems		
		a. By 1988, complete evaluation of disease mechanisms through in vitro studies on pulmonary macrophages. Understanding mechanisms may facilitate novel control procedure applications. (DRDS)	
		b. By 1988, devise and implement an system for the coordination, interpretation, and translation of research findings to other health professionals and the public. (DRDS)	
		c. By 1986, complete evaluation of coal slags used as substitutes for silica sand in abrasive blasting operations. (DBBS)	

Occupational Lung Diseases (continued)

Focus / Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Coal Workers' Pneumoconiosis Silicosis	E.10 By 1985, to assemble technical and scientific information base on coal worker morbidity and mortality. (DRDS)		[	]						
Population in need: Coal miners.		a. In 1985, co-sponsor an international conference with University of Pittsburgh regarding coal worker morbidity and mortality. (DRDS)	[	]						
		b. By 1985, complete work with WHO on coal/silica monograph. (DRDS)	[	]						
		c. By 1985, petition ILO for hosting VII International Conference on CWP (Morgantown). (DRDS)	[	]						
Focus: Coal Workers' Pneumoconiosis	E.11 By 1986, assess toxicology of different coal mine dusts. (DRDS)		[	]						
Population in need: Coal miners.		a. By 1986, through NCS, assess progression of CWP by region and seams. (DRDS)	[	]						
		b. By 1986, in conjunction with MSHA, correlate composition with biological response by region and seam. (DRDS)	[	]						
Focus: Coal Workers' Pneumoconiosis	E.12 By 1990, assess adequacy of 2mg/m^3 dust standard in underground coal mines (DRDS). CROSS REFERENCE: Control Systems		[	]						
Population in need: Underground coal miners.		a. Monitor continuously all pertinent subgroups in NCS and x-ray surveillance through film trials. (DRDS)	[	]						

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		b. Monitor continuously and compare observations with expectations under dose-response curve. (DRDS)	
		c. Annually, publish two peer reviewed articles on subject. (DRDS)	
Focus: Lung Diseases	E.13 By 1988, address concerns of diesels underground. (DRDS)		
Population in need: Underground coal workers.		a. By 1985, publish results of animal studies. (DBBS)(DRDS)	
		b. By 1985, complete analysis of follow-up of coal miners exposed to diesels. (DRDS)	
		c. By 1985, Complete environmental assessments (5 mines). (DRDS)	
		d. By 1985, determine impact of diesel soot on $2mg/m^3$ dust standard. (DRDS)	
Focus: Coal Workers' Pneumoconiosis	E.14 By 1986, assess transfer right option to low dust on basis of "other" medical evidence. (DRDS)		
Population in need: Coal miners.		a. By 1985, analyze NCS data to indicate impairment (other than CWP) caused by environment vs. other extraneous factors. (DRDS)	
		b. By 1986, make recommendations to Department of Labor to clarify rules and regulations. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Lung Diseases Population in need: Mine/non-metal mine industries.	E.15 By 1989, determine if there is a pathology with nuisance dusts. (DRDS)		
		a. By 1986, initiate one study of an ACGIH listed nuisance dust by 1985. (DRDS)	
		b. By 1988, develop a list of workers exposed to various nuisance dusts and other non-fibrous minerals: the NOHSM study will have identified specific minerals to which large numbers of miners are exposed; and will identify new groups of workers exposed to previously characterized mineral hazards. (DRDS)	
Focus: Pneumoconiosis	E.16 By 1988, evaluate therapeutic modalities. (DRDS)		
Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.		a. By 1987, critically evaluate existing data on current methods of treatment of pneumoconiosis. Sponsor workshop and publish proceedings on subject. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Industrial Bronchitis Population in need: Jewelry, alloy and catalyst makers. Polyurethane, adhesive, paint workers. Alloy, catalyst, refinery workers. Solderers. Plastic, dye, insecticide makers. Foam workers, latex makers, biologists. Printing industry. Nickel platers. Bakers. Plastics industry. Woodworkers, furniture makers. Detergent formulators.	E.17 By 1987, assess severity, prevalence, and proportionate contribution of various factors (dust, cigarette smoke, outside environment region, etc.). (DRDS)		
		a. By 1987, assess implications relating to total vice respirable fraction of coal mine dust. (DRDS)	
		b. By 1986, through NCS (environmental section) relate and publish total dust vs. symptoms of bronchitis among non-smokers . (by region). (DRDS)	
		c. By 1986, assemble all NIOSH data sets and analyze bronchitis among non-smokers related to exposure to coal dust. (DRDS)	
		d. By 1985, analysis and publication from follow-up of NCS. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Asthma Population in need: Jewelry, alloy, and catalyst makers. Polyurethane, adhesive, paint workers. Alloy, catalyst, refinery workers. Solderers. Plastic, dye, insecticide makers. Foam workers, latex makers, biologists. Printing industry. Nickel platers. Bakers. Plastic industry. Woodworkers furniture maker. Detergent formulators.	E.18 By 1990, prevent the occurrence of occupational asthma through the identification and evaluation of workplace agents which induce pulmonary hypersensitivity. (DBBS)	a. By 1985, develop sampling and analytical methods for vanadium compounds. (DPSE) CROSS REFERENCE: Sampling/Analysis (E.55.a) b. By 1985, complete the evaluation of the the asthmogenic potential of vanadium pentoxide. (DBBS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Asthma Bronchitis Populations in need: Refrigeration, fertilizer, oil refining industries. Alkali and bleach industries. Silo fillers, arc welders, nitric acid industry. Paper industries. Cadmium smelters, processors. Plastics industry.	E.19 By 1989, define prevalences, host risk factors, causal agent(s), disease mechanisms and diagnostic tests both generally and for specific asthmas. (DRDS)		
		a. By 1987, develop and standardize methods for in vitro processing of antigenic materials from the workplace. (DRDS) CROSS REFERENCE: Instrument/Methods Development (I.29)	
		b. By 1988, characterize substances involved in the etiology of occupational asthma according to their effects on different cell types assessed in vitro. (DRDS)	
		c. By 1985, field test a new, sensitive, and practical method of detecting acute adverse human respiratory effects of common airborne occupational exposures. (DRDS) CROSS REFERENCE: Instrument/Methods Development (I.30)	
		d. By 1988, review the literature and analyze existing DRDS data to publish a comprehensive review of industrial bronchitis. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Asthma Bronchitis Population in need: Grain handlers.	E.20 By 1988, identify causes of grain dust induced asthma, (acute) grain fever, and (chronic) grain dust-induced bronchitis. (DRDS)		
		a. By 1985, complete studies of the interactions of grain dust with the complement system. (DRDS)	
Focus: Occupational Asthma Bronchitis Population in need: Animal confinement.	E.21 By 1989, identify causes occupational lung disease in workers exposed to animal confinement/processing dust. (DRDS)		
		a. By 1985, complete environmental assessment of gram-negative bacterial endotoxin exposures in animal confinement and processing units. (DRDS)	
Focus: Occupational Asthma Bronchitis Population in need: Insect propagation.	E.22 By 1989, identify causes of occupational allergy/asthma in insect workers. (DRDS)		
Focus: Occupational Asthma Bronchitis Population in need: Woodworking.	E.23 By 1989, identify the respiratory effects of wood dusts. (DRDS)		

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Asthma Bronchitis	E.24 By 1989, identify the etiology of phthalic anhydride asthma. (DRDS)		
Population in need: Phthalic anhydride.		a. By 1985, complete medical and environmental surveys at 4 phthalic anhydride plants. (DRDS)	
		b. By 1985, complete data analysis and final report of study. (DRDS)	
Focus: Occupational Asthma Bronchitis	E.25 By 1989, identify the etiology of isocyanate bronchitis and emphysema. (DRDS)		
Population in need: Manufacture of polyurethanes.			
Focus: Occupational Asthma Bronchitis	E.26 By 1989, identify the etiology of platinum salt asthma. (DRDS)		
Population in need: Platinum refiners.			
Focus: Occupational Asthma Bronchitis	E.27 By 1989, identify the etiology of mycotoxins in agricultural dusts. (DRDS)		
Population in need: Farm workers.		a. By 1984, determine whether naturally occurring mycotoxins are toxic to the alveolar macrophage. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Lung Cancers Population in need: Asbestos industry and utilizers. Topside coke oven workers. Uranium and fluospar miners. Chromium producers and processors, users. Nickel smelters, processors, users. Smelters. Mustard gas formulators. Ion exchange resin makers, and chemists.	E.28 By 1990, reduce the prevalence of occupational lung cancer through identification and evaluation of factors that may modify the potential or known cardiogenicity of workplace materials (DBBS).		
		a. By 1988, complete a study on the interaction between asbestos fibers and fluoride. (DBBS)	
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers.	E.29 By 1987, develop methods which can better predict the hazardous potential of non-fibrous minerals. (DRDS)		
Focus: Occupational Lung Diseases	E.30 By 1988, determine indices of hypersusceptibility. (DRDS)		
Population in need: Blue-collar workers. Service workers.		a. By 1987, critically evaluate existing data on indices of hyper-susceptibility. Make recommendations concerning their usefulness in preventing occupational lung diseases. (DRDS)	

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers.	E.31 By 1990, identify and evaluate less hazardous materials which can be used as substitutes for substances in the workplace known to induce occupational lung disease. (DBBS) CROSS REFERENCE: Control Systems		
		a. By 1986, complete a strategy for the identification of substitute materials to be evaluated by _in vivo_ or _in vitro_ methods. (DBBS)	
Abrasive blasters.		b. By 1986, complete evaluation of coal slabs used as substitutes for silica sand in abrasive blasting operations. (DBBS)	
Asbestos industries and utilizers.		c. By 1988, complete two micro-analytical/autopsy studies on workers exposed to asbestos substitute minerals. Complete two additional epidemiologic studies on workers exposed to asbestos substitute minerals where public health significance has been defined. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	K. By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injuries.		[——]
Focus: Occupational Lung Diseases Occupational Cancers Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	K.01 By 1987, verify the efficacy of behavioral methods and job design to reduce workers' exposure to carcinogens in roofing operations. (DBBS) CROSS REFERENCE: Control Systems		[——————]

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P. By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as: chronic lung hazards, neurological hazards, carcinogenic hazards, mutagenic hazards, teratogenic hazards and medical monitoring requirements.		
Focus: Lung Cancers Occupational Cancers Population in need: Asbestos industry and utilizers. Topside coke oven workers. Uranium and Fluorspar miners Chromium producers and processors, users. Nickel smelters, processors, users. Smelters. Mustard gas formulators. Ion exchange resin makers, and chemists.	P.01 By 1988, identify and develop indicator systems which can predict potential carcinogenic hazards of organic chemicals. (DRDS)		
		a. By 1986, validate arabinose-resistant test system as an alternative to Ames testing. (DRDS)	
		b. By 1986, establish human lymphocyte cytogenetic assay system. (DRDS)	
		c. By 1986, establish <u>in situ</u> microbial mutagenicity test system through development of trapping devices, sensitive tester strains, and laboratory and field validations. (DRDS)	

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q. By 1990, the number of health hazard evaluations (and technical assistance) being performed annually should increase tenfold; the number of industrywide studies being performed annually should increase threefold. (OD)		[							]
Focus: Lung Cancers Occupational Cancers Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q.05 By 1988, investigate nature and extent of the cancer risks 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. (DSHEFS) CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance		[					]		

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		a. By 1986, complete 42 cancer epidemiologic studies and evaluate 20 emerging problems for the feasibility proceeding. (DSHEFS)	
		b. By 1988, complete 70 cancer epidemiologic studies and evaluate 20 emerging problems for the feasibility of proceeding. (DSHEFS)	
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T. By 1985, a program should be developed to: (1) follow-up individual findings from health hazard and health evaluations, reports from unions, management and other existing surveillance sources of clinical and epidemiological data; and (2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.		

Occupational Lung Diseases (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Lung Cancers Population in need: Woodworkers, cabinet, and furniture makers. Boot and shoe industry. Radium chemists and processors, dial painters. Asbestos industry and utilizers. Topside coke oven workers. Uranium and Fluorspar miners. Chromium producers and processors, users. Nickel smelters, processors, users. Smelters. Mustard gas formulators. Ion exchange resin makers, and chemists.	T.04 By 1989, define synergistic and other relationships between carcinogenesis (mutagenesis) and other biological activities of organic chemicals and dusts. (DRDS)		[_____]
		a. By 1986, apply specialized monitoring techniques to identify increased risks to worker. (Mutagenic substances will be identified in the laboratory; worker risk will be assessed with the sister chromatid exchange and chromosomal aberration assays.) (DRDS)	[_____]
		b. By 1986, establish risk factors contributing to gastric carcinogenesis in coal miners through study of coal dust and its effect on biological defense mechanisms. (DRDS)	[_____]

PROGRAM AREA: MUSCULOSKELETAL INJURIES

PROGRAM AREA GOAL:

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

RELEVANT OBJECTIVES FOR THE NATION:

- o Improved health status
  - By 1990, the rate of work-related injuries should be reduced to 8.3 cases per 100 full time workers. (In 1978, there were about 9.2 cases per 100 workers.)
  - By 1990, lost workdays due to injuries should be reduced to 55 per 100 workers annually. (In 1978, about 62.1 days per 100 workers were lost.)
- o Improved services/protection
  - By 1990,...the number of industrywide studies being performed annually should increase threefold.
  - By 1990,...generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as..., teratogenic hazards, and medical monitoring requirements.
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVE:

By FY 1986, elucidate job-risk factors leading to certain disorders of the upper 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 need for this program is indicated by the following: (1) Musculoskeletal disorders rank first among disease groups in the frequency of occurrence. Nearly one-half of the Nation's work force is affected (NCHS, 1974, 1977); (2) These conditions represent a significant accessory factor in one-third of reported occupational injuries (NCHS, 1969; NSC, 1976); (3) The cost of musculoskeletal disorders, based on lost earnings and worker compensation payments, exceeds that of any single health disorder. Musculoskeletal injuries, such as (a) inflamed arm/wrist joints and (b) sprains/strains, account for one-third of annual compensation claims, the latter category being the most prevalent, with the back accounting for almost 50 percent of the compensable disorders, followed by (c) disorders of the ankle, knee, and shoulder (BLS, SDS 1979; NCHS, 1969); and (4) The nature of musculoskeletal conditions in the work force is expected to alter over the next several decades with changes in demographic characteristics of the workforce (U.S. Bureau of Census, 1976).

A 5-year program has been drafted by NIOSH with three main objectives: (1) the evaluation of work conditions that contribute to such health and safety risks, (2) the development and testing of intervention strategies for reducing these types of hazards, and (3) the development of effective dissemination procedures for reaching practitioner/user groups.

Major accomplishments expected in FY 1984 which bear on these objectives are: (1) the construction of risk profiles that characterize jobs/tasks associated with upper-extremity disorders, (2) the evaluation of case studies of manual materials handling tasks and assessment of the efficacy of adopted lifting interventions, and (3) the development of a distribution plan for a new ergonomic manual to detect job factors posing risk of upper extremity musculoskeletal disorders.

FOCUS: WORK-RELATED INJURIES

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. 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 these disorders.

LOW BACK INJURIES: Low back injuries, often due to improper manual handling of materials, are the largest single subset of musculoskeletal injuries. 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.

REPETITIVE MOTION-ASSOCIATED TRAUMA: Repetitive motion can cause "cumulative trauma disorders," including carpal tunnel syndrome, tendinitis, ganglionitis, tenosynovitis, bursitis, and epicondylitis. These 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.

VIBRATION-ASSOCIATED INJURIES: 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.

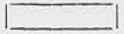
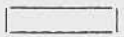
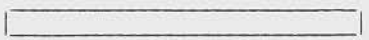
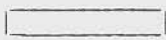
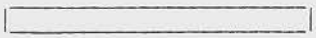
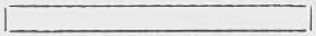
An estimated 1.2 million workers are exposed to "segmental" vibration, i.e., vibration principally of a part or parts of the body, of which the principal sources are handheld power tools, such as chain saws and jackhammers. Vibration syndrome may affect up to 90 percent of workers in such occupations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

Program Area: Musculoskeletal Injuries

Goal: 1. Prevent work-related injuries.
2. Evaluate work-related injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C. By 1990, lost workdays due to injuries should be reduced to 55 per 100 workers annually.		├──────────────────────────────┤
Focus: Carpal Tunnel Syndrome Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C.01 By 1987, elucidate job-risk factors leading to certain disorders of the upper extremities (carpal tunnel syndrome). (DBBS)		├──────────┤
Focus: Strains and Sprains Population in need: Blue-collar workers. Farm workers.	C.02 By 1985, develop improved biomechanical model which includes the effect of pushing and pulling efforts for evaluating manual materials handling tasks. (DSR)		├──────┤

Musculoskeletal Injuries (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Carpal Tunnel Syndrome Population in need: Blue-collar workers. Service workers. Farm workers.	C.03 By 1985, complete longitudinal study relating specific task requirements which relate to the incidence of musculoskeletal injury. For example, the role of cumulative trauma disorders related to carpal tunnel syndrome, or low-level repetitive muscle motions related to muscle fatigue. (DSR)		
Focus: Musculoskeletal Injuries Population in need: Blue-collar workers. Service workers. Farm workers.	C.04 By 1985, complete studies of container design parameters to support development of criteria leading to more efficient handle placement on containers. (DSR)		
Focus: Low Back Injuries Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C.05 By 1990, identify occupational risk factors which result in low back injuries. (DSR)		
		a. By 1986, develop a uniform method for objective evaluation of low back disorders which can be used in a prospective epidemiologic study. (DSR)	
		b. By 1989, conduct studies to establish the relationship between low-level, high-frequency muscle exertions which cause fatigue, and the risk of low back musculoskeletal disorders. (DSR)	
		c. By 1989, complete studies on the the effectiveness of low-back-care health promotion programs as a means of reducing risk. (DSR)	

Musculoskeletal Injuries (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		d. By 1989, develop differential low back injury rates between occupations and identify risk factors through analysis of existing injury data sources. (DSR)	
		e. By 1990, complete a prospective epidemiologic study which delineates personal and task factors which may influence the risk of work-related low back disorders. (DSR)	
		f. By 1989, complete analysis of existing data sources for the purpose of developing differential low back injury rates between occupations, to include identification of risk factors. (DSR)	
		g. By September 1989, complete a prospective epidemiologic study to determine the effects of personal and task factors which influence the risk of work-related low back disorders. (DSR)	
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C.06 By 1990, expand the scientific basis for the identification, evaluation, and control of biomechanical hazards for use in worksite surveillance/ hazard control programs. (DBBS) CROSS REFERENCE: Control Systems		

Musculoskeletal Injuries (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Upper Extremity Disorders Population in need: Blue-collar workers. Service workers. Farm workers.	C.07 By 1986, complete job/tool re-design strategies for reducing upper extremity disorders in two high risk occupations. (DBBS) CROSS REFERENCE: Control Systems		
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers.	K. By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injury.		
Focus: Low Back Injuries Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	K.02 By 1990, complete a low back risk appraisal instrument. (DSR)		

Musculoskeletal Injuries (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.		————————————
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M.01 By 1987, furnish "how-to" manuals as aids in recognizing hazardous conditions. (DBBS) CROSS REFERENCE: Information Dissemination/ Document Development		————

Musculoskeletal Injuries (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M.02 By 1987, demonstrate control techniques for reducing these problems as well as lifting hazards in selected high-risk occupations. (DBBS) CROSS REFERENCE: Control Systems		[_____]
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N. 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.		[_____]

Musculoskeletal Injuries (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N.01 By 1986, a listing of tasks performed by occupational health nurses which have been shown to be associated with a reduction in the severity and number of injuries in industry will be available for O.H.N.'s management and educators. (DSR) CROSS REFERENCE: Information Dissemination/ Document Development		|	———	———	———	———	———	———	——— |

PROGRAM AREA: OCCUPATIONAL CANCERS (OTHER THAN LUNG)

PROGRAM AREA GOAL:

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

RELEVANT OBJECTIVES FOR THE NATION:

- o Improved services/protection
  - By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as:...carcinogenic hazards...and medical monitoring requirements.
- o Improved services/protection
  - By 1990, the number of industrywide studies being performed annually should increase threefold.
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVE:

- By FY 1986, identify and evaluate at least five new agents or combination of agents annually.

PROGRAM DESCRIPTION:

Cancer kills approximately 430,000 people annually; the American Cancer Society estimates some form of cancer will ultimately develop in one-fourth of Americans. Cancer is the second leading cause of death.

It has come to be recognized that a very 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. There are four principal sources of epidemiological data: differences in cancer incidence between communities, changes in cancer incidence following migration, changes in cancer incidence over time, and identification of specific cancer-causing agents.

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 5 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 carcinogensis.

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 exposures 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., hemagiosarcoma 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 1 to 3 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 through toxicologic studies in animals, epidemiologic studies of these specific agents, and programs for prevention.

With the more than 1,000 new chemicals being introduced into the U.S. workplace each year, occupational cancer-related problems may become even more complex in the future. NIOSH's laboratory cancer research program assesses (1) the carcinogenic potential of complex mixtures, (2) the modification of carcinogenic action by promoters and cocarcinogens, (3) the etiology of the carcinogenic process in various workplace environments, (4) the influence of personal and occupational factors and substituted materials on the mechanisms of the disease, and (5) the importance of the route of exposure.

Over the last several years approximately 50 percent of NIOSH's occupational cancer research was supported through an interagency agreement with the National Cancer Institute. Since its inception, NCI has provided NIOSH with more than $19 million to conduct approximately 75 research projects dealing with a broad spectrum of topics related to cancer in the workplace. Approximately 10 projects are currently ongoing. NIOSH has worked closely with NCI under the interagency agreement and has participated in two collaborative workshops with NCI and EPA; a third workshop is planned for FY 1984. Future collaboration between NCI and NIOSH will continue through joint project officers on interagency projects.

The approach by which cancer research is conducted in DSHEFS involves several levels of epidemiologic 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. In FY 1983, county-level maps for the United States were systematically developed according to potential exposures to specific chemicals as indicated by NOHS and NOES, as well as by occurrence of specific diseases, including cancer. 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 goal 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, NIOSH 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 (e.g., proportionate mortality, case-control, and sample cohort studies) in order to better target more comprehensive and costly cohort mortality studies. The case-control study within a cohort mortality study also 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, logistic regression, also 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 re-analyzed during the next few years.

Those studies that were completed in FY 1983 include:

Agent Studies: beta-naphthylamine, cadmium, clay fibers, styrene, tetraethyl lead.

Industry Studies: goldmining, lead smelting, phosphate industry.

Those studies that are ongoing or will be initiated in FY 1984 include:

Agent Studies: beryllium, carbon monoxide, diesel fumes, dioxin, ethylene oxide, formaldehyde, halowax, lead chromate paints, MOCA, perchloroethylene, pesticides, polychlorinated biphenyls, sulfuric acid, talc, toluene diisocyanate.

Industry Studies: antimony smelting, leather industry, painting trades, petrochemical operations, uranium enrichment.

Occupational Groups: granite cutters, uranium miners, wood die and model makers.

The DBBS Occupational Carcinogenesis program has as its goals: to identify and evaluate the carcinogenic/promoting interaction potentials of complex 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 by focusing on the following research objectives.

The objective to "design or establish protocols for testing hypotheses based upon suspect carcinogenic/co-carcinogenic/promoting activity of complex mixtures" is being addressed by a number of ongoing projects and activities. *In vitro* screening methods are being developed and used to evaluate initiating/cocarcinogenic/promoting activity of field samples. Beginning in FY 1983, efforts were coordinated with DRDS through the mutagenesis team to assimilate strategies for assessing initiating activity of field samples. A contract was awarded in FY 1983 and will continue through FY 1984 to establish the utility of using the V79 metabolic cooperation system for assessing promoting/co-carcinogenic activity.

Twenty-five chemicals mutually selected by the National Toxicology Program and NIOSH are being tested by three laboratories. In FY 1983, a contract study was completed that evaluated the co-carcinogenic activity of silica and and other foundry aggregates in the hamster intratracheal lung model. In FY 1983, a contract was awarded to assess the co-carcinogenic/promoting activity of asphalt fumes in the mouse dermal application model.

A related DBBS objective to "make recommendations for reducing carcinogenic risk based on completed studies" will be addressed during FY 1984 due to completed efforts in assessing the foundry environment. These projects included the study of effluents from different binding materials and the study of foundry aggregates. Recommendations limiting the use of nitrite in synthetic cutting fluids and subsequent reduction in exposures to diethanolnitrosamine were begun in FY 1983 and will continue in FY 1984. Investigations will continue during FY 1984 assessing the influence of drugs on the carcinogenicity of halogenated ethanes. Investigations will commence in FY 1984 to determine the efficacy of using low level ultraviolet light as a monitoring tool for estimating polynuclear aromatic hydrocarbon exposure to the skin. Another objective to "link the Division's Occupational Carcinogenesis program to other Institute activities which identify working populations at increased risk" is the stimulus for the active participation on the NIOSH genotoxicology team, the NIOSH Working Group on Control of Occupational Cancers, and the National Toxicology Program for the testing of potential carcinogens. These activities will address the likely etiologies of increased cancer risks in various occupational settings.

An output bearing on another DBBS objective to "promote worker awareness of occupational cancer hazards and adherence to safeguards designed to reduce such risks" will be achieved in FY 1984. This consists of a set of guidelines for composing and communicating health messages to workers concerning carcinogenic hazards. Field testing of these guidelines will commence in FY 1985.

The objective to "establish the utility of behavioral approaches and job design factors for furthering efforts at controlling cancer hazards at the workplace" was addressed in a project completed in FY 1981 concerning styrene workers. 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. Future efforts will formulate control strategies and verify the effectiveness of the approach in a demonstration study.

The DRDS 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; in the determination of the relationship between cancer incidence and the result of mutagenic studies in the selected occupational setting. Effort is also being made to determine the possible mechanisms for the high incidence of gastric cancer in coal miners. The projects in this research area involve mutagenic monitoring of workplaces and workers, and the impact of coal dust in gastric cancer and defense mechanisms.

FOCUS: WORK-RELATED DISEASES

CANCER OF THE STOMACH AND GASTROINTESTINAL SYSTEM: A study was developed by DRDS to assess the gastric cancer risk of coal mine dust. The results of this study were published in Cancer, January, 1983. published in Cancer, January, 1983.

These findings described in the article titled "Gastric Cancer and Coal Mine Dust Exposure," indicate that when prolonged coal mine dust exposure is combined with prolonged cigarette smoking, a statistically significant cancer risk occurs.

Malignant Neoplasm of Bladder: NIOSH plans to study bladder cancer in FY 1984. The primary populations at risk are rubber and dye workers. The causative agents are benzidine, alpha and beta nephthylamine, amamine, magenta, 4-aminobiophenyl, and 4-nitrophenyl. Both the disease and untimely death are unnecessary and preventable.

Malignant Neoplasm of Larynx: NIOSH plans to study laryngeal cancer in FY 1984. The populations at risk are workers in the asbestos industries and utilizers, and the primary cause is asbestos. The resulting disability, morbidity, and mortality are all preventable.

Program Area: Occupational Cancers

Goal: 1. Prevent work-related diseases and injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	K. By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injuries.		[_____]
Focus: Occupational Cancers Occupational Lung Diseases Population in need: Construction workers. Roofers.	K.01 By 1987, verify the efficacy of behavioral methods and job redesign to reduce workers' exposure to carcinogens in roofing operations. (DBBS) CROSS REFERENCE: Control Systems		[_____]

Occupational Cancers (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.		
Focus: Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers.	M.03 By 1990, reduce occupational disease risk by preventing significant percutaneous absorption of chemicals from the work environment.		

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Cancers Occupational Lung Diseases Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P. By 1990, generic standards and other forms of technology transfer should be established where possible, for standardized employer attention to such major common problems as: --chronic lung hazards --carcinogenic hazards --mutagenic hazards --teratogenic hazards --and medical monitoring requirements.		
Focus: Occupational Cancers Occupational Lung Diseases Population in need: Asbestos industry and utilizers. Topside coke oven workers. Uranium and Fluospar miners Chromium producers and processors, users. Nickel smelters, processors, users. Smelters. Mustard gas formulators. Ion exchange resin makers, chemists.	P.01 By 1988, identify and develop indicator systems which can predict potential carcinogenic hazards of organic chemicals. (DRDS)		
		a. By 1986, validate arabinose-resistant test system as an alternative to Ames testing. (DRDS)	
		b. By 1986, establish human lymphocyte cytogenetic assay system. (DRDS)	
		c. By 1986, establish in situ microbial mutagenicity test system through development of trapping devices, sensitive tester strains, and laboratory and field validations. (DRDS)	

Occupational Cancers (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Cancers Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P.02 By 1990, identify and evaluate the carcinogenic and cocarcinogenic/promoting interaction potential of complex occupational environments encountered by workers. (DBBS)		├──────────────────────────────────────┤
		a. By 1985, complete the design of a study to evaluate the action of co-carcinogenic particulates on PAH carcinogenicity. (DBBS)	├──────┤
		b. By 1987, establish in vitro screening systems for evaluating cocarcinogens. (DBBS)	├──────────────┤
Focus: Occupational Cancers Population in need: Blue-collar workers. Service Workers. Farm workers. White-collar workers. Woodworkers.	P.03 By 1986, develop direct approaches which prevent premature mortality and reduce unnecessary morbidity among workers. (DPSE) CROSS REFERENCE: Control Systems		├──────────┤
		a. By 1985, provide input to wood working industry on wood dust control technology. (DPSE)	├──────┤
Hospital workers.		b. By 1985, develop a sampling and analytical method for ethylene oxide. (DPSE) CROSS REFERENCE: Sampling and Analysis (1.22)	├──────┤

Occupational Cancers (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q. By 1990, the number of health hazard evaluations (and technical assistance) being performed annually should increase tenfold; the number of industrywide studies being performed annually should increase threefold. (OD)		
Focus: Occupational Cancers Occupational Lung Diseases (Lung Cancers) Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	Q.05 By 1988, investigate nature and extent of the cancer risks 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. (DSHEFS) CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance		

Occupational Cancers (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		a. By 1986, complete 42 cancer epidemiologic studies and evaluate 20 emerging problems for the feasibility of proceeding. (DSHEFS)	
		b. By 1988, complete 70 cancer epidermatologic studies and evaluate 20 emerging problems for the feasibility of proceeding. (DSHEFS)	
Chemical industry. Hazardous waste-site cleanup workers. Petroleum industry. Firefighters.		c. By 1987, complete dermal absorption profiles for nine industrial chemicals administered as liquid. (DBBS)	
		d. By 1986, develop measuring techniques for evaluation skin exposures to gases, vapors, and fumes. (DBBS)	

PROGRAM AREA: AMPUTATIONS, FRACTURES, EYE LOSS, LACERATIONS, AND TRAUMATIC DEATHS

PROGRAM AREA GOAL:

Evaluate amputations, fractures, eye loss, lacerations, and traumatic deaths so as to understand their causes and to detect their vulnerabilities to prevention.

RELEVANT OBJECTIVES FOR THE NATION:

- Improved health status
  - By 1990, workplace accidental deaths for firms or employers with 11 or more employees should be reduced to less than 3,750 per year.
  - By 1990, the rate of work-related injuries should be reduced to 8.3 cases per 100 full time workers.
  - By 1990, lost workdays due to injuries should be reduced to 55 per 100 workers annually.
- Improved service/protection
  - By 1990,...the number of industrywide studies being performed annually should increase threefold.
- Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVE:

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

PROGRAM DESCRIPTION:

Occupational injuries resulting in deaths, amputations, fractures, and eye losses are clearly among the most severe losses borne by U.S. workers each year. In 1981, about one out of every twelve workers in the private sector was involved in an occupational injury requiring treatment beyond first aid. In more hazardous industries, such as construction, about one out of seven workers was injured in 1981. Occupational fatalities in that year were estimated at 12,300 by the National Safety Council. The Bureau of Labor Statistics had 4,370 fatalities reported to it. Additionally, the National Safety Council estimates that 2.1 million workers experienced disabling injuries, of which 70,000 were permanent impairments. The economic impact of such workplace accidents continues to be extreme. Data from Social Security Disability files indicate the cost of workers' compensation payments to be roughly $11.9 billion of which $3.5 billion was for medical and hospitalization costs and $8.4 billion was for wage compensation. The 1981 indirect costs from such accidents were $15.1 billion, up 8 percent from 1980, and up almost 20 percent from 1979. The total cost figure for workplace injuries in 1981 was $32.5 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 (the National Electronic Injury Surveillance System). Projected 1983 frequencies are 17,000 amputations, 215,000 fractures, and 316,000 eye injuries, based on 6-month NEISS figures for 1983. Roughly 5 percent, or 16,000, of the eye injuries will involve permanent partial or total loss of vision. NIOSH has targeted 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 injury prevention programs, with the mission of decreasing the number and severity of work-related injuries. Functionally, the program is comprised of injury surveillance and epidemiology, injury prevention research, and technology applications. 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 developing/evaluating specific proposals for prevention and mitigation of injuries to workers.

3. Developing criteria for recommended safety practices.

4. Developing performance criteria for respirators and other items of personal protective equipment.

NIOSH has developed descriptive statistics based on estimates developed from the Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS) and the Bureau of Labor Statistic's Supplementary Data System (SDS). In 1972, these severe traumatic injuries accounted for 992,000 (31 percent) of the estimated 3.2 million emergency-room treated occupational injuries in the United States.

FOCUS: WORK-RELATED INJURIES

AMPUTATIONS: While amputations, as a category of severe injury, occur relatively infrequently (less than 1 percent of reported injuries estimated by the NEISS), there were approximately 14,500 amputations over a one-year surveillance period.

About 93 percent of these were finger amputations, with hand and toe amputations accounting for another 4 percent. Most often fingers are caught in a machine or handtool (11 percent) or amputated by a moving object such as a saw or slicer (10 percent). Other prominent sources of injury include presses (6.3 percent), belts (4.8 percent), powered hand tools (2 percent), and doors or gates (1.5 percent). According to SDS data, there is no particular industry or occupation associated with amputations; with the exception of machine operators, who account for 7 percent of these injuries, no other occupation or industrial category accounts for more than 3 percent. Among the three-year objectives for DSR is the completion of a series of studies on machine guarding to prevent amputations, and the study of job requirements that impact psychophysiologic functions of consequence to workers' health and safety. The development and application of control measures for preventing these problems include workplace and tool redesign.

FRACTURES: In 1980, workers' compensation data from the Bureau of Labor Statistics included 208,000 estimated occupational injuries resulting in fractures. Estimates for 1982 based on emergency-room-treated job injuries included 180,000 fractures nationwide. Since only 36 percent of job injuries may be treated in emergency rooms, fractures could number as high as 500,000 nationwide. Other highlights include the following: occupations suffering the greatest percentage of fractures are truck drivers (5.2 percent of all fractures), miscellaneous machine operatives (3.2 percent), and carpenters (2 .7 percent). At least 23 percent of all fractures are associated with falls to the ground or working surface.

EYE LOSS: It is difficult to obtain specific data on the incidence of eye loss or blindness among workers. However, according to NEISS, there are annually approximately 280,000 eye injuries. Eighty-four percent of these eye traumas are minor, mostly workers who have foreign bodies in their eyes, such as pieces of metal, wood or glass (38 percent of all injuries or 44 percent of least severe injuries). Burns and avulsions to eyeballs encompass nearly 15 percent of all eye injuries among workers. Forty-four percent of these injuries are caused by chemical or acid burns. DBBS will complete a compendium on personal protective eyeware in FY 1984. The compendium will contain a list of all available protective eyeware that is commercially available.

LACERATIONS: NIOSH estimates that there were 425,300 occupationally-related lacerations which were reported to workers' compensation agencies in the United States in 1980. The parts of body most likely to be seriously lacerated are the fingers (in 48 percent of the cases), the arms (24 percent), the legs (13 percent), and the head and neck (9 percent). These lacerations resulted primarily from being struck by an object (in 32 percent of the injuries) or from striking against a stationary object (25 percent). The major sources of injury for lacerations are knives (13 percent), sharp metal items (13 percent), saws (6 percent), glass items (5 percent), nails (5 percent) and machines (3 percent). The industries with the greatest number of lacerations were eating places (7.4 percent), grocery stores (4.4 percent), general building contractors (2.1 percent), and meat packing plants (1.9 percent).

TRAUMATIC DEATHS: The National Safety Council estimates that there were 13,000 occupational deaths in 1980 in the United States. The Bureau of Labor Statistics estimates that there were 4,400 occupational deaths in the same period. While the difference between these two estimates is due partly to different survey populations and differences in estimation procedures, more information is needed to properly assess the true extent of occupational fatalities. The major categories for these deaths, according to the Bureau of Labor Statistics, are over-the-road motor vehicle accidents (with 28 percent of the deaths), heart attacks, industrial vehicle accidents, and falls (each with 10 percent of the deaths), electrocutions (with 8 percent of the deaths) and aircraft crashes (with 7 percent of the deaths). The industry groups with the highest percentages of deaths are manufacturing (26 percent), construction (20 percent), transportation and public utilities (18 percent), and wholesale and retail trade (14 percent).

NIOSH has ongoing programs addressing the areas of amputations and death directly. One project, which is examining the use of light curtains for machine guard self-tripping is in the final stages of completion. Another project, just under way, will begin to develop an adequate technical basis for specifying the safe distance between two-hand machine actuator controls and the point of operation on mechanical power presses. The results from both of these studies will ultimately influence the risk of amputation to operators of such machines. A pilot project to study the circumstances surrounding fatal occupational accidents and to gather case-comparison information on fatally injured workers is underway also.

A case-comparison study of falls from ladders will address fractures, as well as other traumatic injuries. Projects planned for the coming year include surveillance and data analysis which will examine traumatic injuries more closely.

Program Area: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths

Goal: 1. Prevent work-related injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Traumatic Deaths Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	A. By 1990, workplace accident deaths for firms or employers with 11 or more employees should be reduced to less than 3,750 per year.		├──────────────────────────────┤
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Construction workers.	A.02 By 1988, conduct studies to identify causal factors in high risk occupations, such as construction, and determine effective measures for reducing injuries. (DSR)		├──────────────┤

Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Fractures Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers.	A.03 By 1987, results of an epidemiological study of ladder fall injuries will delineate information on their causes and intervention strategies for reducing ladder fall injuries. Also a description of the methodology used and an evaluation of the adaptability of established epidemiological methods when applied to occupational traumatic injury studies will be presented. (DSR)		
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Construction workers.	A.04 By 1984, develop a computer model for analyzing multi-story concrete structure construction to determine safe loading conditions for concrete placement of the removal of the shoring or reshoring. (DSR)		
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Construction workers.	A.05 During 1984, complete study for measuring the in situ strength of recently poured concrete. (DSR)		
Focus: Traumatic Deaths Population in need: Construction workers.	A.06 By 1988, complete studies to identify causal factors in high risk occupations such as construction and determine effective measures for reducing fatalities. (DSR)		

Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Amputations Population in need: Construction workers.	A.07 In 1984, complete draft construction safety standards for excavations jointly with the National Bureau of Standards. (DSR)		
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers.	A.08 By 1984, complete guidelines for controlling hazardous energy during maintenance and servicing. (DSR)		
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Land-based oil and gas well drillers. Grain storage workers. Feed mill workers.	A.09 By 1984, complete reports addressing hazards encountered in the land-based oil and gas well drilling industry, and the grain elevators and feed mills industry. (DSR)		
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Construction workers.	A.10 By 1985, complete reports addressing hazards encountered in the precast concrete products industry and the fabricated structural metal products industry. (DSR)		

Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	A.11 By 1986, complete report on selection of personal protective equipment for hazardous materials incidents. (DSR) CROSS REFERENCE: Other Personal Protective Equipment		
Focus: OBJECTIVE FOR THE NATION Amputations, Fractures, Eye Loss, Lacerations Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C. By 1990, lost workdays due to injuries should be reduced to 55 per 100 workers annually.		
Focus: Amputations Population in need: Power press operators.	C.01 By 1986, complete studies of mechanisms for preventing injuries related to the actuation of mechanical power presses. (DSR)		

Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Musculoskeletal Injuries Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C.02 By 1987, elucidate job-risk factors leading to certain disorders of the upper extremities. (DBBS)		
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C.06 By 1990, expand the scientific basis for the identification, evaluation, and control of biomechanical hazards for use in worksite surveillance/hazard control programs. (DBBS) CROSS REFERENCE: Control Systems		

Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.		————————————
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Musculoskeletal Injuries Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M.01 By 1987, furnish "how-to" manuals as aids in recognizing hazardous conditions. (DBBS) CROSS REFERENCE: Information Dissemination/ Document Development		————

Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Musculoskeletal Injuries Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M.02 By 1987, demonstrate control techniques for reducing injury problems as well as lifting hazards in selected high-risk occupations. (DBBS) CROSS REFERENCE: Control Systems		
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N. 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 an understandable manner.		

Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Musculoskeletal Injuries Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N.01 By 1986, a listing of tasks performed by occupational health nurses which have been shown to be associated with a reduction in the severity and number of injuries in industry will be available for O.H.N.'s, management and educators. (DSR) CROSS REFERENCE: Information Dissemination/ Document Development		[ ]

PROGRAM AREA: CARDIOVASCULAR DISEASES

PROGRAM AREA GOAL:

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

RELEVANT OBJECTIVE FOR THE NATION:

- o Improved health status
  - By 1990, workplace accident deaths for firms or employers with 11 or more employees should be reduced to less than 3,750 per year.
  - By 1990, occupational heavy metal poisoning (lead, arsenic, zinc) should be virtually eliminated.
  - By 1990, improvements in the control of toxic agents can be expected over the longer term to yield reduced rates for...and other acute and chronic conditions.

    CROSS REFERENCE: Toxic Agent Control
- o Improved services/protection
  - By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as:...medical monitoring requirements.
  - By 1990,...the number of industry wide studies being performed annually should increase threefold.
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVES:

- By FY 1986, develop test methods to identify cardiotoxic substances and evaluate at least three such substances each fiscal year.

- By FY 1986, screen suspected toxins for the effects of contractility of blood vessels using the cardiovascular smooth muscle system.

PROGRAM DESCRIPTION:

Diseases of the heart and blood vessels kill more people in the United States than all other causes combined, nearly one million every year. More than 50 million man-days per year are lost because of cardiovascular disease (CVD), and the economic burden amounts to nearly 30 percent of all health care costs. National 1990 health objectives include improving the health status of workers through identification, evaluation, and surveillance of workplace hazards and related health effects including heart disease. NIOSH considers CVD to be one of the ten leading work-related health problems.

Although the prevalence of CVD due to occupational risk factors is unknown, a growing body of research indicates that a number of specific psychosocial factors, chemical hazards, and work activities are linked to the increased incidence of CVD. Stress factors such as work overload, work role, time pressure, and supervisory relations have been shown to be associated with an increased risk for CVD. Similarly, carbon monoxide, halogenated hydrocarbons, carbon disulfide, and nitroglycerin, may adversely affect more than one hundred thousand workers increasing their risk for acute myocardial infarction. Furthermore, job associated noise, heat, cold, and sedentary occupations in general are also possible contributors to increased CVD.

The workplace is highly suited for the introduction of control measures that can reduce the risk of CVD and its consequences. To do this it is necessary to identify and evaluate the most prevalent types of CVD that are associated with occupation, the number of workers at risk, and the specific factors in the workplace that promote CVD. Because of the diverse nature of CVD, it must be combated on several fronts. Laboratory investigation on animals and humans, field and epidemiological studies, and surveillance can provide specific information and insights regarding not only the problem of occupational CVD, but how it can be corrected.

DBBS objectives are aimed at establishing a scientific basis for identification and evaluation of cardiotoxins. During FY 1983, subchronic inhalation studies assessing the potential toxic myocardial effects of selected aliphatic amines of industrial importance were completed. Among the amines to be tested was triethylamine which is used as a catalytic solvent and chemical synthesis, and in the rubber and plastic industries.

Relationships between the chemical structure of the amine and its biologic activity were emphasized. Employing methods developed during this study, the interaction of carbon disulfide exposure with various risk factors (e.g., diabetes and alcohol intake) will be evaluated in laboratory animals in FY 1984. Methods for assessing cardiovascular function in animals exposed in utero to suspected teratogens will also be developed. In the future, DBBS intends to develop in vitro techniques for the identification and evaluation of cardiotoxins.

DBBS is also conducting research to determine the contribution of job stress to cardiovascular disease. Objective methods for measuring the association between stress and cardiovascular effects will be developed, and contributing workplace factors will be evaluated.

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 (below the current OSHA standard) while the second study involves bridge and tunnel workers exposed to higher levels (near the current OSHA standard). The latter study will be completed during FY 1984. The study of nitroglycerine exposed workers was completed in FY 1983; however, additional questions which remain unanswered may be pursued during FY 1984. The study of workers exposed to carbon disulfide has been completed and will be published in FY 1984.

FOCUS: WORK-RELATED DISEASES

ATHEROSCLEROSIS: Carbon disulfide has been shown to increase the risk of atherosclerosis in animal studies as well as in human epidemiology studies. The atherogenic potential of carbon disulfide involves both the cerebrovascular and the cardiovascular system.

Carbon monoxide is believed to be one of the factors in cigarette smoke responsible for the increased risk of cardiovascular disease among smokers. Carbon monoxide has been postulated to enhance atherosclerosis. The main concern is the formation of carboxyhemoglobin following exposure to carbon monoxide with resulting decreased delivery of oxygen to critical tissues. Occupational exposures to carbon monoxide can add to already elevated carboxyhemoglobin levels among smokers and exposures among non-smokers can increase carboxyhemoglobin levels to critical levels in some workers. The prevalence of angina among Finnish foundry workers was greatest among smokers with occupational carbon monoxide exposure. Studies of American steelworkers identified certain job classifications with significant increases of cardiovascular disease suggesting a possible contributing role of carbon monoxide, among other factors.

RIGHT-SIDED HEART FAILURE: Exposure to fibrogenic dusts such as asbestos and silica, may cause pulmonary disease of sufficient severity to increase the risk of right-sided heart failure. Further studies are necessary to clarify this relationship.

SUDDEN CARDIAC DEATHS: Exposure to nitrates used in the manufacture of explosives (i.e., nitroglycerin and ethyleneglycoldinitrate) has been associated with sudden cardiac deaths. These deaths are often associated with acute withdrawal from exposure possibly related to rebound vasospasm, but risk may also be increased years after exposure ends.

A number of halogenated hydrocarbons including chloroform, trichloroethylene, and fluorocarbons have been associated with arrhythmias and sudden cardiac deaths. Many workers are exposed to halogenated hydrocarbons in cleaning, degreasing, and painting. Fatal episodes may require massive exposures, but the effects of exposure upon workers with pre-existing cardiac disease are not well understood. In addition to a possible increased risk of arrhythmias, 1,1,1-trichlorethane may also have a direct effect on myocardial contractility. Methylenechloride acts by subsequent metabolism to carbon monoxide.

HYPERTENSION: A number of metals have been implicated as possible factors in the etiology of cardiovascular disease though additional studies are needed to clarify these relationships. The possible relationship between soft water, trace metal content, and cardiovascular disease has been studied with equivocal results. The possible role of antimony and arsenic in cardiovascular disease, lead in hypertensive disorders, and cadmium in hypertension have been raised (Roseman and Fine). Recent evidence from animal laboratory studies implicates noise exposure with elevated blood pressure. Research will be undertaken in worker populations to assess any effects of noise on cardiovascular disease.

CORONARY HEART DISEASE: The possibility that social and psychological stress may adversely affect the cardiovascular system has been recognized. The strongest evidence for a relationship between psychological factors and cardiovascular disease is in the area of Type A/Type B personality patterns. The possible role of occupational stress in cardiovascular disease has not been well studied and needs further refinement. Several recent findings raise important questions. 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 were having a non-supportive boss 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 bosses and fewer job promotions among higher educated working wives appeared to affect cardiovascular risk among their husbands. The ability of workers to adjust schedules to meet varying demands may be a factor in cardiovascular disease risk.

In summary, the possible role of occupational factors in the etiology of cardiovascular disease has not been well studied. Cardiovascular diseases represent the greatest cause of mortality in the United States. Even a small contribution towards risk from occupational exposures would have profound public health consequences. The fact that cardiovascular disease mortality has declined dramatically in recent years indicates the preventable nature of this disease category.

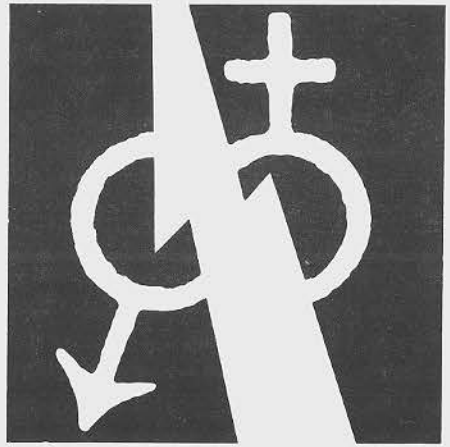
The workplace is important in cardiovascular disease prevention both because of the health promotion possibilities of worksite based prevention programs involved in modifying non-occupational cardiac risk factors such as hypertension and cigarette smoking and because workplace exposures and stress factors may in themselves contribute to cardiovascular disease risk.

Program Area: Cardiovascular Diseases

Goal: 1. Prevent work-related diseases and injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Cardiovascular Diseases Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T. By 1985, a program should be developed to: (1) follow individual findings from health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and (2) use the findings to determine etiology, natural history, and the mechanisms of suspected occupational diseases and injury.		
		a.(d.) By 1987, develop test methods to identify cardiotoxic substances and at least three such substances will be evaluated each fiscal year. (DBBS)	

PROGRAM AREA: 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.

RELEVANT OBJECTIVES FOR THE NATION:

- o Improved services/protection
  - By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as:...mutagenic hazards, teratogenic hazards and medical monitoring requirements.
  - By 1990,...the number of industrywide studies being performed annually should increase threefold.

    CROSS REFERENCE: Pregnancy and Infant Health
  - By 1990, a system should be in place for comprehensive and longitudinal assessment of a range of prenatal factors (e.g.,... toxic agents,...) on infant and child physical and psychological development.

    CROSS REFERENCE: Toxic Agent Control
  - By 1990, improvements in the control of toxic agents can be expected over the longer term to yield reduced rates from..., birth defects,...
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVES:

- By FY 1986, identify the major priorities for field and laboratory studies.

- By FY 1986, complete development work on new laboratory and field methodology for evaluating reproductive effects.

- By FY 1986, complete the initial steps is developing a surveillance network for reproductive effects. This network would link the CDC birth defects registry, the NOES, and State surveillance systems.

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 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 reproductive effects initiative 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 methodology for evaluating these reproductive effects.

Activities for this Program area that were identified for FY 1984 and beyond are:

1. To examine the adverse reproductive effects 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. 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.

3. To increase the sum of scientific knowledge regarding the reproductive toxicity of significant industrial risk factors through toxicologic studies.

DSHEFS performs two types of studies to examine the adverse reproductive effects that may be caused by occupational exposures to certain biological, chemical, and physical agents. These effects may be manifested as infertility, spontaneous abortion, fetal death, low birth weight, altered sex ratio, birth defects, developmental deficits, and childhood cancer. The two epidemiologic approaches employed by DSHEFS are case-control studies of reproductive failure and parental exposure cohort studies.

To identify the major priorities of field and laboratory studies, NIOSH is using the National Toxicology Program (NTP), surveillance systems, and health hazard evaluations. The major classes of chemicals evaluated during FY 1983 were the glycol ethers and industrial alcohols. A major international conference was held which described the effects of glycol ethers on reproduction in laboratory animals. In FY 1984, a method will be developed for identifying compounds for laboratory study. During FY 1983, new laboratory and field methods for evaluating disorders of reproduction were developed. Methods for sperm analyses were refined, and a videographic method for use in field applications was evaluated. It was found that the use of drosophila for evaluating reproductive effects may be useful for the evaluation of teratogenic effects of chemicals. The Chernoff teratology test for screening of chemicals for reproductive effects continues to be evaluated. This method has been used to evaluate 15 chemicals. These data will add to the data base of some 100 chemicals which ultimately will determine the usefulness of this method.

Throughout the next few years, the area of reproductive disorders research will be refined, and exposures of interest will be continually evaluated. The results generated from these studies will add significantly to our understanding of the effects on the reproductive system (male and female) from certain occupational exposures and may provide important information to help set standards and protect the health of the workers.

During FY 1983, information dissemination and linkage with other Institute activities was accomplished in a variety of ways. DBBS personnel participated in the NIOSH Genotoxicity Team and Reproductive Working Group and was extensively involved with the preparation by DSDTT of the Current Intelligence Bulletin on Glycol Ethers.

FOCUS: WORK-RELATED DISEASES

FETAL MORTALITY: An interagency agreement between NIOSH and the National Center for Health Statistics (NCHS), supported data collections for the 1980 National Natality and Mortality study. NIOSH and NCHS staff collaborated in an analysis of maternal employment characteristics and pregnancy outcome in the U.S. which was published in the DHHS publication Health U.S., 1983.

A study was completed which examined the relationship between maternal employment and reproductive outcome, and selected information was extracted from a sample of the New York City live births and fetal deaths. The analysis focused on seven pregnancy outcomes among the live births and fetal deaths. Statistically significant associations were observed among four occupational groups (administrative support; machine operators; handlers and equipment cleaners; service).

Five industrial groups showed significantly elevated odds ratios (finance, insurance and real estate; personal services; retail trade; entertainment; and transportation). The report is undergoing review, and will be submitted to a professional journal for publication.

Surveillance cooperative agreements with New York and Utah supported activities directed to the study of employment and adverse reproductive outcome. Live birth and fetal death data collected under these agreements were forwarded to NIOSH for analysis. A preliminary analysis of these data will be undertaken in FY 1984.

SPONTANEOUS ABORTIONS AND INFERTILITY: The DBBS Reproductive Hazards program has as its goal the development of a scientific basis for understanding and characterizing the nature of occupational reproductive hazards so that the safe conditions of exposure can be described. Progress toward that goal is being made by focusing on specific research objectives.

Reproductive hazards investigations that fall into DSHEFS' industrywide studies program are generally conducted using the parental-exposure cohort concept. The study designs and 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 and development of 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 were completed during FY 1983. Also during FY 1983, a study of petroleum refinery workers was conducted to examine effects of exposure on workers' sperm. 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.

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 genotoxicity. This area of research includes the evaluation of chromosomal changes (sister chromatid exchange and aberrations) sperm changes, and the detection of mutagens in urine. Several studies of genotoxic effects were initiated in FY 1983, including an examination of chromosomes among workers exposed to low levels of ethylene oxide. This study will be published in early FY 1984. Another chromosome study is underway (i.e., ethylene dibromide) and will be completed during FY 1984, while additional agents are being considered for study.

This area of research is partially supported by an NCI interagency agreement. Another study which is supported by this agreement involves the testing for mutagenicity of the urine from workers exposed to benzidine based dyes (o-dianisidine and o-tolidine).

The objective to "improve the sensitivity and accuracy with which shifts in human fertility can be detected" is the stimulus for a project under which improved methods of semen analysis have been adapted for use in NIOSH field studies. Objective, reproducible techniques for evaluating sperm motility, morphology, viability, and other semen characteristics have been established in DBBS laboratories.

The DBBS Reproductive Hazards program objective to "improve the repertoire of tests available for evaluating reproductive health hazards" is being similarly addressed through the development and validation of improved short-term in vitro and in vivo screening tests for reproductive and developmental toxicity. NIOSH/NTP-sponsored contract studies using an in vivo reproductive toxicity assay were completed in FY 1983 on 30 NIOSH and NTP priority chemicals, and other contracts were monitored under which an additional 30 chemicals are being tested. This testing/validation activity will continue in FY 1984. Development of an in vitro teratogenesis screening system using fruit flies (Drosophila melanogaster) continued in FY 1983, and extensive validation studies are planned for FY 1984, to be supported by a research contract.

Preliminary developmental work also was begun to investigate methods of evaluating cardiovascular function in neonatal rats, so that this organ system can be tested for impaired functional integrity as a result of intrauterine chemical insult. Developmental efforts will continue in FY 1984. The development of "improved methods for evaluating genotoxic activity" is being supported through the NIOSH research grants program and by DBBS participation in the NIOSH Genotoxicity Team and the NTP.

Another DBBS objective is to "increase the sum of scientific knowledge regarding the reproductive toxicity of significant industrial risk factors." Progress in this area included establishment of a research program to investigate the reproductive and developmental toxicity of normal primary alcohols. Research continued on the glycol ether family and on the hazards of exposure to radiofrequency radiation. These research programs will continue in FY 1984, and will include laboratory investigations of significant industrial chemicals to identify previously unrecognized reproductive toxins.

The performance of mutagenicity assays for workplace chemicals and complex mixtures and mutagenic monitoring for selected workplace environments and worker groups serves several purposes: The detection of mutagens in the workplace; the determination of whether mutagenic compounds found in the workplace are sufficient to cause genetic alteration to the workers; establishing the relationship between the level of workplace mutagens, genetic alteration and health hazards (if any); and identifying 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 of in vitro assay systems to study the mutagenic activity of workplace chemical complexes and mixtures.

3. Performance, validation, or improvement of human mutagenic monitoring systems which include urine analysis and cytogenetic studies.

4. Performance of in vitro mutagenesis studies for HHE's and other related projects within the Institute, and identification of occupational groups for mutagenic monitoring and epidemiologic studies.

There are several projects which were initiated in previous years which will be completed during FY 1984. These include studies of reproductive effects from exposure to polychlorinated biphenyls, and from exposure to ethylene dibromide. Other studies are under consideration and/or ongoing in FY 1984 such as effects from the use of video display terminals (VDTs), exposure to ethylene oxide, exposure to organotin, and from exposure to microwave radiation. The DBBS Symposium on the Reproductive Toxicity of Glycols and Glycol Ethers will be published in 1984 by Environmental Health Perspectives.

Program Area: Disorders of Reproduction

Goal: 1. Prevent work-related diseases and injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.		

Disorders of Reproduction (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Disorders of Reproduction Occupational Cancers Neurotoxic Disorders Dermatologic Conditions	M.03 By 1990, reduce occupational disease risk by preventing significant percutaneous absorption of chemicals from the work environment. (DBBS)		
Population in need: Chemical industry. Hazardous waste-site cleanup workers. Petroleum workers.		a. By 1987, complete dermal absorption profiles for nine industrial chemicals administered as liquid. (DBBS)	
		b. By 1986, develop measuring techniques for evaluating skin exposures to gases, vapors, and fumes. (DBBS)	
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders	N. 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 an understandable manner.		
Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.			

Disorders of Reproduction (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N.02 By 1988, test instruments incorporating psychological and neurobehavioral measure will be available for use by occupational health practioners for identification/monitoring of neurotoxic effects stemming from workplace exposure to chemical agents. (DBBS) CROSS REFERENCE: Instrument/Methods Development		
Focus: OBJECTIVE FOR THE NATION Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T. By 1985, a program should be developed to: (1) follow-up individual findings from health evaluations, reports from unions and management and other existing surveillance sources of clinical and epidemiological data; and (2) use the findings to determine the etiology, national history and mechanisms of suspected occupational diseases and injury. CROSS REFERENCE: Surveillance		
		a.(d) By 1987, identify the major priorities (Disorders of Reproduction) for field and laboratory studies. (DBBS)	

Disorders of Reproduction (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Disorders of Reproduction Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	V. By 1990, a system should be in place for comprehensive and longitudinal assessment of a range of prenatal factors (e.g., toxic agents) on infant and child physical and psychological development. OBJECTIVE FOR THE NATION CROSS REFERENCE: PREGNANCY AND INFANT HEALTH(S)		├──────────────────────────────────────┤
		a. By 1987, have completed the development work on new laboratory and field methodology for evaluating reproductive effects. (DBBS)	├──────────────┤
Focus: Disorders of Reproduction Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	V.01 By 1990, develop a scientific basis for understanding and characterizing the nature of occupational reproductive hazards so that safe conditions of exposure can be specified.		├──────────────────────────────────────┤
		a. By 1985, develop a research grants program to evaluate the relationship between mutagens and adverse reproductive outcomes. (DBBS)	├──────┤

PROGRAM AREA: NEUROTOXIC DISORDERS

PROGRAM AREA GOAL:

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

RELEVANT OBJECTIVES FOR THE NATION:

- o Improved health status
  - By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as:...neurological hazards,...and medical monitoring requirements.
  - By 1990,...the number of industrywide studies being performed annually should increase threefold.
  - By 1990, occupational heavy metal poisoning should be virtually eliminated.

    CROSS REFERENCE: Toxic Agent Control
  - By 1990, improvements in the control of toxic agents can be expected over the longer term to yield reduced rates for ..., nervous system disease,....
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

PROGRAM OBJECTIVE:

- By FY 1986, assess the adequacy of current workplace exposure limits for furnishing effective protection against combinations of industrial solvents and fumigants based on neurobehavioral measures, and develop new tests for acute neurotoxicity to rapidly screen would-be chemical hazards.

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 labelled neurotoxic at levels as low as or lower than other health effects. Several hundred other chemicals, representing every major chemical class, have also been identified as neurotoxic at various concentrations. 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 judgement, 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 5-year 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 DHHS 1990 Health Objectives to establish exposure/disease relationships and to develop group standards for chemical classes posing occupational hazards.

By 1987 NIOSH will have: a) developed a strong epidemiologic research program aimed specifically at evaluating neurotoxic effects in relation to occupational exposures, b) assessed the adequacy of current workplace exposure limits for furnishing effective protection against combinations of ketones, hydrocarbons, heavy metals, alcohols, and fumigants based on neurobehavioral measures, c) developed new tests of acute neurotoxicity for use in screening would-be chemical hazards in both animal and human subjects, and d) expanded its large and small grants program to include basic and applied research and pre-doctoral post-doctoral and candidate support in problems of neurotoxic illness.

In the area of methods development, assessments of the literature on human neurotoxicity test methods were completed in FY 1984. This was one of the primary issues discussed at an international workshop on "Prevention of Neurotoxic Illness in Working Populations" which was co-sponsored by the World Health Organization and NIOSH. Papers offering an evaluation of human worksite neurotoxicity studies and the use of neurotoxicity as a basis for recommended standards were also completed.

FOCUS: WORK-RELATED DISEASES

MOTOR IMPAIRMENT: DBBS's 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. Research in FY 1983, evaluated the neurobehavioral sequelae of methyl bromide exposures in fumigators and, via contract, the work practices employed in applying carbon tetrachloride/carbon disulfide fumigant mixtures in grain storage facilities. The latter work is to serve as a prelude to a neurotoxicity study of grain storage workers to be conducted in FY 1984.

Health hazard evaluations have frequently revealed the simultaneous occurrence of the solvents methyl-ethyl-ketone (MEK), toluene, and acetone in spray paint operations. In FY 1983, the first phase of a laboratory study of the neurobehavioral effects of two spray paint agents, toluene and MEK, was completed, yielding little evidence of impairment at exposure levels near the respective TLVs for these solvents. With regard to a second phase of this work, a laboratory study of acetone/MEK mixtures was begun following instrumentation of a new 4-person exposure facility. A final contract report augmenting this laboratory work was received which describes the lack of neurobehavioral effects for workers having chronic, long-term exposures to mixtures of paint solvents found in metal furniture making and painting industries.

SENSORY IMPAIRMENT: New work in FY 1984, will continue to study a mix of animal and human laboratory and worksite neurotoxicity studies in addressing problem areas of greatest concern. Exposures of animals will be conducted to evaluate hypothesized mechanisms of acute aliphatic hydrocarbon toxicity, and development will begin on a new project to evaluate 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 involve cooperative work with DBBS in 1984, include follow-up HHEs in pesticide workers, implementation of solvent test batteries emphasizing cognitive impairment for routine use in HHEs, and consultation on the proposed industrywide study on dioxin. In addition, a major ongoing effort is directed toward the identification of worker populations where there are exposures to chemicals that have been shown to be neurotoxic in laboratory animals, such as the class of hexanes. A behavioral checklist for home-cage observations of animals was developed in FY 1983 using acute exposures to ethanol and n-hexane. Tests of multiple choice behavior and operant learning were evaluated using chronic exposures to aluminum chloride and lithium compounds, respectively.

BEHAVIORAL TERATOGENESIS: Behavioral teratology studies conducted in animals began in FY 1983. Classical fetotoxicity evaluations were performed for four 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. In FY 1984, gestational exposures to alcohol solvents will continue and embryotoxicity and behavioral terotological effects will be evaluated.

Program Area: Neurotoxic Disorders

Goal: 1. Prevent work-related diseases and injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Neurotoxic Disorders Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	G. By 1990, occupational heavy metal poisoning (lead, arsenic, zinc) should be virtually eliminated.		├──────────────────────────────┤
Focus: Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	G.01 By 1988, have underway three workplace studies regarding the neurotoxicity of selected metals not adequately evaluated previously. (DBBS)		├──────────────────┤

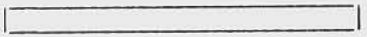
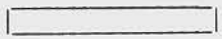
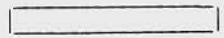
Neurotoxic Disorders (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.		
Focus: Neurotoxic Disorders Occupational Cancers Disorders of Reproduction Dermatologic Conditions Population in need: Chemical industry. Hazardous waste-site cleanup workers. Petroleum industry. Firefighters.	M.03 By 1990, reduce occupational disease risk by preventing significant percutaneous absorption of chemicals from the work environment. (DBBS)	a. By 1987, complete decimal absorption profiles for nine industrial chemicals administered as liquid. (DBBS) b. By 1986, develop measuring techniques for evaluating skin exposures to gases, vapors, and fumes. (DBBS)	

Neurotoxic Disorders (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N. 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 an understandable manner.		
Focus: Neurotoxic Disorders Disorders of Reproduction Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N.02 By 1988, test instruments incorporating psychological and neurobehavioral measure will be available for use by occupational health practitioners for identification/monitoring of neurotoxic effects stemming from workplace exposure to chemical agents. (DBBS) CROSS REFERENCE: Instrument/Method Development		

Neurotoxic Disorders (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Neurotoxic Disorders Occupational Lung Diseases Occupational Cancers Disorders of Reproduction Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P. By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as: --chronic lung hazards --carcinogenic hazards --mutagenic hazards --teratogenic hazards --medical monitoring requirements		
Focus: Neurotoxic Disorders Population in need: Pesticide workers and utilizers. Petroleum and chemical workers. Agricultural workers. Grain storage workers.	P.04 By 1987, assess the adequacy of current workplace exposure limits for furnishing effective protection against combinations of industrial solvents and fumigants based on neurobehavioral measures. (DBBS)		
Focus: Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P.05 By 1987, develop new tests for acute neurotoxicity to rapidly screen would-be chemical hazards. (DBBS)		

Neurotoxic Disorders (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Neurotoxic Disorders Cardiovascular Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T. By 1985, a program should be developed to: (1) follow up individual findings from health evaluations, reports from unions and management and other existing surveillance sources of clinical and epidemiological data; and (2) use the findings to determine the etiology, natural history and mechanisms of suspected occupational diseases and injury. CROSS REFERENCE: Surveillance		
		a.(e) By 1987, develop test methods to identify cardiotoxic substances and at least three such substances will be evaluated each fiscal year. (DBBS)	
Focus: OBJECTIVE FOR THE NATION Neurotoxic Disorders Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	U. By 1990, improvements in the control of toxic agents can be expected over the longer term to yield reduced rates of cancer, birth defects, respiratory disease, kidney disease, nervous system disease and other acute and chronic conditions. OBJECTIVE FOR THE NATION CROSS REFERENCE: TOXIC AGENT CONTROL		

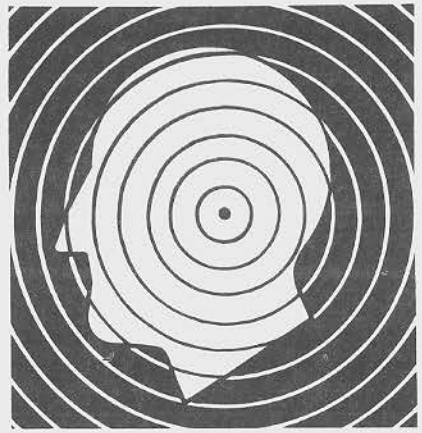
Neurotoxic Disorders (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	U.01 By 1990, design and establish strategies and techniques for probing/detecting/evaluating workplace chemicals and processes which pose significant neurotoxic risk. (DBBS)		————————————
		a. By 1986, complete the validation of a screening battery for human working populations. (DBBS)	————
Focus: Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	U.02 By 1990, execute a systematic program to evaluate the impact of acute exposures to selected chemical compounds/classes on neurobehavioral health and related issues of safety. (DBBS)		————————————
		a. By 1987, complete an evaluation of acute effects of select alphatic hydrocarbons. (DBBS)	————
Focus: Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	U.03 By 1990, provide the scientific basis for establishing control of chemical exposures/ elimination of neurotoxic illness following extended exposures in the work environment (DBBS).		————————————
		a. By 1986, complete industrial hygiene and neuro-behavioral profiles for grain storage operators. (DBBS)	————

PROGRAM AREA: NOISE-INDUCED LOSS OF HEARING

PROGRAM AREA GOAL:

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



RELEVANT OBJECTIVES FOR THE NATION:

- o Improved health status
  - By 1990, the prevalence of occupational noise-induced hearing loss should be reduced to 415,000 cases. (In 1975, there were an estimated 462,000 cases of work-related hearing loss.)
- o Improved services/protection
  - By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as:...medical monitoring requirements.
  - By 1990, the number of industrywide studies being performed annually should increase threefold.
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

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 that 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.

PROGRAM DESCRIPTION:

NIOSH is contributing to these goals 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 1984-1987.

In FY 1983, NIOSH developed a 5-year program of noise research with three major goals:

1) To 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) To determine the relative hazards from different types of noise and to examine synergism between noise and other occupational hazards, and

3) To develop programs and behavioral methods to foster hearing conservation.

In FY 1983, DBBS completed and submitted for publication the results of a study of hearing loss among paper workers, a field study of the effectiveness of personal hearing protectors, and initiated studies on impact noise measurements.

In FY 1984, the revised Compendium of Available Protective Devices will be published. With the distribution of this report, the Institute will have a ready reference to answer the most often asked question, "What is the proper way to select ear protectors?" FY 1984 will also see completion of the evaluation of a method to verify earplug effectiveness within workplace settings.

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 one, a brief study will be conducted to define prevalence of hearing loss in miners. DBBS is also examining hearing in firefighters and establishing liaison with the National Center for Health Statistics so that NIOSH might benefit from hearing data acquired in HANES III.

FOCUS: WORK-RELATED INJURIES

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 compendium on personal hearing protectors developed by DBBS will be published in 1984 by the journal Sound and Vibration.

Program Area: Noise-Induced Loss of Hearing

Goal: 1. Prevent work-related diseases and injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers.	F. By 1990, the prevalence of occupational noise-induced hearing loss should be reduced to 415,000 cases. (PREFERRED: By 1990, reduce hearing loss to 75 percent in workers, based on 1975 baseline rates.)		├──────────────────────────────┤
Focus: Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers.	F.02 By 1987, examine the hearing of workers who have been exposed to impulse noise, and determine if the patterns of loss are different from that expected for continuous noise-equivalent energy. (DBBS)		├──────────┤
Focus: Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers.	F.03 By 1986, examine the acoustics of impulse noise at the worker's ear and the effectiveness of earplugs in reducing exposure. (DBBS) CROSS REFERENCE: Other Personal Protective Equipment		├──────┤

Noise-Induced Loss of Hearing (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers. Underground coal mine workers.	F.04 By 1987, determine relative hazards from different types of noise and examine synergism between noise and other occupational hazards. (DBBS)		
		a. By 1986, complete a field study which evaluates synergistic relationships. (DBBS)	
Focus: Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers. Underground coal mine workers.	F.05 By 1987, develop programs and behavioral methods to foster hearing conservation programs. (DBBS) CROSS REFERENCE: Control Systems		
		a. By 1986, devise a model hearing conservation program, implement it, and commence monitoring of its effectiveness. (DBBS)	

PROGRAM AREA: DERMATOLOGIC CONDITIONS

PROGRAM AREA GOAL:

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

RELEVANT OBJECTIVES FOR THE NATION:

- o Improved health status
  - By 1990, the incidence of compensable occupational dermatitis should be reduced to about 60,000 cases.
- o Improved services/protection
  - By 1990,...the number of industrywide studies being performed annually should increase threefold.
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational disease and injury.

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 aldehydes.

- By FY 1986, identify worker groups and the extent of dermatologic disease produced by chronic physical trauma to the skin.

PROGRAM DESCRIPTION:

According to the Bureau of Labor Statistics' (BLS) annual survey of occupational injuries and illnesses, skin diseases and disorders have accounted for more than 40 percent of all reported occupational illnesses each year from 1972 through 1981. Annual incidence of occupational skin disease for the private sector for 1972-1976 was 1.5 cases per 1,000 workers. During 1975, one of every 11 employees (9.1 percent) experienced a job related injury or illness of some kind. The vast majority of these (96.7 percent) were classified as injuries; only 3.27 percent were classified as illnesses, and of these 1.49 percent were skin diseases or disorders.

Considered in perspective, these statistics seem to indicate that occupational illness is a minor proportion of total occupational health problems. However, a Stanford Research Institute report and the Discher Report, both of which evaluated existing data sources of occupational health statistics, cast considerable doubt on such a conclusion. The serious under-reporting of occupational disease and the inadequacy of the reporting system may mean that the true incidence is anywhere from 10 to 50 times greater than reported in the BLS data. Schwartz, Tulipan, and Birmingham have indicated that approximately 1 percent of the work force may be affected by occupational skin disease at any given time. Data from the 1976 BLS survey show that occupational skin diseases or disorders were unevenly distributed among industries.

Skin diseases are more prevalent in agriculture and manufacturing: the agriculture industry, which employed 1 percent of the private sector work force, had 4 percent: manufacturing, with 30 percent of the work force, accounted for 65 percent of skin disease. The agriculture industry had the highest incidence rates for both total cases and lost workday cases, the second highest incidence rate for lost workdays, and the second highest for the other two types of cases. All other industries had low incidence rates for all three aspects of cases.

Annual cost of occupational skin disease could be used as a measure of the significance of occupational skin disease. Using the BLS data and averaging the 1975-1976 figures, approximately 200,000 lost workdays are attributable annually to occupationally induced skin problems. Assuming an average pay rate of $6.00 per hour, this represents a direct economic cost due to the lost productivity of absent workers of $9.6 million. Adding the cost of a less efficient replacement worker, indemnity, medical costs and insurance could easily increase this figure two to three times (i.e., to $20-30 million annually).

Often overlooked, because of the emphasis on respirators and engineering controls to limit the inhalation of chemicals, is the potential significance of dermal absorption. Absorption of chemicals through the skin, as the sole route of exposure or in conjunction with inhalation, has resulted in occupational illnesses from a variety of chemicals, pesticides, and metals. Despite respiratory protection, skin absorption may be as important as, or more serious than, pulmonary exposures alone for chemicals such as aniline, dimethylformamide, dibromochloropropane, and glycol ethers.

Although RTECS lists 1,426 chemicals with skin LD50s, only 211 of these are addressed by NIOSH Criteria Documents, TLVs or OSHA PELs. For most chemicals used in industry, little or no quantitative information is available on their ability to penetrate skin or on their potential contribution to the overall chemical body burden of workers. This is of concern where exposures to chemical carcinogens, teratogens, and other systemic occupational poisons are present.

The 3-year objectives for the Institute's dermatology program include:

1. Stabilize research grants support for dermatologic projects at academia and other eligible institutions.
2. Develop NIOSH's intramural dermatology competence, including employing at least one board-certified dermatologist.
3. Complete dermal absorption profiles for several volatile aromatic and nonaromatic solvents.
4. Identify worker groups and the extent of dermatologic disease produced by chronic repeated trauma to the skin.

During FY 1984, DSHEFS will assess the need for epidemiology in the area of occupational dermatology. This will involve the identification of agents and exposures that are suspected of causing dermatologic disorders and identification of affected occupational groups. Feasibility studies will be initiated during FY 1984. This research activity will be coordinated with other interested Divisions and especially with DSDTT. Dermatologic problems also will continue to be one of the important issues that is dealt with in the health hazard evaluation program.

FOCUS: WORK-RELATED DISEASES

SKIN CANCER: The DBBS dermatology program addresses the skin both as a target of occupational injury and disease and as a route of entry into the body for hazardous substances contacted in the work environment. The program consists of intramural and extramural components and provides for liaison with other Federal agencies involved in dermatologic research activities within NTP. As part of the extramural grants program in dermatology, DBBS assists in the Institute's secondary review of relevant grants and provides technical assistance once the grants are awarded.

The research grants are a major contribution to the NIOSH dermatology program. Studies supported during FY 1983 included: (1) Pathomechanisms of chemically-induced depigmentation, (2) Role of inflammatory proteinases in irritant dermatitis, (3) Chloracne mechanisms of pathogenesis, (4) Photochemical processes and occupational dermatoses, (5) Accommodation and tolerance in humans and guinea pigs, (6) Coal liquids--skin toxicity and mutagenicity studies, (7) Factors in uptake and elimination of chemicals in the skin, (8) Measurements of dermal exposure to chemical hazards, (9) Epidermal langerhans cells: in-vitro studies, (10) Mechanisms of occupational leukoderma, (11) Transdermal kinetics after multiple cutaneous exposure, and (12) Protective creams to prevent poison oak/ivy dermatitis.

DERMAL ABSORPTION: The DBBS program addresses dermatologic conditions but is also linked by its dermal absorption projects to four other areas of concern. These are occupational, neurotoxic disorders, cancer, cardiovascular diseases and disorders of reproduction.

Research is being directed largely to the development and evaluation of quantitative in-vivo techniques for studying the extent and rate of the percutaneous absorption of chemicals. The long range goal of this research is to reduce occupational disease risk by preventing significant percutaneous absorption of chemicals from the work environment.

Through this program, DBBS will identify chemicals which pose a significant health risk in the occupational environment, evaluate the role of dermal absorption as a contributing factor to total body burden, and assess the efficacy of methods for intervening or preventing dermal absorption of workplace chemicals. Using an in-vivo technique which permits the quantitative recovery of volatile chemicals applied as liquids to the skin, dermal absorption profiles were completed during FY 1983 for benzene, toluene, and carbon disulfide. Chemicals to be studied during FY 1984 include ethyl benzene, aniline, methylchloroform, and ethylene glycol dinitrate. With this methodology it will be possible to investigate the relationships between human animal absorption rates, and to study the effectiveness of protective materials. The results of these studies will provide support for NTP skin carcinogenesis assays and for the Occupational Safety and Health Administration for its standard setting activities.

CONTUSIONS: Also being evaluated are the effects of repeated mechanical micro traumas (friction, pressure, punctures) to the skin. A report completed under contract in September 1982 identified populations and job categories at risk and provided projections about the number of workers potentially affected and the dollar costs. The report, based on derived cost estimates, suggests that the yearly national economic impact of job-related traumas to the skin is minimally about 15 million dollars, although actual costs could be 10-50 times greater. A workshop consisting of international experts was convened in April 1983 to discuss the topic and provide insight into future research directions. The workshop was considered an important seeding event for new areas of research since this was the first time that this topic had been addressed by health professionals and there is virtually no literature nor information on the subject.

Proceedings of this gathering are to be published late in FY 1984. Information gained under this program will be useful in achieving the 1990 Objective of reducing the incidence of compensable job-related dermatitis. Overall, the DBBS program is expected to identify cutaneous hazards; to provide support for the development and evaluation of control technologies and protective clothing, and to provide a sound basis for recommended work practices.

Program Area: Dermatologic Conditions

Goal: 1. Prevent work-related diseases and injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	D. By 1990, the incidence of compensable occupational dermatitis should be reduced to about 60,000 cases.		
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Petroleum industry. Restaurant workers.	D.01 By 1987, identify worker groups and the extent of dermatologic disease produced by chronic physical trauma to the skin. (DBBS)		
Focus: Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	D.02 By 1986, develop NIOSH's intramural dermatology competence, including employing at least one board-certified dermatologist. (DSHEFS)		

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.		83–90
Focus: Dermatologic Conditions Occupational Cancers Disorders of Reproduction Neurotoxic Disorders	M.03 By 1990, reduce occupational disease risk by preventing significant percutaneous absorption of chemicals from the work environment. (DBBS)		83–90
Population in need: Chemical industry. Hazardous waste-site cleanup workers. Petroleum industry. Firefighters.		a. By 1987, complete dermal absorption profiles for 9 industrial chemicals administered as liquid. (DBBS)	83–87
		b. By 1986, develop measuring techniques for evaluating skin exposures to gases, vapors, and fumes. (DBBS)	83–86

PROGRAM AREA: PSYCHOLOGIC DISORDERS

PROGRAM AREA GOAL:

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

RELEVANT OBJECTIVES FOR THE NATION:

- o Improved public/professional awareness
  - By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injuries.
- o Improved services/protection
  - By 1990,...the number of industrywide studies being performed annually should increase three-fold.
- o Improved surveillance/evaluation
  - By 1985, a program should be developed to: 1) follow up individual findings from health hazard and health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and 2) use the findings to determine etiology, natural history, and mechanisms of suspected occupational disease and injury.

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.

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. We can find job stress 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 (Lublin, 1980; Mclead, 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, we can eliminate or control many causes of job stress through ergonomic, job, or organizational redesign approaches (Smith, 1981). When such remedies are infeasible, we can use alternative techniques through worker stress-management training. The advent of spreading 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 5-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 1984 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. These program plans are in accord with the DHHS 1990 Objectives calling for an enlargement of the knowledge base for understanding stress, and promoting wider scale adoption of stress management programs at the workplace.

FOCUS: WORK-RELATED DISEASES AND INJURIES

EMOTIONAL DISTURBANCES: 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 disturbance 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.

Studies of ergonomic factors in VDT workstation design started during FY 1982 and continued during FY 1983. Productivity gains, along with reductions in physical discomfort/complaint indices, were found upon introducing various conditions of glare control, furniture adjustment, and work/rest regimens. DBBS will complete this work in FY 1984 with more objective measures of visual/ocular effects and muscle tension taken to depict the benefits of these manipulations.

A report on job stress in policing was completed during FY 1983. This was the culmination of a questionnaire study of over 2,200 male officers from 19 police departments. Few of the more than 25 job demand factors demonstrated significant stress levels. Those factors showing the highest stress ratings were lack of participation in job decisions, frustration with court leniency, and repetitious work routines. The factors showing the most significant associations with negative health and emotional states were future job security and role conflict. An examination of potential job stress problems for women in nontraditional jobs indicated that the major issues concerned social isolation, job security, and sexual harassment. A worksite study to illustrate ergonomic design deficiencies will be completed in early FY 1984.

DBBS stress reduction research has emphasized both individual coping strategies and ergonomic redesign. During FY 1983, results from DBBS conducted field trials, as well as from other sources, were collated bearing on the efficacy of workplace programs for stress management. Using this material as a data base, a manual will be prepared in FY 1984 describing the procedures for establishing such programs, their varied forms, and means for evaluation. DBBS will undertake this jointly with DSDTT.

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. Other job stress research related to new technology has begun to examine information processing jobs and robotics. During FY 1983, psychometric and psychophysiologic tests were developed to rate congitive demands in terms of their stress significance.

These will be applied in combination laboratory and worksite studies in FY 1984. The association between stressful job factors and indices of psychophysiological strain will be the thrust of future NIOSH efforts. The development and validation of objective methods to measure psychophysiological strain will be emphasized. Of particular interest will be the evaluation of such strain indicators as cardiovascular effects, behavioral changes, endocrine/immunologic consequences, and personality factors. Workplace factors will be evaluated for their contribution to employees' strain, and prevention strategies will be developed and tested for efficacy.

Program Area: Psychologic Disorders

Goal: 1. Prevent work-related diseases and injuries.
2. Evaluate work-related diseases and injuries so as to understand their causes and to detect their vulnerabilities to prevention.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers.	K. By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injury.		[——]
Focus: Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	K.03 By 1988, define psychological risk factors for mental health professionals. (DBBS)		[————]

Psychologic Disorders (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	W. By 1990, the existing knowledge base through scientific inquiry about stress effects and stress management should be greatly enlarged. OBJECTIVE FOR THE NATION CROSS REFERENCE: CONTROL OF STRESS AND VIOLENT BEHAVIOR (M)		├──────────────────────────────────────┤
Focus: Psychologic Disorders Population in need: VDT operators.	W.01 By 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. (DBBS)		├──────────┤
Focus: Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	X. By 1985, a methodology would have been developed to rate the major categories of occupations in terms of their environmental stress loads. OBJECTIVE FOR THE NATION CROSS REFERENCE: CONTROL OF STRESS AND VIOLENT BEHAVIOR (L)		├──────┤
		a. By 1985, a valid psychometric instrument for evaluating stress load will be developed. (DBBS)	├──────┤

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 identify new and emerging problems through the disciplines of engineering, ergonomics, and 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 system.

NIOSH, recognizing the importance of control, has established working groups for four 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 three more working groups, one each, for musculoskeletal injuries, for occupational cancers, and for amputations, fractures, eye loss, lacerations, and traumatic death. 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

PROGRAM AREA: RESPIRATORS

PROGRAM AREA GOAL:

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

RELEVANT OBJECTIVES FOR THE NATION:

- o Improved health status
  - 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.
  - By 1990, occupational heavy metal poisoning (lead, arsenic, zinc) should be virtually eliminated.
- o Reduced risk factors
  - By 1985, 50 percent of all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.
  - By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.
- o Improved public/professional awareness
  - By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.

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 Part 11.

- By FY 1986, improve NIOSH ability to accurately evaluate respirator performance.

- By FY 1986, expand the respirator audit-testing program to more accurately evaluate the quality control of respirator manufacturers.

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 both the quantity and quality 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.

FOCUS: WORK-RELATED DISEASES

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 5-year program activitives 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.

A procedure for recording, tracking, and resolving complaints/problems with respirators was developed and implemented during FY 1983. These respirator program activities have resulted in 13 technical publications and reports as well as presentations at prominent national and international conferences.

Included was information related to development of new testing methods, evaluations of factors related to the selection and performance of respirator cartridges and filters as well as knowledge related to 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, including studies to establish relationships between laboratory performance tests and field performance of respirators. The 5-year program activities are:

1. To revise and update the respirator performance standards in 30 CFR 11, to improve the quality of certified respirators, and to advance the state of respirator technology,

2. To correlate the laboratory and field respirator research activities to permit NIOSH to more accurately evaluate respirator performance, and

3. To ensure the quality of the research program.

NIOSH operates the MSHA/NIOSH respirator approval program; conducts a respirator research program; and conducts complaint, laboratory, and field investigations. These ongoing efforts are conducted in cooperation with industry, labor, universities, and respirator manufacturers.

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,

2. The SCBA "use test" performance requirements,

3. The filter efficiency of the face seal of negative pressure particulate respirators as a function of aerosol size,

4. The applicability of a predicting model in the performance evaluation of organic vapor cartridges, and

5. The effect of lung deposition during exhalation on the measurement of protection factors.

Additionally, technical support for the proposed revisions of respirator regulations (30 CFR Part 11) will be provided.

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-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 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 1983, the respirator approval program issued more than 300 respirator approvals, denials, stop sales, and recalls; published an updated certified equipment list; and conducted more that 51 respirator audits. A draft revision to the respirator regulations (30 CFR 11) was prepared and submitted to the Director, NIOSH.

Further, NIOSH in-house research laboratories were established in FY 1983 for conducting research in the areas of organic vapor and gas performance and breakthrough characterization, aerosol filter efficiency monitoring, and physiological factor assessment related to protective equipment usage.

The DSR respirator field research program, working with the U.S. Army Chemical Systems Laboratory, collected quantitative facepiece fit data for a large sample size with two different test aerosols, NaCl and Dioctyl Sebacate, with training and methods as additional variables. A final report is in preparation. This program also assisted DSHEFS in developing a respirator test protocol for evaluating the respirator protection afforded paint sprayers against paint containing lead chromate pigments.

Program Area: Respirators

Goal: 1. Prevent work-related diseases and injuries.
2. 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.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers.	E. 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 workers' pneumoconiosis.		
Focus: Occupational Lung Diseases Population in need: Miners.	E.38 By 1985, provide criteria to improve methods of control and prevention of respiratory disease through appropriate use of respirators. (DRDS) CROSS REFERENCE: Control Systems		
Focus: Occupational Lung Diseases Population in need: Workers exposed to fumes and dusts.	E.39 By 1987, increase the quality and efficiency of the respirator testing and certification program. (DSR)		
		a. By 1987, complete manual of test procedures used for testing and certification. (DSR)	
		b. By 1986, increase the efficiency of reviewing applications (evaluate 150 approval submissions). (DSR)	

Respirators (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		c. By 1987, implement formal quality assurance program for in-house testing efforts. (DSR)	
		d. By 1986, implement all improved methods for testing based on research results. (DSR)	
		e. By 1987, revise and update the respirator performance standards contained in 30 CFR Part 11. (DSR)	
		f. By 1987, develop an analytical model for lung disposition to better enable accurate measurements of protection and fit factors. (DSR)	
		g. By 1988, recommend improved "man tests" for SCBA. (DSR)	
		h. By 1988, recommend new criteria for organic vapor test standards. (DSR)	
		i. FY 1989, complete utilizing results of current research on sorbents and SCBA man tests, identify and initiate and perform additional research on sorbents for SCBA. (DSR)	
		j. By 1989, evaluate the new performance criteria of the revised 30 CFR 11 and recommend further research activities. (DSR)	
		k. By 1988, correlate the laboratory and field respirator research activities to permit NIOSH to more accurately evaluate respirator performance. (DSR)	

Respirators (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		l. By 1986, perform field studies to correlate relationships between work-place protection factors (WPF) and fit factors. (DSR)	
		m. By 1988, publish final recommendations of WPF and fit factors. (DSR)	
		n. By 1987, expand the respirator audit-testing of respirators purchased off-the-shelf to more accurately evaluate the quality control of respirator manufacturers. (DSR)	
		o. By 1986, increase audits by 5 percent. (53)(DSR)	
Focus: Occupational Lung Diseases (Coal Workers' Pneumoconiosis) Population in need: Coal miners.	E.40 By 1988, increase coal miner's safety and health through more accurate measurements of exposure levels. (DSR) CROSS REFERENCE: Sampling/Analysis		
		a. By 1986, validate DPSE laboratory evaluation procedures. (DSR)	
		b. By 1986, certify Coal Mine Dust Personal Sampler Units (CMDPSU) under existing 30 CFR 74 regulations. (DSR)	
		c. By 1988, in conjunction with MSHA, modify 30 CFR 74 to allow certification of any Respirable Dust Samplers (RDS) based on DPSE evaluation procedures. (DSR)	

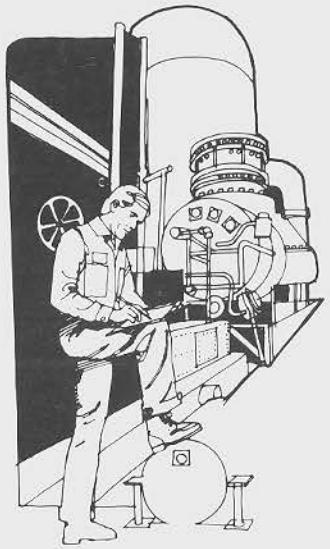
Respirators (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Population in need: Miners.	E.41 By 1990, develop laboratory evaluation procedures for the certification of direct-reading respirable dust monitors. (DSR) CROSS REFERENCE: Sampling/Analysis		————————————
Focus: Occupational Lung Diseases	E.42 By 1985, address respirator effectiveness. (DRDS)		————
Population in need: Blue-collar workers. Service workers. Farm workers.		a. By 1985, critically review OSHA proposed rulemaking on respiratory protection. (DRDS)	————
		b. By 1985, formulate guidelines to determine fitness to wear respirators. (DRDS)	————
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers.	E.43 By 1987, make recommendations on and demonstrate efficacy of in-respirator mask monitoring devices. (DPSE) CROSS REFERENCE: Sampling/Analysis		————————
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers.	E.44 By 1987, demonstrate the ability to monitor exposures within the respirator mask and provide performance standards. (DPSE)		————————————
		a. By 1987, increase audits by 10 percent. (58)(DSR)	————————————

Respirators (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers. Hazardous waste-site cleanup workers.	I. By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.		
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. Hazardous waste-site cleanup workers	I.03 By 1986, determine how well respirators can control respiratory exposures of waste-dump cleanup workers and recommend improvements.		

PROGRAM AREA: CONTROL SYSTEMS



PROGRAM AREA GOAL:

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

RELEVANT OBJECTIVES FOR THE NATION:

- Improved health status
  - By 1990, workplace accident deaths for firms or employers with 11 or more employees should be reduced to less than 3,750 per year.
  - By 1990, the rate of work-related injuries should be reduced to 8.3 cases per 100 full time workers.
  - By 1990, lost workdays due to injuries should be reduced to 55 per 100 workers annually.
  - By 1990, the incidence of compensable occupational dermatitis should be reduced to about 60,000 cases.
  - 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.
  - By 1990, the prevalence of occupational noise-induced hearing loss should be reduced to 415,000 cases.
  - By 1990, occupational heavy metal poisoning (lead, arsenic, zinc) should be virtually eliminated.
- Reduced risk factors
  - By 1985, 50 percent of all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.

- By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment and new installations.

o Improved public/professional awareness

- By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.

- 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.

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 workplace diseases, while being incurable (e.g., lung disease, cancer), are preventable by proper workplace design and work practice. The logical sequel to the recognition and evaluation of occupational hazards is control. 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 (e.g., engineering, substitution).

2. Remove emissions from the pathway between the source and the worker (e.g., engineering, work practices).

3. Control exposure with barriers between the worker and the hazardous work environment (e.g., engineering, personal protection).

Desirable characteristics of a hazard control systems are:

- It must provide adequate and reliable protection for workers when functioning as designed.
- 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.
- 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.
- The effectiveness of protection for each individual worker must be determinable.
- Provision for regular or continuous monitoring of critical process, hazard, exposure, and control parameters should be included.
- 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, nonferrous metals production, manufacturing processes such as tire building and spray painting, service industries such as dry cleaning, and control techniques such as air recirculation and push-pull local exhaust ventilation. In some situations, behavioral, motivational, and ergonomic considerations can lead to successful control of worker exposure to hazardous situations. DBBS, in conjunction with DPSE, has helped evaluate the work practices and motivational aspects in several of these studies.

Engineering control research projects are conducted to develop and evaluate continuous monitoring techniques, protocols and control criteria which can be used in the development, implementation, and maintenance of control systems. This program investigates the applicability of innovative control methods which are not currently in general use and demonstrates the effectiveness of existing workplace controls. The FY 1984 program will develop a hazard control plan logic to serve as a guide for effective and complete hazard control plans.

Control monitoring instruments and techniques provide information on the operational status of control systems, provide warnings to plant personnel and provide 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.

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 workforce at a rate of three to five percent per year. NIOSH efforts will be 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. DPSE and DTMD are cooperating in this effort.

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.

FOCUS: WORK-RELATED DISEASES AND INJURIES

OCCUPATIONAL LUNG DISEASES: By 1985, 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 will be completed.

Three demonstrations of push-pull ventilation are completed. The demonstrations covered solvent tank emission control, chromic acid mist control and fume control in a torch cutting operating. Criteria for the control are being prepared for the Ventilation Committee of the ACGIH.

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.

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; 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.

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-reinforcement 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 maintainability of these work procedures as established at the original target sites began in FY 1983 in a jointly supported DPSE/DBBS effort.

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.

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.

Program Area: Control Systems

Goal: 1. Prevent work-related diseases and injuries.
2. 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.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C. By 1990, lost workdays due to injuries should be reduced to 55 per 100 workers annually.		
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C.06 By 1990, expand the scientific basis for identification, evaluation, and control of biomechanical hazards for use in worksite surveillance/hazard control programs. (DBBS) CROSS REFERENCE: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths		

Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Blue-collar workers. Service workers. Farm workers. White-collar workers.	C.07 By 1986, complete job/tool re-design strategies for reducing upper extremity disorders in 2 high risk occupations. (DBBS) CROSS REFERENCE: Musculoskeletal Injuries		
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Population in need: Blue-collar workers. Farm workers.	E. 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.		
Focus: Occupational Lung Diseases (Silicosis) Population in need: Quarrymen, abrasive blasters, silica processors, mining, metal, and ceramic industries.	E.09 By 1989, make recommendations to improve methods for control or prevention of silicosis. (DRDS) CROSS REFERENCE: Occupational Lung Diseases		
		a. By 1988, complete evaluation of disease mechanisms through <u>in</u> <u>vitro</u> studies on pulmonary macrophages. Understanding mechanisms may facilitate novel control procedure applications. (DRDS)	
		b. By 1988, devise and implement a system for the coordination, interpretation, and translation of research findings to other health professionals and the public. (DRDS)	

Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		c. By 1986, complete evaluation of coal slags used as substitutes for silica sand in abrasive blasting operations. (DBBS)	
		d. By 1986, develop an unambiguous definition of silicosis. (DRDS)	
		e. By 1987, add silicosis to the MMWR list of reportable diseases. (DRDS)	
Focus: Occupational Lung Diseases (Coal Workers' Pneumoconiosis) Population in need: Underground coal miners.	E.12 By 1990, assess adequacy of 2mg/m^3 dust standard in underground coal mines (DRDS). CROSS REFERENCE: Occupational Lung Diseases (E.10)		
		a. Monitor continuously all pertinent subgroups in NCS and x-ray surveillance through film trials. (DRDS)	
		b. Monitor continuously and compare observations with expectations under dose-response curve. (DRDS)	
		c. Annually, publish 2 peer reviewed articles on subject. (DRDS)	
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers.	E.31 By 1990, identify and evaluate less hazardous materials which can be used as substitutes for substances in the workplace known to induce occupational lung disease. (DBBS) CROSS REFERENCE: Occupational Lung Diseases		

Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		a. By 1986, complete a strategy for the identification of substitute materials to be evaluated by in vivo or in vitro methods. (DBBS)	
Asbestos industries and utilizers.		b. By 1988, complete 2 micro-analytical/autopsy studies on workers exposed to asbestos substitute minerals. Complete 2 additional epidemiologic studies on workers exposed to asbestos substitute minerals where public health significance has been defined. (DRDS)	
Focus: Occupational Lung Diseases (Asbestosis) Population in need: Asbestos workers, utilizers, and removers.	E.32 By 1985, complete preliminary control technology study of asbestos removal industry and make recommendations for future work. (DPSE)		
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers.	E.33 By 1987, complete criteria for design and operation of ventilation techniques to increase availability and efficiency of control of workplace environments. (DPSE)		
		a. By 1985, develop criteria for design and operation of ventilation and process control techniques to increase availability and efficiency of control of workplace environments. (DPSE)	

Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Population in need: Blue-collar workers.	E.34 By 1985, complete assessment of bag opening systems. (DPSE)		
Focus: Occupational Lung Diseases Population in need: Blue-collar workers.	E.35 By 1986, complete assessment of powder weighing and batching systems. (DPSE)		
Focus: Occupational Lung Diseases (Byssinosis) Population in need: Textile workers. Cotton industry workers.	E.36 By 1990, make specific recommendations for the control and prevention of byssinosis. (DRDS)	a. By 1984, conduct trial to completely eliminate the bioactivity from low-grade cotton by mild washing methods. (DRDS)	
Focus: Occupational Lung Diseases Population in need: Foundry workers.	E.37 By 1985, complete demonstration of control monitoring systems in foundries. (DPSE)		
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers.	E.38 By 1985, provide criteria to improve methods of control and prevention of respiratory disease through appropriate use of respirators. (DRDS) CROSS REFERENCE: Respirators		

Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers.	F. By 1990, the prevalence of occupational noise-induced hearing loss should be reduced to 415,000 cases.		
Focus: Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers. Underground coal miners.	F.05 By 1987, develop programs and behavioral methods to foster hearing conservation programs. (DBBS)	a. By 1986, devise a model hearing conservation program, implement it, and commence monitoring its effectiveness. (DBBS)	
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Cardiovascular Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I. By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment and new installation.	a. By 1985, 50 percent of all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment and new installations. b. By 1985, develop a hazard control plan for use by industry to assure that all control elements are appropriately considered in final plan. (DPSE)	

Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		c. By 1987, demonstrate efficiency of hazard control plan for industry. (DPSE) CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance (1.00.c) Information Dissemination/ Document Development (1.00.c)	├──────────┤
		d. By 1985, document control practices in 2 growing or emerging processes. (DPSE) CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance (1.00.d) Work Force Development (1.00.b)	├──────┤
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers.	K. By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injury.		├──────┤

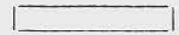
Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Occupational Cancers Population in need: Construction workers. Roofers.	K.01 By 1987, verify the efficacy of behavioral methods, and job redesign to reduce workers' exposure to carcinogens in roofing operations. (DBBS) CROSS REFERENCE: Occupational Lung Diseases Occupational Cancers		[——————]
Focus: Objective for the Nation Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.		[————————————]
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers.	M.02 By 1987, demonstrate control techniques for reducing health problems as well as lifting hazards in selected high-risk occupations. (DBBS) CROSS REFERENCE: Musculoskeletal Injuries, Amputations Fractures, Eye Loss, Lacerations, and Traumatic Deaths		[——————]

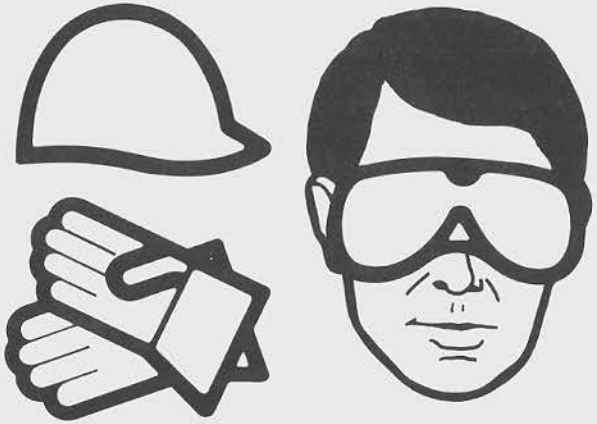
Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Disease Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P. By 1990, generic standards and other forms of technology transfer should be established where possible, for standardized employer attention to such major common problems as: --chronic lung hazards, --carcinogenic hazards, --mutagenic hazards, --teratogenic hazards, --and, medical monitoring requirements.		|_____|
Focus: Occupational Cancers Population in need: Blue-collar workers. Farm workers.	P.03 By 1986, develop direct approaches which prevent premature mortality and reduce unnecessary morbidity among workers (DPSE) CROSS REFERENCE: Occupational Cancers		|_____|
		a. By 1985, provide input to wood working industry on wood dust control technology. (DPSE)	|_____|
Focus: Occupational Lung Diseases Occupational Cancers Population in need: Automobile manufacturing, woodworking industry, logging industry. cabinet, furniture makers.	P.06 By 1985, develop recommendations on wood dust control technology. (DPSE)		|_____|

Control Systems (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Disease Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P.07 By 1986, initiate studies in reliability engineering to transfer effective technology. (DPSE)		

PROGRAM AREA: 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.

RELEVANT OBJECTIVES FOR THE NATION:

- Improved health status
  - By 1990, workplace accident deaths for firms or employers with 11 or more employees should be reduced to less than 3,750 per year.
  - By 1990, the incidence of compensable occupational dermatitis should be reduced to about 60,000 cases.
  - By 1990, the prevalence of occupational noise-induced hearing loss should be reduced to 415,000 cases.
- Reduced risk factors
  - By 1985, 50 percent of all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment and new installations.
  - By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new installations.
- Improved public/professional awareness
  - By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.

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). It has often been cited that, with the increasingly tightening economic conditions, the use of PPE as an alternative to more expensive engineering controls will 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.

With regard to CPC, the Supplemental Data System (SDS) specifically notes chemical exposure as a causal factor in nearly half of the 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 would not be readily detectable by the user, contact with carcinogens and other harmful materials could frequently occur.

Three-year goals in the area of PPE 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 methods.

FOCUS: WORK-RELATED INJURIES

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).

AMPUTATIONS, FRACTURES, EYE LOSS, LACERATIONS, AND TRAUMATIC DEATHS: Activities within DSR have included work to establish test criteria and procedures designed to evaluate the performance of PPE. 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' nelmets, 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 concentrate on respirator research and certification.

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.

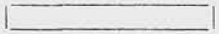
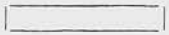
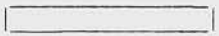
DERMATOLOGIC CONDITIONS: In response to the national concern regarding the exposure of workers in industry and chemical waste dump cleanup operations, DSR has initiated a program designed to evaluate chemical protective clothing. With initial emphasis on glove material, the program will establish a standard permeation test designed to evaluate the permeability of various protective clothing materials 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 product re-use, 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.

Program Area: Other Personal Protective Equipment

Goal: 1. Prevent work-related diseases and injuries.
2. 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.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers.	A. By 1990, workplace accident deaths for firms or employers with 11 or more employees should be reduced to less than 3,750 per year.		├──────────────────────────────┤
Focus: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers.	A.11 By 1986, complete document on selection of personal protective equipment for hazardous materials incidents. (DSR) CROSS REFERENCE: Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths		├──────┤
Focus: OBJECTIVE FOR THE NATION Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers.	D. By 1990, the incidence of compensable occupational dermatitis should be reduced to about 60,000 cases.		├──────────────────────────────┤

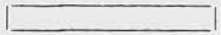
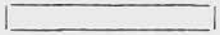
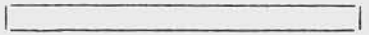
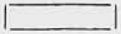
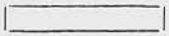
Other Personal Protective Equipment (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Petroleum industry. Firefighters.	D.03 By 1987, delineate the industrial need and use of chemical protective clothing. (DSR)		
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Petroleum industry. Fire fighters.	D.04 By 1986, develop new test methods to evaluate CPC in the field. (DSR)		
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Petroleum industry. Firefighters.	D.05 By 1987, conduct a pilot study to look at the effectiveness of CPC in the field.		

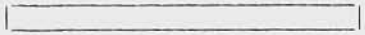
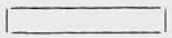
Other Personal Protective Equipment (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Petroleum industry. Firefighters.	D.06 By 1987, make existing permeation data available and encourage additional evaluation and development of predictive models. (DSR)		▬▬▬▬▬
Focus: Dermatologic Conditions Population in need: Chemical industry. Petroleum industry. Pesticide manufacturers and utilizers.	D.07 By 1987, conduct penetration and permeation tests on various gloves utilizing several pesticides. (DSR)		▬▬▬▬▬
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Firefighters.	D.08 By 1988, complete Round Robin Validation of CPC test methods and encourage the development and standardization of product evaluation methods. (DSR)		▬▬▬▬▬▬▬
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Petroleum industry. Firefighters.	D.09 By 1989, finalize recommendations on decontamination procedures. (DSR)		▬▬▬▬▬▬▬▬

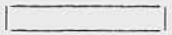
Other Personal Protective Equipment (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Petroleum industry. Firefighters.	D.10 By 1987, increase user information on CPC by publishing data on CPC and provide input for NIOSH guidelines. (DSR)		
Focus: Dermatologic Conditions Population in need: Chemical industry. Hazardous waste cleanup workers. Petroleum industry. Firefighters.	D.11 By 1987, publish summary report of available data on CPC. (DSR)		
Focus: OBJECTIVE FOR THE NATION Noise-Induced Loss of Hearing	F. By 1990, the prevalence of of occupational noise-induced hearing loss should be reduced to 415,000 cases.		
Population in need: Blue-collar workers. Service workers. Farm workers.		a. By 1985, publish a compendium of hearing protectors. (DBBS)	
Focus: Noise-Induced Loss of Hearing Population in need: Blue-collar workers. Service workers. Farm workers.	F.03 By 1986, examine the acoustics of impulse noise at the worker's ear and the effectiveness of earplugs in reducing exposure. (DBBS) CROSS REFERENCE: Noise-Induced Loss of Hearing		

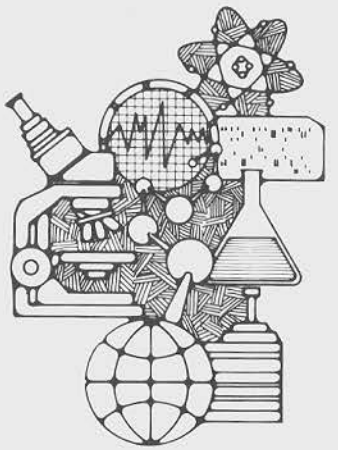
Other Personal Protective Equipment (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers. Hazardous waste-site cleanup workers.	1. By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.		
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Hazardous waste-site cleanup workers.	I.04 By 1986, provide information to hazardous chemical handlers for proper selection of protective clothing. (DSR)		

Other Personal Protective Equipment (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Harzardous waste-site cleanup workers.	1.05 By 1986, evaluate the physiological effects of wearing protective clothing and respirators and develop recommendations for the safe selection and use of protective equipment. (DSR)		

PROGRAM AREA: 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.

RELEVANT OBJECTIVES FOR THE NATION:

o Reduced risk factors

- By 1985, 50 percent of all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment and new installations.

- By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment and new installations.

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, revise and update the performance standards contained in 30 CFR 74 to improve the quality of certified personal sampler units for coal mine dust.

- By FY 1986, continue research on improving tests used in the certification program for dust samplers.

PROGRAM DESCRIPTION:

This program within DPSE provides sampling consultation, analytical support, and field instrument maintenance to field research activities within NIOSH. Information is provided for the data base used by industrial hygienists and engineers to make decisions on the hazard potential of workplace exposure, the association of exposure with disease, and the effectiveness of engineering control systems.

Three year program objectives are as follows: By the end of FY 1984, to develop a manual of standard operating procedures for the prioritization, collection, handling, shipping, and analysis of samples to ensure more cost utilization of diminished resources.

The manual of standard operating procedures contains the following information: pre-survey planning, support requests, sample submittal forms, sample hold criteria, quality assurance, sample receipt policy, sample shipment, submission of blanks, revised support requests, requesting high priority, sampling media, and sample retention policy. The manual was provided to all field personnel and the regional offices.

During the period FY 1983 to FY 1986, NIOSH will 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 the instrumental capabilities. Continuing education is an important Institute function if its staff is to stay abreast of quickly changing analytical chemistry procedures. Several of the staff have been cross-trained in organic and inorganic analytical techniques.

DBBS will also modify or develop an average of 20 methods of field activities over a three-year period. Projections indicate the following research areas will require substantial effort in this regard: amines, substituted PNA's, plastic decomposition products, and energy studies.

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 such workplaces more completely and more rapidly.

NIOSH, with some support from "Superfund," has conducted three visits to hazardous waste sites and evaluated portable direct reading instruments. This work will continue and make use of a mobile laboratory. Six sampling and analytical methods were developed.

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, improved cooperation with groups requesting support by utilizing group coordinators and holding regular coordination meetings and use of more qualitative screening to prevent large numbers of unnecessary quantitative measurements below detection limits.

In addition to analytical support, DBBS operates a maintenance and calibration laboratory. In FY 1983, 400 industrial hygiene instruments were serviced, repaired, or calibrated. A nickel-cadmium battery cycler/charger was designed and constructed to extend the useful lifetime of some of NIOSH's portable instruments. DBBS also provides clinical and biochemical analytical support services for field studies and in-house research programs. Included in this activity are the analyses of urine, blood, tissue, and breath samples for the quantitation and characterization of worker and experimental animal exposures to industrial chemicals.

In addition, service support is available for the physical and chemical characterization (sizing and analysis) of particular materials, be they individual particles, bulk samples, or from biological specimens.

FOCUS: WORK-RELATED DISEASES AND INJURIES

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).

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, 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.

During FY 1984, DRDS plans to refine sampling techniques for areas contaminated with microbial agents; including fungal, bacterial, and protozoan contaminants. DRDS will also continue to report to the Division of Physical Sciences and Engineering's Analytical Chemistry group on the field performance of NIOSH sampling and analytical methods.

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.

Sampling and analytical methods were developed and validated by DPSE for vanadium pentoxide (V_2O_5), lead sulfate ($PbSO_4$), and asbestos in FY 1983. Methods for ammonium metavanadate (V_2NH_3), ammonia (NH_3), sodium hydroxide (NaOH), hydrogen cyanide (HCN) and hydrogen fluoride (HFl) are being developed in FY 1984 and FY 1985.

NEUROTOXIC DISORDERS: During FY 1983, sampling and analytical methods were developed for dinitrochlorobenzene and oryzalin in the chemicals manufacturing industry; 3,3'dichlorobenzidene in manufacturing of pigments; and azodicarbonamide and ethylhexanol in the plastics industry. In support of toxicological research, analytical methods were developed for allylamine, saccharin, tryptophan, phorbol, and phorbol esters.

Sampling and analytical methods for dichlorobenzidine in pigment manufacturing ethylhexanol and azodicarbonamide in the plastics industry; 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.

Program Area: Sampling/Analysis

Goal: 1. Prevent work-related diseases and injuries.
2. 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.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Disease Population in need: Blue-collar workers. Service workers. Farm workers.	E. 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 workers' pneumoconiosis.		
Focus: Occupational Lung Diseases (Coal Workers' Pneumoconiosis) Population in need: Coal miners.	E.40 By 1988, increase coal miner's safety and health through more accurate measurements of exposure levels. (DSR) CROSS REFERENCE: Respirators		
		a. By 1986, validate DPSE laboratory evaluation procedures. (DSR)	
		b. By 1986, certify Coal Mine Dust Personal Sampler Units (CMDPSU) under existing 30 CFR 74 regulations. (DSR)	
		c. By 1988, in conjunction with MSHA, modify 30 CFR 74 to allow certification of any Respirable Dust Samplers (RDS) based on DPSE evaluation procedures. (DSR)	

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Population in need: Miners.	E.41 By 1990, develop laboratory evaluation procedures for the certification of direct-reading respirable dust monitors. (DSR) CROSS REFERENCE: Respirators		├──────────────────────────────┤
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E.43 By 1986, make recommendations on and demonstrate efficacy of in-respirator mask monitoring devices. (DPSE) CROSS REFERENCE: Respirators		├──────────┤
Focus: Occupational Lung Diseases (Coal Workers' Pneumoconiosis) Population in need: Coal miners.	E.45 By 1985, make recommendations on improving sampling accuracy in coal mines. (DPSE)		├──────┤
		a. By 1985, make recommendation on certifying gravimetric coal mine dust personal sampler units. (DPSE)	├──────┤
		b. By 1985, establish the ability to analyze settled dust samples from NOHS-Mining. (DPSE)	├──────┤
Focus: Occupational Lung Diseases Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E.46 By 1985, develop an improved sampling and analytical method for monitoring exposures to hydrogen fluoride. (DPSE)		├──────┤

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases, Occupational Cancers, Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E.47 By 1985, evaluate direct-reading dust monitors. (DPSE)		[_____]
Focus: Occupational Lung Diseases, Occupational Cancers, Cardiovascular Diseases, Disorders of Reproduction Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E.48 By 1987, develop a passive monitoring method for aldehydes. (DPSE)		[_____]
Focus: Occupational Lung Diseases, Occupational Cancers, Cardiovascular Diseases, Disorders of Reproduction Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E.49 By 1987, develop a sampling and analytical method for isocyanates used in polyurethanes, adhesives, and coatings. (DPSE)		[_____]

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E.50 By 1985, develop direct reading dust measurement methods. (DPSE)		├──────┤
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E.51 By 1985, develop an accurate sampling and analytical method for ozone. (DPSE)		├──────┤
Focus: Occupational Lung Diseases (Pneumoconiosis) Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	E.52 By 1985, report on the accuracy of the NIOSH developed aerodynamic particle sizer. (DPSE)		├──────┤
Focus: Occupational Lung Diseases (Asbestosis) Population in need: Asbestosis industry and utilizers.	E.53 By 1986, develop an asbestos generation system for the NIOSH Proficiency Analytical Testing Program. (DPSE)		├──────────┤

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases (Occupational Asthma) Population in need: Jewelry, alloy, and catalyst makers. Polyurethane, adhesive, paint workers. Refinery workers. Solderers. Mastic, dye, insecticide makers. Foam workers, latex makers, biologists. Printing industry. Nickel platers. Bakers. Plastic industry. Woodworkers, furniture makers. Detergent formulators.	E.54 Prevent the occurrence of occupational asthma through the identification and evaluation of workplace agents which induce pulmonary hypersensitivity. (DPSE)	a. By 1985, develop sampling and analytical methods for vanadium compounds. (DPSE) CROSS REFERENCE: Occupational Lung Diseases (E.18.a)	▭
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	G. By 1990, occupational heavy metal poisoning (lead, arsenic, zinc) should be virtually eliminated.		▭

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	G.02 In 1985, develop sampling and analytical methods for ammonium metavanadate, chromium III, and chromium VI. (DPSE)		[_____]
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I. By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.		[_____]

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases, Occupational Cancers, Neurotoxic Disorders, Dermatologic Conditions Population in need: Blue-collar workers, Service workers, Farm workers, White-collar workers.	I.06 By 1985, publish the third edition of the NIOSH Manual of Analytical Methods. (DPSE)		├──┤
Focus: Occupational Lung Diseases, Occupational Cancers, Cardiovascular Diseases, Disorders of Reproduction, Neurotoxic Disorders Population in need: Blue-collar workers, Service workers, Farm workers, White-collar workers.	I.07 By 1985, make effective use of data from the Proficiency Analytical Testing Program to assure and improve the accuracy of industrial hygiene measurements of hazards. (DPSE)		├──┤
Focus: Occupational Lung Diseases, Occupational Cancers, Cardiovascular Diseases, Disorders of Reproduction, Neurotoxic Disorders Population in need: Blue-collar workers, Service workers, Farm workers, White-collar workers.	I.08 By 1985, develop a sampling and analytical method of HF. (DPSE)		├──┤

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.09 By 1986, develop an improved sampling and analytical method for HCN. (DPSE)		├──────┤
Focus: Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.10 By 1986, develop sampling and analytical methods for four aldehydes: formaldehyde, acrolein, furfural, and glutaraldehyde. (DPSE)		├──────┤
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.11 By 1986, develop sampling and analytical methods for alphatic and aromatic amines. (DPSE)		├──────┤

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.12 By 1986, develop a convenient sampler for measuring exposure to isocyanates. (DPSE)		|_____|
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.13 By 1985, report on image analysis systems for counting mineral fibers. (DPSE)		|_____|
Focus: Occupational Lung Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.14 By 1987, develop a sampling and analytical method for sodium hydroxide. (DPSE)		|_____|
Focus: Occupational Lung Diseases Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Cardiovascular Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.15 By 1986, analyze and effectively use metals data from the Proficiency Analytical Testing Program to assure and improve the accuracy of industrial hygiene measurements. (DPSE)		|_____|

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Cardiovascular Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	1.16 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. (DPSE)		├──────┤
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.17 By 1985, develop improved breath-analysis technique which will allow for more extended use of non-invasive biological monitoring techniques, thus providing additional workplace exposure information to control and prevent exposures. (DPSE) CROSS REFERENCE: Information Dissemination/ Document Development (J.00.c)		├────┤

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Dermatologic Conditions Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.18 By 1987, begin the development of PAT samples for liquid and ion chromatographic analysis. (DPSE)		[ ]
Focus: Dermatologic Conditions Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.19 By 1990, provide a PAT sample for ion chromatographic analysis. (DPSE)		[ ]
Focus: Dermatologic Conditions Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.20 By 1987, develop a sampling and analytical method specific for sodium hydroxide. Current methods use only an indirect method (alkalinity) and do not measure the OSHA standard substance. (DPSE)		[ ]
Focus: Neurotoxic Disorder Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.21 By 1985, develop a sampling and analytical method to accurately measure total hydrocarbons in air. (DPSE)		[ ]

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Cancers Population in need: Hospital workers.	I.22 By 1984, develop a sampling and analytical method for ethylene oxide. (DPSE) CROSS REFERENCE: Occupational Cancers (P.03.b)		
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	L. By 1985, all workers should receive routine notification in a timely manner of all health examinations or personal exposure measurements taken on work environments directly related to them.		
Focus: Occupational Lung Diseases Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Cardiovascular Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	L.01 By 1985, improved monitoring technology should routinely provide workers 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. (DPSE)		

Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Cancers Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	L.02 By 1986, NIOSH will have developed improved procedures for sampling and analyzing work environments, such as illegal chemical dump sites, foundries, coke oven, and coal conversion plants, which contain complex mixtures of toxic and carcinogenic organic compounds. Such procedures will enable NIOSH to characterize worker exposures in such workplaces more completely and more rapidly. (DPSE)		├──┤
Focus: OBJECTIVE FOR THE NATION Occupational Cancers Occupational Lung Diseases Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P. By 1990, generic standards and other forms of technology transfer should be established where possible, for standardized employer attention to such major common problems as: --chronic lung hazards --carcinogenic hazards --mutagenic hazards --teratogenic hazards --and medical monitoring requirements.		├──────────────────────────────┤
Focus: Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P.08 By 1985, characterize roofing asphalt fumes for organic chemicals which contribute to its carcinogenicity. (DPSE)		├──┤

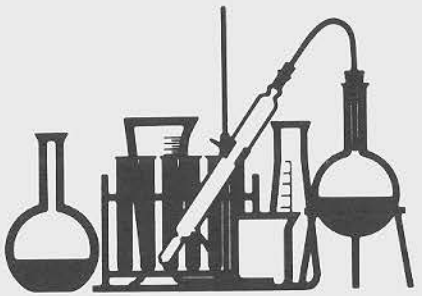
Sampling/Analysis (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Occupational Cancers Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P.09 By 1986, NIOSH will publish performance specifications and testing protocols for new passive monitors for users and manufacturers. The use of these criteria will increase the reliability of these samplers before they become commercially available. (DPSE)		

PROGRAM AREA: 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.



RELEVANT OBJECTIVES FOR THE NATION:

o Reduced risk factors

- By 1985, 50 percent of all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment and new installations.

- By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment and new installations.

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.

PROGRAM DESCRIPTION:

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

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.

FOCUS: WORK-RELATED DISEASES

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. The effects of wind on the accuracy of aerosol sampling will be studied this year. The results of this work will serve NIOSH's aerosol research and provide needed documentation for a total dust sampling method for the International Standards Organization.

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 (ozone) for which convenient and accurate monitoring methods are not available. New dust monitoring instrumentation is being evaluated to improve asbestos fiber measurement techniques.

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.

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 10 methods for inclusion in the 3rd 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); developed and evaluated a method for vanadium trioxide.

During FY 1984, methods development research will include furfural, glutaraldehyde, ammonium metavanadate, chromium, HF, HCN, NaOH, ethylene oxide, aliphatic amines, and multi-element analysis in blood and tissue. An exhaled breath sampling device will be developed and evaluated.

DPSE supports the other Institute projects by analyzing air and biological samples. Approximately 13,000 samples were analyzed in FY 1983. In order to meet the varied needs of this task, the Division maintained two contract efforts and an in-house effort. 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. The analyses of non-routine samples and the development of methods (when requests are received for which no methods exist) are performed by NIOSH scientists.

NIOSH sampling and analytical methods are published in a manual and made available to the public through the Government Printing Office. The second edition of this manual now contains many outdated methods. Revision of the manual began in FY 1983 and will continue in FY 1984. The third edition of the NIOSH Manual of Analytical Methods will be available to the public in FY 1984. The third edition will contain chapters on quality assurance, air sampling and biological sampling in addition to the air-sample and biological-sample analytical methods. The format of the manual will be sufficiently flexible so that additional material can be added and obsolete material removed. The sampling and analytical 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.

By 1986, NIOSH will compile existing biological methods as well as six new methods into a separate section of the 3rd edition of the NIOSH Manual of Analytical Methods.

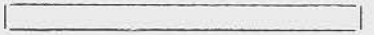
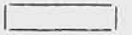
In FY 1984, the Institute will publish a 3rd edition of the NIOSH Manual of Analytical Methods. The first printing will contain 100 methods. By 1985 the 3rd edition will contain 300 air and biological sampling and analytical methods.

By 1986, NIOSH will publish performance specifications and testing protocols for new passive monitors for users and manufacturers. The use of these criteria will increase the reliability of these samplers before they become commercially available.

A testing protocol is being tested. The protocol detected problems with one commercial passive monitor for formaldehyde. The laboratory work will continue in FY 1984. A theoretical study of other physical parameters which influence these samplers will be completed in FY 1984. At that time the performance specifications and testing protocols will be complete and parameters seriously affecting sampler accuracy identified.

Program Area: Instrument/Methods Development

Goal: 1. Prevent work-related diseases and injuries.
2. 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.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Disease Population in need: Blue-collar workers. Service workers. Farm workers.	E. 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 workers' pneumoconiosis.		
Focus: Occupational Lung Diseases (Asbestosis, Silicosis) Population in need: Asbestos industry and utilizers. Quarrymen, sandblasters, silica processors, mining, metal and ceramic industries.	E.55 By 1985, develop and evaluate monitoring instrumentation and measurement techniques for asbestos and silica. (DPSE)		

Instrument/Methods Development

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers. Hazardous waste-site cleanup workers.	I. By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.		[_____]
Focus: Occupational Cancers Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Hazardous waste-site cleanup workers.	I.23 By 1986, improve methods for sampling and analyzing work environments which contain complex mixtures of toxic and carcinogenic organic compounds. (DPSE)		[_____]

Instrument/Methods Development

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Population in need: Hazardous waste cleanup workers. Metal cleaning workers. Electroplating workers.	I.24 By 1987, develop hydrogen cyanide and particulate cyanide methods to monitor exposures and prevent disease in hazardous waste cleanup, metal cleaning, and speciality electroplating operations. (DPSE)		[——————]
Focus: Occupational Lung Diseases Occupational Cancer Disorders of Reproduction Neurotoxic Disorders Cardiovascular Diseases Population in Need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I.25 By 1987, develop two rapid multi-element methods for rapid analysis of either human or animal samples. (DPSE)		[——————]
		a. By 1985, develop a rapid multi-element (25 elements) method for analyzing blood samples from exposed workers in all metal industries, and for animal exposures in toxicologic research. The method will decrease analysis time by more than 90 percent. (DPSE)	[———]
		b. By 1987, develop a rapid method for analyzing 25 elements simultaneously in tissue samples of animals used in toxic exposure research. This will improve research data and provide results 5-10 times more quickly. (DPSE)	[——————]
		c. 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. (DPSE)	[————]

Instrument/Methods Development

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases, Occupational Cancers, Cardiovascular Diseases, Disorders of Reproduction, Neurotoxic Disorders Population in need: Blue-collar workers, Service workers, Farm workers, White-collar workers.	I.26 By 1987, develop and evaluate gas or aerosol direct-reading instrumentation. (DPSE)		├──────┤
Focus: Occupational Lung Diseases, Cardiovascular Diseases, Disorders of Reproduction, Neurotoxic Disorders Population in need: Hospital workers, Petroleum industry, Pesticide users.	I.27 By 1987, develop and evaluate instruments and methods for ethylene oxide and ethylene dibromide. (DPSE)		├──────┤
Focus: Occupational Lung Diseases, Occupational Cancers, Cardiovascular Diseases, Disorders of Reproduction, Neurotoxic Disorders Population in need: Blue-collar workers, Service workers, Farm workers, White-collar workers.	I.28 By 1986, establish performance specifications and test protocols for new passive monitors for users and manufacturers. (DPSE)		├────┤

Instrument/Methods Development

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases (Occupational Asthma and Bronchitis) Population in need: Refrigeration, fertilizer, oil refining industries. Alkali and bleach industries. Silo fillers, arc welders, nitric acid industry. Paper industries. Cadmium smelters and processors. Plastics industry.	I.29 By 1987, develop and standardize methods for in vitro processing of antigenic materials from the workplace. (DRDS) CROSS REFERENCE: Occupational Lung Diseases (E.19.a)		[_____]
Focus: Occupational Lung Diseases (Occupational Asthma and Bronchitis) Population in need: Refrigeration, fertilizer, oil refining industries. Alkali and bleach industries. Silo fillers, arc welders, nitric acid industry. Paper industries. Cadmium smelters and processors. Plastics industry.	I.30 By 1985, field test a new, sensitive, and practical method of detecting acute, adverse human respiratory effects of common airborne occupational exposures. (DRDS) CROSS REFERENCE: Occupational Lung Diseases (E.19.c)		[_____]

Instrument/Methods Development

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N. 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.		
Focus: Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N.02 By 1988, test instruments incorporating psychological and neurobehavioral measure will be available for use by occupational health practitioners for identification/monitoring of neurotoxic effects stemming from workplace exposure to chemical agents. (DBBS) CROSS REFERENCE: Occupational Lung Diseases Occupational Cancers Disorders of Reproduction Neurotoxic Disorders		

DISSEMINATE FINDINGS AND RECOMMENDATIONS ON WORK-RELATED DISEASES AND INJURIES

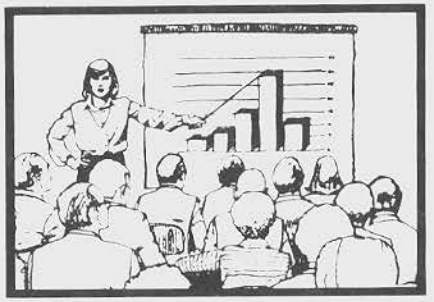
One of NIOSH's program goals is to disseminate scientific findings and appropriate recommendations to all organizations and individuals to assist them to reduce work-related diseases and injuries. Training and developing personnel for the field are essential elements of the program. NIOSH scientists disseminate findings by recommending governmental actions (recommend standards), informing the public of identified problems and their solutions (research reports), and providing service and benefits (HHEs). Transferring information into private and public organizations through education, conferences, and joint action (government, management, and labor) is an integral link in the disseminating process so as 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
Workforce Development

PROGRAM AREA: INFORMATION DISSEMINATION/DOCUMENT DEVELOPMENT

PROGRAM AREA GOAL:

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



REVELANT OBJECTIVES FOR THE NATION:

o Improved public/professional awareness

- By 1990, at least 25 percent of workers should be able, prior to employment, to state the nature of their occupational health and safety risks and their potential consequences, as well as be informed of changes in these risks while employed. (In 1979, an estimated 5 percent of workers were fully informed.)

- By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injuries.

- By 1985, all workers should receive routine notification in a timely manner of all health examinations or personal exposure measurements taken in work environments directly related to them.

- By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.

- 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.

o Improved services/protection

- By 1990, generic standards and other forms of technology transfer should be established, where possible, for standardized employer attention to such major common problems as: chronic lung hazards, mutagenic hazards, teratogenic hazards, and medical monitoring requirements.

PROGRAM OBJECTIVES:

- By FY 1986, merge health and safety document development processes.

- By FY 1986, disseminate at about the same level of output or increase it slightly.

- By FY 1986, publish 4 to 6 Surveillance Reports containing information on high-risk industries and occupations each year.

- 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, publish the results of a study of excavation, trenching, and shoring practices jointly with the National Bureau of Standards.

PROGRAM DESCRIPTION:

This is a continuing program area for NIOSH, and all 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.

In FY 1984, there should be approximately a 50 percent increase in DSDTT's output (6 criteria documents, 8 current intelligence bulletins, and 8 other publications). Within DSDTT, emphasis in FY 1984 will be placed on the following:

- Improving the quality/timeliness of NIOSH's response to DOL rulemaking efforts.
- Implementing a practical research/document development priority-setting mechanism.

- Improving the management of our document development efforts.
- Experimenting with new methods for technology transfer.

In FY 1984, DSDTT plans to finish and submit to MSHA criteria documents on asbestos, radiation, and silica which will have recommendations for standard setting. DRDS also continues to be actively involved in the dissemination of information on ways to reduce the most prevalent work-related respiratory diseases. Approximately 100 health hazard evaluations were completed by DRDS in FY 1983, each providing workers and their employers with advice on how to minimize hazards in mines and/or work related respiratory diseases.

In FY 1983, DSHEFS continued with its efforts to actively disseminate the results of its field investigations to professionals in the OSH field and to appropriate employers and employees. Such efforts included (1) submission of between 200-250 reports on completed industrial hygiene and medical studies (i.e. industrial plant health hazard evaluation and industry wide studies reports) to NTIS; (2) publication of 6 or 7 NIOSH technical reports with three in press; (3) publication of approximately 65-70 articles in technical journals with approximately 25 new manuscripts approved for publication; (4) publication of approximately 10 articles in CDC's MMWR; (5) publication of three articles in industry/labor trade journals describing hazards found and means for reducing the hazards; (6) providing approximately 250 reports to requestors of information regarding potentially hazardous industries or agents identified in NIOSH's National Occupational Hazards Survey (NOES); and (7) giving 80-90 presentations pertaining to the results of DSHEFS studies before technical, academic, and professional groups.

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.

The results of the various Institute research efforts, from all the research divisions, are made available to the general and professional publics through publication in appropriate professional journals and government reports, and in public presentations. These output documents also include the reports resulting from the HHE programs maintained by both DSHEFS and DRDS.

In developing recommended standards under the OSHA and MSHA mandates, the DSDTT draws upon the breadth of NIOSH expertise as well as advice provided by occupational safety and health professionals from other governmental 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.

Recommendations for control of occupational hazards require current awareness of emerging scientific, technical, and policy information, as well as literature searches and assessment of data in order to apprise the OSH community of emerging public health problems. DSDTT maintains the Institute's current awareness information acquisition and storage systems, including the computer data bases and the libraries. Information is disseminated through publications (e.g. criteria documents, current intelligence bulletins, technical reports, fact sheets, etc.), exhibits, and direct responses to requests by occupational safety and health professionals for technical information.

A variety of information dissemination methods were used by NIOSH in FY 1983. These methods included video tapes, books, symposia, exhibits, Current Intelligence Bulletins (CIB's), and the MMWR, in addition to presentations at scientific meetings, and publicaton of articles in technical journals. Video tapes were prepared on carpal tunnel syndrome and stress reduction. Chapters on neurotoxicity, ergonomics, and stress were authored for four books. Symposia included one on mechanical trauma to the skin with international participation at a World Health Organization meeting. In addition to poster sessions at meetings, an exhibit on relaxation techniques was held at the Cincinnati Health Fair. The MMWR was found to be useful for timely disseminaton of research findings on several occasions. A new instrument for information, the fact sheet, has been designed to provide a one-page summary on topics of current interest to occupational health professions.

Additional topics will be covered by fact sheets in FY 1984, and consideration is being given to expanding this information mechanism to other occupational health issues of interest. It is expected that the MMWR will be used more extensively in FY 1984. In FY 1984, DSDTT will work with WHO to develop joint criteria documents.

FOCUS: WORK-RELATED DISEASES AND INJURIES

OCCUPATIONAL LUNG DISEASES: In FY 1983, three papers were produced describing the results of the third round of the National Coal Study. A draft NIOSH protocol on environmental sampling relative to hypersensitivity pneumonitis in office buildings was widely circulated among employer, labor, and governmental groups. Four papers on control of the adverse health effects resulting from cotton dust were published in the Proceedings of the Seventh Cotton Dust Research Conference, and three other papers have been submitted to peer review journals. Several articles on respiratory diseases (Kaposis' Sarcoma, Silicosis) were published in CDC's Morbidity and Mortality Weekly Report. In September of 1983, DRDS played a major role in developing NIOSH's testimony to OSHA in regard to the OSHA standard for cotton dust.

In FY 1984, DRDS expects to continue it's standards development and information dissemination efforts at approximately the same level of output. Also in FY 1984, DRDS will publish a joint NIOSH/WHO monograph on diseases related to vegetable dusts. This is as a result of a NIOSH/WHO workshop held in FY 1983.

During 1983, the Division of Physical Sciences and Engineering (DPSE), made further efforts toward the effective communication and application of useful control technology to industry, submitting over 50 walk-through and in-depth technical reports to the National Technical Information Service documenting effective control technology. The NIOSH technical report on occupational health control technology for the primary aluminum industry was published, and four others are in process. Information obtained in the control technology assessment of the pesticides industry was used in the preparation of a draft of interagency guidelines on pesticides manufacturing and formulating for the World Health Organization. These guidelines are intended to help in introducing control measures before and during the operation of new industries, both in developing and in highly industrialized countries.

Also within this time period, approximately 20 speeches, 40 journal articles, and 10 contract publications were prepared to reach professionals, business people, associations, academic institutions, and unions who can ultimately take action to improve the workplace environment and prevent occupational injuries and illnesses. The revision of the NIOSH Manual of Analytical Methods, being carried out under the direction of an editor, a 12-member Technical Advisory Committee, and with contributions from more than 40 NIOSH chemists and industrial hygienists, has been a major effort in 1983. To date, approximately 50 draft revised methods have been written, in addition to draft chapters on Quality Control, Sampling, and Biological Samples. DPSE expects to have the first printing (100 priority substances), in loose-leaf form, available mid-1984.

MUSCULOSKELETAL DISORDERS: DBBS has developed video tapes dealing with carpal tunnel syndrome and Vibration White Finger Disease injuries (VWF). DBBS has also finished a supplement to the Journal of Occupational Medicine specifically on VWF. During FY 1983, DSDTT and DBBS completed a Current Intelligence Bulletin on vibration syndrome. In FY 1984, DBBS will complete a manual for occupational health/safety practitioners on how to recognize, and prevent, upper extremity musculoskeletal disorders.

Low back injuries, often due to improper manual handling of materials, are the largest single subset of musculoskeletal injuries. In FY 1981, DSR published a Work Practices Guide for Manual Lifting which contains a basis for rating the hazard of overexertion in lifting tasks.

OCCUPATIONAL CANCERS: In FY 1983, DSDTT completed two documents describing the carcinogenic effects of hazards in the workplace. Work will continue in FY 1984 on other NIOSH policy documents addressing potential workplace carcinogens (PCB's, cadmium, 1,3-butadiene).

AMPUTATIONS, FRACTURES, EYE LOSS, LACERATIONS, AND TRAUMATIC DEATHS: DSR prepares information for dissemination to employers and workers in specific industries, industry and labor organizations, OSH professionals, and organizations such as government regulatory, research, and service agencies. During 1983, DSR continued development of comprehensive safety recommendations for specific industries with higher than average worker injury and illness rates.

These documents focused on recommended safe work practices for direct use in the field by industry. 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 are nearing completion. Additionally, publications of findings from studies of hazardous energy control methods during maintenance and servicing, interlock devices and applications, fall protection during construction of buildings, and a manual on personal protective equipment selection and use for hazardous materials control were developed in FY 1983. All of the above documents are in final review stages prior to publication.

A DSR-sponsored study of excavation, trenching, and shoring practices yielded results which were published jointly with the National Bureau of Standards (NBS) in May 1983. This document provides the framework and rationale for a revised Federal construction standard on excavations.

CARDIOVASCULAR DISEASES: NIOSH will review a joint Finland/USSR report on cardiotoxic agents and their relationship to cardiovascular disease.

DISORDERS OF REPRODUCTION: In cooperation with WHO, DSHEFS in FY 1983, published a monograph on disorders of reproduction. DBBS and DSDTT completed a Current Intelligence Bulletin on the potential adverse reproductive effects of glycol ethers.

NEUROTOXIC DISORDERS: DBBS, in cooperation with WHO, held a workshop on neurotoxic disorders. A monograph will be forthcoming to be tested in a developing country through one of the WHO regional offices. DSDTT completed a criteria document on the effects of styrene on the central nervous system.

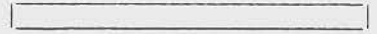
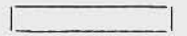
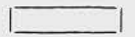
NOISE-INDUCED LOSS OF HEARING: DBBS will publish the results of a paperworkers' study. DBBS and DSDTT are revising the NIOSH criteria document on noise. This revision should be published in FY 1985.

DERMATOLOGIC CONDITIONS: DBBS held a conference on chronic trauma in FY 1983. The DSDTT criteria document on styrene also addressed the issue of skin irritation related to styrene exposure. Most DSDTT criteria documents currently being developed (welding, foundries, plant manufacturing, monohalomethanes) contain recommendations for reducing dermalotogic conditions relating to these hazards.

PSYCHOLOGIC DISORDERS: The Health Motivation Working Group will publish a strategy document in Public Health Reports. This document will discuss NIOSH's role in health promotion, acknowledging the synergism of health promotion and health protection. NIOSH and the Center for Health Promotion and Education co-sponsored with Health and Welfare, Canada, a scientific meeting of the Society for Prospective Medicine. The major program segments were aimed at presenting and analyzing the USA/Canada 1990 Health Goals; the current status and plans for worksite health promotion in both countries; and to present for public debate the recommendations of both countries for improving the scientific credibility of Health Risk Appraisal.

Program Area: Information Dissemination/Document Development

Goal: 1. Prevent work-related diseases and injuries.
2. Disseminate scientific findings and appropriate recommendations to all organizations and individuals with the need to know to assist them in acting to reduce work-related diseases and injuries; training and developing personnel for the field are essential elements of this program.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Disease Population in need: Blue-collar workers. Service workers. Farm workers.	E. 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 workers' pneumoconiosis.		
Focus: Occupational Lung Diseases (Asbestosis) Population in need: Asbestos workers and utilizers.	E.56 By 1986, make recommendations to MSHA regarding the appropriate standard for asbestos. (DSDTT) CROSS REFERENCE: Occupational Lung Diseases (E.01.a)		
Focus: Occupational Lung Diseases (Silicosis) Population in need: Miners.	E.57 By 1985, complete a criteria document for MSHA on Crystalline Silica in Mines. (DSDTT) CROSS REFERENCE: Occupational Lung Diseases (E.08.b)		

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases, Musculoskeletal Injuries, Occupational Cancers, Amputations, Fractures, Eye Loss, Lacerations, Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers. Hazardous waste-site cleanup workers.	1. By 1990, all firms with more than 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.		|_____|
		a.(e) By 1985, develop a hazardous waste comprehensive guidance manual as part of the Superfund National Contingency Plan. (DSDTT)	|_____|
		b.(f) By 1985 submit comments on eight OSHA/MSHA rulemaking efforts. (DSDTT)	|_____|
		c. By 1987, demonstrate efficiency of hazard control plan for industry. (DPSE) CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance (I.00.c) Control systems (I.00.c)	|_____|
		d.(g) By 1987, conduct pilot projects involving joint management/worker participation in monitoring and hazard control systems. (DPSE)	|_____|
Focus: Occupational Lung Disease Occupational Cancer Disorders of Reproduction Neurotoxic Disorders Cardiovascular Diseases Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	1.31 By 1986, publish response characteristics of control monitoring equipment for process control. (DPSE)		|_____|

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Hazardous waste-site cleanup workers.	1.32 By 1986, provide for collection and dissemination of information as a result of NIOSH's Superfund effort. (DSDTT)		[	]						

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Disease Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	J. By 1990, at least 25 percent of workers should be able to state the nature of their occupational health and safety risks and their potential health consequences, as well as be informed of changes in these risks while employed.		
		a. By 1987, optimum message strategies for informing workers of occupational cancer and other chronic disease risks will have been formulated and verification studies of their effectiveness begun. (DBBS)	
		b. By 1985, disseminate results of studies on control monitoring of workplace atmospheres. (DPSE)	
		c. By 1985, develop improved breath-analysis technique which will allow for more extended use of non-invasive biological monitoring techniques, thus providing additional workplace exposure information to control and prevent exposures. (DPSE) CROSS REFERENCE: Sampling/Analysis (I.17)	
		d. By 1987, develop and evaluate gas or aerosol direct-reading instrumentation. (DPSE)	
		e. By 1986, the HHE program will disseminate at least: CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance (Q.01.d)	

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
		(i) 16 MMWR articles; (DSHEFS)								
		(ii) three quarterly summaries; (DSHEFS)								
		(iii) 12 professional or trade journal articles; (DSHEFS)								
		(iv) four documents aimed specifically at State and local health departments mainly dealing with dermatitis, heavy metal poisoning and lung diseases. (DSHEFS)								
		f. By 1988, the HHE program will disseminate at least: CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance (Q.01.i)								
		(i) 18 MMWR articles; (DSHEFS)								
		(ii) three quarterly summaries; (DSHEFS)								
		(iii) 15 professional or trade journal articles; and (DSHEFS)								
		(iv) six documents aimed specifically at State and local health departments, mainly dealing with dermatitis, heavy metal poisoning and lung diseases. (DSHEFS)								

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	K. By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injuries.		[ ]							

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Disease Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. Young workers (under 25 years of age).	K.04 By 1989, incorporate occupational risk factors into health risk appraisals. (OPPE)		├──────────────────────────────────────┤
		a. By 1987, 3 HRA's will have been tailored for specific working groups. (OPPE)	├──────────────┤

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.		├──────────────────────────────┤
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M.01 By 1987, furnish "how-to" manuals as aids in recognizing hazardous conditions. (DBBS) CROSS REFERENCE: Musculoskeletal Injuries Amputations, Fractures, Eye Loss Lacerations, and Traumatic Deaths		├──────────┤

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N. 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.		
Focus: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N.01 By 1986, a listing of tasks performed by occupational health nurses which have been shown to be associated with a reduction in the severity and number of injuries in industry will be available for O.H.N.'s, management and educators. (DSR) CROSS REFERENCE: Musculoskeletal Injuries Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths		

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Disease Occupational Cancers Disorders of Reproduction Neurotoxic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	P. By 1990, generic standards and other forms of technology transfer should be established where possible, for standardized employer attention to such major common problems as: --chronic lung hazards, --carcinogenic hazards, --mutagenic hazards, --teratogenic hazards, --and medical monitoring requirements.		
		a. By 1986, merge health and safety document development processes. (DSDTT)	
		b. By 1985 publish the following: --the revised Pocket Guide and Guidelines, --six criteria documents/updates, --eight current intelligence bulletins, and --eight other documents (fact sheets, etc.) (DSDTT)	
		c. By 1986, increase the DSDTT Document Development Branch output 20 percent over FY 1984. (DSDTT)	

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders	R. By 1985, ongoing occupational health hazard/illness/injury coding system, survey and surveillance capability should be developed, including identification of workplace hazards and related health effects, including cancer, coronary heart disease, and reproductive effects. This system should include adequate measurements of the severity of work-related disabling injuries. CROSS REFERENCE: Surveillance Work Force Development		|_____|
Population in need: Blue-collar workers. Service workers. Farm workers.		a. By 1984, complete series of training for State health department personnel for industry/occupation coding of death certificates and establishment of quality control programs. (DSHEFS)	|____|
		b. By 1984, complete baseline prevalence measures and identification of unusual patterns of disease and disability by occupation and industry using the NCHS Health Interview Survey data. (DSHEFS)	|____|
		c. By 1984, complete adoption of the Sentinel Health Events (Occupation) (SHE(O)) for use in SCANS and other State-related projects. (DSHEFS)	|____|

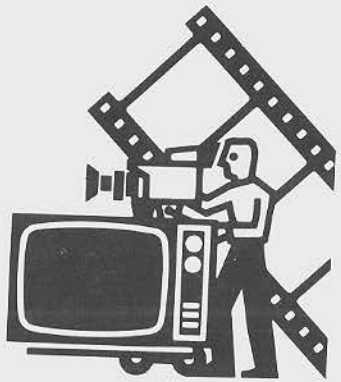
Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T. By 1985, a program should be developed to: (1) follow-up individual findings from health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and (2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational diseases and injury.									

Information Dissemination/Document Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Occupational Lung Disease Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.05 By 1985, produce a long-range plan with specific objectives, progress indicators, and resource requirements through 1989. (DSDTT)		[ ]							

PROGRAM AREA: 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 acting to reduce work-related disease and injuries; training and developing personnel for the field are essential elements of this program.

RELEVANT OBJECTIVES FOR THE NATION:

o Improved public/professional awareness

- By 1990, at least 25 percent of workers should be able, prior to employment, to state the nature of their occupational health and safety risks and their potential consequences, as well as be informed of changes in these risks while employed. (In 1979, an estimated 5 percent of workers were fully informed.)

- By 1985, workers should be routinely informed of lifestyle behaviors and health factors that interact with factors in the work environment to increase risks of occupational illness and injuries.

- By 1985, all workers should receive routine notification in a timely manner of all health examinations or personal exposure measurements taken on work environments directly related to them.

- By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.

- 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.

- 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.

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 engineering curriculum for four major colleges of engineering.

- 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.

- By FY 1986, provide a deferral of coding costs for selected States.

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 workforce. NIOSH is a prevention-oriented research institute responsible for identifying OSH hazards, conducting research and field studies on these problems, and conveying the results to OSHA, MSHA, other Federal agencies, and to the OSH professional community at large. Work force development activities are based on the premise that these results are of limited value unless they are actually applied to the protection of the worker.

NIOSH, as a research institute, has two major objectives: 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 objective 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 consistent with the DHHS 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 within 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 1982, the ERC programs, coupled with the Institute's own direct training program, provided training to over 12,000 OSH practitioners.

In FY 1983, special customized training courses were presented to the U.S. Coast Guard, to the MSHA Training Academy, and to the International Operations of the IBM Corporation in Paris, France.

The effort, begun in FY 1982, to build and maintain an OSH competency at the State level was continued. A beginning OSH course for State health agency personnel was presented to the States of Georgia, Washington, Oregon, and New Mexico. A follow-up advanced course in industrial hygiene was presented to the State of Georgia. Consultation and training assistance in response to requests from labor unions continued as a high priority. Training programs were presented to the American Federation of Government Employees and to the International Molders and Allied Workers Union. In addition, DTMD and DSHEFS collaborated on developing and presenting training sessions to the Joint Labor/Management Health Safety Committee of the Oil, Chemical, and Atomic Workers International Union (OCAW). The vocational-industrial arts OSH training program was presented to vocational education teachers and supervisors in the Northeast Region (Boston, Massachusetts), in the Mid-Atlantic Region (Dover, Delware), and in Tampa, Florida.

In FY 1984, 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, including Strategies and Statistics for OSH Studies. Specialized training to outside organizations will include State MSHA, OSHA, and DHHS agencies. Training consultation to foreign governments and accommodation of foreign visitors in NIOSH courses will continue.

CURRICULUM DEVELOPMENT

It is through the assimilation and correlation of facts and information produced through 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 science teachers to the hazards of their working environment has resulted in the training of over 100,000 secondary school teachers in 5 years. Not only has this program been extremely cost beneficial but its impact has resulted in major curriculum changes in recently published high school science texts.

Work began on the design of a training program for State and local health agency personnel based on the ten leading work-related diseases and injuries. Projects were initiated with schools of engineering faculty to develop OSH materials for use in upper-level undergraduate engineering courses. An OH nursing curriculum needs assessment study was conducted to help determine the curriculum for an advanced OH nursing course. Work on the revised edition of the NIOSH training syllabus continued.

The major thrust in FY 1984 will be the development of educational materials in conjunction with the NIOSH research divisions based on significant research outputs and/or special training needs for OSH personnel.

The activities proposed represent translation of current high-priority Institute research projects into easily utilizable information for dissemination to broader audiences than the audience for which most research reports are traditionally designed. Programs which will be continued in FY 1984 include the pilot testing of the confined spaces entry program, pilot testing of the State agency top ten OSH problems course, videotape research seminar programs, and additional chapters for the NIOSH training syllabus. New starts will include development of OSH educational modules for use in schools of business, an advanced course in OH nursing, and a course in recognition of OSH hazards for allied health professionals and paraprofessionals, such as collateral duty safety officers, union stewards, and environmental technologists.

HAZARDOUS WASTE TRAINING PROGRAM

This program is a major part of the Superfund Interagency Agreement between NIOSH and EPA and will provide the curriculum materials necessary for 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, in operational hazardous waste treatment and disposal sites, and during emergency response to spills of hazardous materials on and off site.

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 will be incorporated into the DSDTT Guidance Document and will serve as the major building blocks for development of the training package. This package will focus on the development of curriculum materials designed to prepare personnel for entry into situations where the potential for exposure to hazardous wastes exist. The program to be developed will be field tested to assure that it meets the needs of personnel who need to receive this training. The total training program will consist of two parts. Part I will result in the development of a train-the-trainer program for management and health professionals and will deal with the transfer of technology resulting from the development of the guidance document. Part II will consist 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 emergency spills course, the uncontrolled waste site courses, and for the train-the-trainer course. In FY 1984, course instructor guides, student texts, and pilot tests are scheduled for all three courses.

EDUCATIONAL RESOURCE DEVELOPMENT

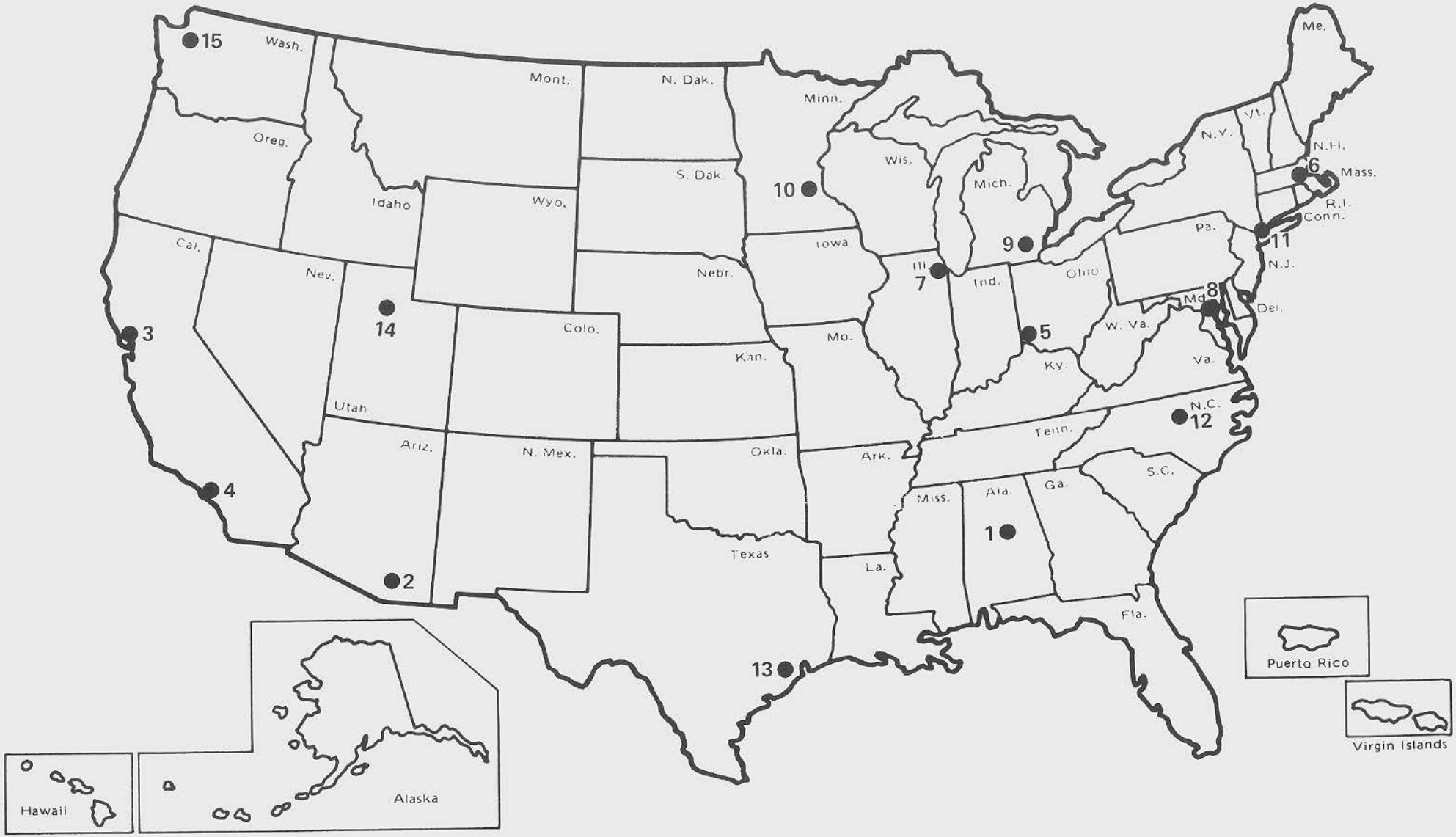
The OSH Act calls for an adequate supply of resources; i.e., qualified personnel and educational/informational programs to carry out the purposes of the Act. The educational resource development activity assesses these resource requirements and continually evaluates current programs. Ongoing assessment 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 6 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 John Hopkins University.

In FY 1983, the Institute continued to guide, administer, and monitor the training project grants and the fifteen Educational Resource Center grants. The first International Symposium on Occupational Health Nursing Practice, Research and Education was held with resounding success. A videotape program highlighting major symposium themes was produced for wide dissemination. 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 preliminary study to determine OSH training/curriculum routes in the College of Engineering was conducted at the Georgia Institute of Technology. Additional contacts were established with engineering schools and professional engineering societies. Proceedings of the Second Control Technology Workshop and Position Papers for the Third Control Technology Workshop were completed. A train-the-trainer workshop for faculty members from various schools of business was conducted at the University of North Carolina School of Public Health.

Figure 15

•NIOSH EDUCATIONAL RESOURCE CENTERS•



1 University of Alabama (Birmingham)
2 University of Arizona
3 University of California (Berkeley)
4 University of California (Irvine)
5 University of Cincinnati
6 Harvard University
7 University of Illinois
8 Johns Hopkins University
9 University of Michigan
10 University of Minnesota
11 Mt. Sinai School of Medicine
12 University of North Carolina
13 University of Texas
14 University of Utah
15 University of Washington

In FY 1984, the OSH Labor Market Survey Contract awarded in FY 1982 will be continued. The Nursing Symposium proceedings will be published, an invitational Nursing Educational Directions Conference will be planned, and a steering committee organized. The Engineering Education Enhancement Program and the Business Administration Enhancement Program (known as Project Minerva) will be continued, along with the training grant program, the OSH career guidance program, and the educational consultation program.
In FY 1983, DBBS provided technical assistance and review to DTMD in the production of videotapes dealing with three of the "Top 10" occupational problems: musculoskeletal disorders, noise-induced hearing loss, and psychologic disorders. Other training material prepared dealt with prevention of harmful effects of radiation, hazardous vibration, and heat stress.

DBBS staff will continue to present lectures in NIOSH training courses, as has been the practice for many years. The topics covered currently are ergonomics, heat stress, hearing conservation, hearing protection, psychosocial stress, and various aspects of toxicology such as industrial carcinogens and teratogens.

In FY 1983, a Control Technology Engineering Education Steering Committee was established. The initial meeting was attended by representatives of DTMD, DPSE, and DSR. This meeting established a Control Technology Engineering Education (CTEE) Working Group to develop a 5-year work plan. In FY 1984, the CTEE Working Group will develop specific program/project milestones which will be incorporated into the DTMD FY 1985 Work Force Development Plan.

In FY 1984, DTMD and DPSE will be collaborating 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 will jointly develop and deliver 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 1983, a joint effort led by DSHEFS, in cooperation with DTMD and the Center for Professional Development and Training (CPDT), was initiated to design a track in occupational safety and health to be incorporated into the existing CPDT Applied Epidemiology Course. In FY 1984 this material will be further developed for consideration as a DTMD speciality course/workshop.

In FY 1983, a meeting was held by DTMD and DSHEFS to explore initiating a joint project for occupational health training of general medical practitioners. In 1984, a project will be initiated to determine the feasability of increasing primary health care providers' awareness of occupational health issues. Consideration will also be given to incorporating the use of the "Sentinel Occupational Health Event" surveillance mechanism into this training. This project addresses the 1990 Objective which states that, "by 1990 at least 70 percent of the 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 1983, DSDTT 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 1984, they will also produce companion training programs for selected technology transfer documents, e.g., Current Intelligence Bulletins (CIB's), Criteria Documents, and Hazard Alerts.

In FY 1983, DRDS developed an instructional package for training X-ray B-readers. In FY 1984, DTMD will distribute this package through the ERC continuing education/outreach network.

FOCUS: WORK-RELATED DISEASES AND INJURIES

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 initial draft of an instructor resource training guide for managers of respiratory protection programs and for the operation, care, and maintenance of the self-contained breathing apparatus (SCBA) is undergoing review by the NIOSH research divisions.

MUSCULOSKELETAL DISORDERS: Work will be initiated on a manual preventing upper extremity disorders such as carpal tunnel syndrome, epicondilitis, thoracic outlet syndrome, tenosynovitis, and cervical brachial disorders. 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.

AMPUTATIONS, FRACTURES, EYE LOSS, LACERATIONS, AND TRAUMATIC DEATHS: 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 Workspaces" 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 and will be available in early 1984. In FY 1983, DSR and DTMD produced a safety training course package for lift truck operators, including a course manual and slide/tape modules. In FY 1984, the materials will be distributed as a NIOSH course package.

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 1984. In FY 1984, the materials will be distributed as a NIOSH course package. In FY 1984, a worksite stress management manual will be developed as a joint DBBS-DSDTT-DTMD project. The "Health Issues of VDT Use" training course developed jointly by DBBS and DTMD was pilot tested with trainees who supervise VDT operations in government and private sector work settings.

Program Area: Work Force Development

Goal: 1. Prevent work-related diseases and injuries.
2. Disseminate scientific findings and appropriate recommendations to all organizations and individuals with the need to know to assist them in acting to reduce occupationally related health problems; training and developing personnel for the field are essential elements of this program.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Hazardous chemical cleanup workers, health industry, and hazardous waste-site cleanup workers.	H. By 1985, 50 percent of all firms with more with 500 employees should have an approved plan of hazard control for all new processes, new equipment, and new installations.		
		a. By 1987, develop three instructional programs on the problems related to the disposal of hazardous wastes: emergency spills, uncontrolled waste-sites, and a supervisory train-the-trainer workshop. (DTMD)	
		b. By 1987, implement hazardous waste training-program delivery. (DTMD)	

Work Force Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	I. 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.		
		a.(e) By 1985, develop a 5-year plan in time for FY 1985 planning. (DPSE)	
		b.(d) By 1985, document control practices in two growing or emerging processes. (DPSE) CROSS REFERENCE: Health Hazard Evaluation/ Technical Assistance (I.00.d) Control Systems (I.00.d)	
		c.(f) By 1986, publish research results and develop protocols for inclusion in engineering curricula. (DTMD)	
		d.(g) By 1985, publish research results of ventilation and process control monitoring for case studies and design guides in graduate engineering curricula. (DPSE)	
		e.(h) By 1985, develop IPA positions for engineering school faculty. (DPSE)	
		f.(i) By 1986, publish developed hazard control plan logic for use in engineering curricula. (DPSE)	

Work Force Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		g.(j) By 1987, develop contacts with engineering and scientific professional societies. (DPSE)	
		h.(k) By 1986, encourage publication of research results in engineering, chemistry and physics journals. (DPSE)	
		i.(l) By 1987, document control practices in four emerging or growing industries. (DPSE)	
		j.(m) By 1987, initiate revision of selected engineering textbooks depending on IPA recruitment. (DPSE)	
		k.(n) By 1987, incorporate OSH educational content into the engineering curriculum for four major colleges of engineering. (DPSE)	

Work Force Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	J. By 1990, at least 25 percent of workers should be able, prior to employment, to state the nature their occupational health and safety risks and their potential consequences, as well as be informed of changes in these risks while employed.	a.(g) By 1987, present vocational/industrial arts OSH train-the-trainer for secondary school teachers in four State departments of education. (DTMD)	
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Occupational Cancers Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	M. By 1990, all managers of industrial firms should be fully informed about the importance of and methods for controlling human exposure to the important toxic agents in their work environments.	a. By 1987, incorporate OSH educational content into business curriculum of four major colleges of business administration. (DTMD) b. By 1987, conduct pilot projects involving joint management worker participation in monitoring and hazard control systems. (DPSE)	

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	N. 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 an understandable manner.		
		a. By 1987, provide information on compound identity and mixture composition required by many NIOSH studies for producing credible results. (DPSE)	
		b. By 1986, provide educational consultation and deliver pilot retraining programs to 15 State health departments. (DTMD)	
		c. By 1986, develop an Occupational Health and Applied Industrial Hygiene Course for sanitarians and other State health department personnel. (DTMD)	
		d. By 1987, complete the OSH Labor Market Survey of Supply/Demand Characteristics. (DTMD)	
		e. By 1986, produce 2,000 graduates from NIOSH-supported OSH academic programs. (DTMD)	
		f. By 1986, provide academic programs in the core and allied OSH disciplines for 6,000 trainees through the ERC and small training-grant mechanisms. (DTMD)	

Work Force Development (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
		g. By 1986, present continuing education programs to 35,000 OSH practitioners via NIOSH direct training courses and the Educational Resource Centers. (DTMD)	
Focus: Occupational Lung Disease Population in need: Textile workers.	N.03 By 1987, approve/re-approve applications from 100 training organization for provision of pulmonary function testing training courses. (DTMD)		
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	R. By 1985, an ongoing occupational health hazard/illness/injury coding system, survey and surveillance capability should be developed, including identification of workplace hazards and related health effects including cancer, coronary heart disease, and reproductive effects. This system should include adequate measurements of the severity of work-related disabling injuries. (DSHEFS) CROSS REFERENCE: Surveillance Information Dissemination/ Document Development		
		a. By 1984, complete series of training for State health department personnel for industry/occupation coding of death certificates and establishment of quality control programs. (DSHEFS)	

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
		b. By 1984, complete baseline prevalence measures and identification of unusual patterns of disease and disability by occupation and industry using the NCHS Health Interview Survey data. (DSHEFS)		—						
		c. By 1984, complete adoption of the Sentinel Health Events (Occupation) (SHE(O)) for use in SCANS and other State-related projects. (DSHEFS)		—						

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).

Management principles used by NIOSH include long-term planning; management-by-objectives; program hierarchy; program evaluation and review techniques; planning, programming, and budgeting systems; project management; and control, feedback, and management-by-exception.

1. Long-Term Planning entails establishing objectives and programs in excess of 1 year (generally), and focuses on an integrated approach to achieving goals, with flexibility to respond to opportunities in a changing environment.
2. Management-by-Objectives (MBO) for which a systematic approach depends on the following characteristics: (a) Managers at all levels set objectives, (b) supervisors and subordinates agree on work plans, (c) project plans are developed that identify the activities and organizational efforts necessary to achieve the objectives, and (d) objectives are set again for the future--and the process is repeated.
3. Program Hierarchy requires that each objective support the next higher objective and, conversely, that each upper objective is the guide for objectives at the next lower level.
4. Program Evaluation and Review Technique (PERT) is applied in NIOSH to define critical milestones and costs for each project for each quarter which, if slipped, reflect probable slips in the final report.
5. Planning, Programming, and Budgeting Systems (PPBS) is an approach to objective-oriented management. Budgeting in NIOSH focuses on person years and non-personnel funds. The sequence in establishing programs is to: (a) decide what needs to be done, (b) consider alternative ways to do it, (c) establish the costs of alternatives, and (d) set the best alternatives.
6. Project Management Goals are the commitments to milestones and project completion, and must include: (a) the project organization chart (WHO), (b) the work-breakdown structure (WHAT), (c) the assignment of tasks (WHO does WHAT), (d) an account code number structure, (e) a project schedule (WHEN), (f) person years and cost estimates (HOW MUCH), (g) space, facilities, and equipment plan, and (h) a protocol (including safety considerations).
7. Control, Feedback, and Management-by-Exception: In NIOSH, milestones and costs are the indicators of action. A missed milestone leads to analysis of the variance from the plan; this feedback of analysis is then considered as an exception in the operation of the Institute and requires managerial attention.

PROGRAM AREAS: Institute Administration
Division, Region, and Grants Administration

PROGRAM AREA: 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 refine a more rational approach (purpose precedes action) to 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. The administration program is an Institute-wide system for managing over 350 projects. These components--planning, execution, and evaluation--provide necessary financial and program information systematically organized into significant and measurable program elements. Administering the NIOSH program in this manner produces a sense of total commitment to the highest principles of public stewardship. NIOSH's management system monitors three dimensions of accountability--resources (input), organization (who is accountable), and results (output).

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 1 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, automated data processing, and word processing services 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 one occupational safety and health expert. 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. Thus, regional offices reflect the entire Institute program. The regional offices, in addition to the HHE program, constitute the "frontline" of service in occupational safety and health.

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. It also 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. In this regard, research programs at universities provide an additional opportunity for students to become familiar with issues such as work-related diseases and injuries. The grants program performs a valuable role for NIOSH in that it complements the Institute's research efforts by supporting research NIOSH does not perform.

INTERNATIONAL HEALTH

Interest in work-related diseases and injuries has grown dramatically throughout the world. NIOSH has a cooperative agreement with WHO which has 3 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.

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.

FOCUS: WORK-RELATED DISEASES AND INJURIES

On January 21, 1983, NIOSH published a list of the ten leading work-related diseases and injuries. Three criteria were used to develop the list: the frequency of occurrence, severity in the individual case, and amenability to prevention. The list was suggested with three purposes: 1) to encourage deliberation and debate among professionals about the major problems in the field of public health, 2) to assist in setting national priorities for efforts to prevent health problems related to work, and 3) to convey to a diverse audience the concerns of the leadership of NIOSH and the focus of the Institute's activities. 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. NIOSH is planning to hold a national conference in FY 1985 to review control strategies for the top five. Below is a discussion of specific actions taken for each of the ten leading work-related diseases and injuries.

OCCUPATIONAL LUNG DISEASES: In 1982, occupational lung disease was designated the leading work-related disease problem. A working group comprising the Institute's foremost experts in this field was established in 1983. It is developing a detailed strategy for the control of asbestosis, byssinosis, silicosis, and coal workers' pneumoconiosis.

MUSCULOSKELETAL INJURIES: In 1981, NIOSH published a Work Practices Guide for Manual Lifting and produced and distributed two videotapes oriented to the prevention of such injuries. Research continues on the epidemiology and prevention of back injuries occurring during complex lifting procedures. NIOSH also has a program that addresses musculoskeletal injuries to the leg, ankle, and foot. In 1982, staff of the Institute met regularly with officials of the insurance industry and OSHA to develop collaborative efforts for the prevention of musculoskeletal injuries. Also in 1982, the category of musculoskeletal injuries was designated one of the leading work-related diseases and injuries.

The Director of NIOSH established a working group on musculoskeletal injuries in the summer of 1983. This group is to come up with a detailed strategy for the control of these injuries.

OCCUPATIONAL CANCERS (OTHER THAN LUNG): In light of the life-threatening nature of carcinogens found in the workplace, NIOSH has supported OSHA's policy of expediting standard-setting for carcinogens. With the Institute's active support, OSHA developed and promulgated a generic carcinogen standard in 1981.

In 1982, NIOSH listed occupational cancer among the leading work-related diseases and injuries. In the summer of 1983, the Director of NIOSH established a working group on occupational cancers. This group is to develop a detailed strategy for the control of these cancers.

AMPUTATIONS, FRACTURES, EYE LOSS, LACERATIONS, AND TRAUMATIC DEATHS: In cooperation with the Consumer Product Safety Commission, NIOSH has augmented the National Electronic Injury Surveillance System to provide current (within 10 days) national estimates of occupational injuries treated in hospital emergency rooms. This system will help in defining more precisely the incidence of workplace injuries. The Institute has also published documents containing recommended standards for the prevention of certain traumatic deaths and injuries. Subjects of these documents include hot environments; emergency egress; benzoyl peroxide and explosives; coal gasification; and confined spaces. In addition, the Institute convened the Symposium on Occupational Safety, Research, and Education in 1980. In 1982, amputations, fractures, eye loss, lacerations, and traumatic deaths were listed in NIOSH's suggested list of leading work-related diseases and injuries. In the summer of 1983, the Director of NIOSH established a working group on this category of injuries. This group is to develop a detailed strategy for the control of these injuries and deaths.

CARDIOVASCULAR DISEASES: In 1982, the Institute designated cardiovascular diseases as one of the leading work-related diseases and injuries. A working group will be established in FY 1984 to prepare a control strategy for these diseases.

DISORDERS OF REPRODUCTION: In 1980, the Institute issued a program announcement which asked for research grant applications on reproductive effects from occupational hazards. In 1982, it designated disorders of reproduction as one of the leading work-related diseases and injuries. A working group will be established in FY 1984 to prepare a control strategy for these disorders.

NEUROTOXIC DISORDERS: In 1982, the Institute designated neurotoxic disorders as one of the leading work-related diseases and injuries. In 1983, WHO and NIOSH held a joint workshop on neurotoxic disorders. They will publish a joint monograph as a result in 1984. NIOSH will designate a working group in 1984 to prepare a control strategy for these disorders. NIOSH also participates in the National Toxicology Program.

NOISE-INDUCED LOSS OF HEARING: In 1975, there were a estimated 462,000 cases of work-related loss of hearing. MSHA set noise standards for underground mines in 1971 and for surface mines in 1972. In 1973, NIOSH published a recommended standard for occupational exposure to noise. The Institute tested hearing protectors in 1976 and issued a compendium that describes the noise attenuation properties of commercially available hearing protectors. This compendium will be updated.

In 1982, NIOSH completed a survey of the effectiveness of earplugs worn by workers at the worksite. Tests of 420 workers at 15 individual plants indicated that 50 percent of the workers received less than half the potential protection demonstrated in laboratory testing of earplugs. Also in 1982, noise-induced loss of hearing was placed on the list of leading work-related diseases and injuries. In 1984, NIOSH will convene a working group to develop a strategy to control this impairment.

DERMATOLOGIC CONDITIONS: In 1976, there were an estimated 70,000 cases of dermatitis involving compensation in the United States. In 1981, there were 51,200 cases according to data from the Department of Labor's Bureau of Labor Statistics. Thus, it appears that Objective 4 of the 1990 Objectives has already been achieved.

In 1973, NIOSH recommended a standard for occupational exposure to ultraviolet radiation because of problems with skin cancer, dermatitis, and burns. In 1977, NIOSH published four documents--on methylparathion, refined petroleum solvents, fibrous glass, and inorganic nickel--recommending standards for occupational exposure to chemical agents that cause dermatitis. In 1978, the Institute recommended a standard for asphalt fumes and coal tar products. As yet, standards for these agents have not been promulgated by OSHA.

In 1980, NIOSH issued a request for applications for research grants relating to occupational dermatological problems, and the Institute is currently funding 10 research projects investigating these problems. NIOSH's staff has conducted research on cutaneous hazards and evaluated protective clothing and skin creams for their degree of protection. In 1982, dermatological conditions were included on the list of leading work-related diseases and injuries. In 1983, NIOSH hosted the first conference to be held on hazards of mechanical trauma to the skin. In 1984, NIOSH will designate a working group to develop a strategy to control these conditions.

PSYCHOLOGIC DISORDERS: In 1982, NIOSH established a working group on "health motivation" to plan a program that would address behavioral factors and the interaction of these factors with toxic agents found in the workplace. The Department of Health and Human Services established a health promotion task force to consider the utility of the worksite as a place in which to dispense health information. NIOSH has begun to develop the capability of providing individual health risk appraisals to workers, incorporating job-specific information on risks. This effort is expected to extend the benefits of individual health risk appraisals to blue-collar and service workers who, to date, have not been included in most health promotion programs. In 1982, NIOSH included psychologic disorders on the list of the leading work-related diseases and injuries. In 1984, it will designate a working group to develop a strategy to control these disorders.

Regional Offices

Figure 16

REGION VI:
Louisiana
Arkansas
Oklahoma
Texas
New Mexico

REGION VII:
Nebraska
Kansas
Iowa
Missouri

REGION VIII:
North Dakota
South Dakota
Montana
Wyoming
Colorado
Utah

REGION IX:
California
Nevada
Arizona
Hawaii
Guam
American Samoa

REGION X:
Alaska
Washington
Oregon
Idaho

REGION I:
Maine
Vermont
New Hampshire
Massachusetts
Connecticut
Rhode Island

REGION II:
New York
New Jersey
Puerto Rico
Virgin Islands

REGION III:
Pennsylvania
Maryland
District of Columbia
Delaware
Virginia
West Virginia

REGION IV:
Kentucky
Tennessee
North Carolina
South Carolina
Mississippi
Alabama
Georgia
Florida

REGION V:
Illinois
Indiana
Michigan
Minnesota
Ohio
Wisconsin

PROGRAM AREA: DIVISION, REGION, AND GRANTS ADMINISTRATION

PROGRAM AREA GOAL:

Administer NIOSH Divisions, Regions, and Grants with a sense of total commitment to the highest principles of public stewardship.

PROGRAM DESCRIPTION:

The Office of the Deputy Director has responsibility for managing the Institute's research grants program. Research grants enlist the resources of America's colleges and universities as well as State and local governments in this effort. Nationally renowned scientists, scholars, and investigators provide a diversity of expertise needed to develop a credible research base to address OSH problems. Support to a wide variety of institutions ensures many sites of expertise, as well as many innovative approaches to solving these problems.

Thus, the purpose of the research grants program is to encourage established researchers at universities and elsewhere to focus greater attention on OSH problems and to support the long-term integrity of the field by maintaining a stable science base that contributes to the development of the available pool of scientific and medical experts. In this regard, research programs at universities provide an additional opportunity for students to become familiar with OSH needs and issues that would not be derived from contract research conducted at non-university facilities.

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. Thus, the Office of the Deputy Director reflects the entire Institute program and represents an important link in the transfer of research conclusions into practical application in the workplace.

The Division/Office Directors are responsible for managing projects consistent with the Institute's goals. They also are responsible as stewards of their resources, productivity, and the safety and health of their employees as related to work.

FOCUS: WORK-RELATED DISEASES AND INJURIES

OCCUPATIONAL LUNG DISEASES: Two Divisions have programs that identify changes in occupational lung diseases that may be significant. These Divisions are DSHEFS and DRDS, and they monitor trends through their surveillance programs and detect changes in the status of occupational safety and health through their health hazard evaluations. The Regional Officers offer an adjunct to this evaluation program.

Three Divisions conduct research into the etiology of lung diseases. DRDS studies dust-related diseases, DSHEFS studies lung cancer, and DBBS studies occupational asthma. Research grants offer a meaningful addition to this program. Two Divisions conduct research into the control of lung diseases. DPSE oversees engineering controls and monitoring techniques for airborne contaminants. DSR tests and certifies respirators. A request-for-applications has been circulated for research grants on respirators.

Two other Divisions distribute NIOSH findings related to lung diseases. DSDTT issues recommendations to regulating and professional organizations and responds to inquiries for information. DTMD develops curricula and administers training programs.

MUSCULOSKELETAL INJURIES: DSHEFS interprets trends from Social Security disability awards in the area of musculoskeletal injuries. DSHEFS also attends to changes in HHE requests in this area. DSR interprets their injuries from the SDS and NEISS systems. DBBS conducts most of the study into the etiology of these injuries. DSHEFS and DSR conduct some of this research, too. Ergonomics, a strategy for controlling musculoskeletal injuries, is centered in DBBS. Both DSDTT and DTMD see that information is disseminated on preventing these injuries. DBBS and DSR established a working group to coordinate their research activities. They will concentrate on musculoskeletal injuries and ergonomics as an intervention strategy.

OCCUPATIONAL CANCERS: DSHEFS identifies trends in occupational cancer from two of its programs: surveillance and HHE's. DBBS uses toxicological methods to identify potential workplace carcinogens. Both DSHEFS and DBBS investigate the etiology of occupational cancers. DBBS also evaluates the safety of substitutes for chemical carcinogens. DPSE is responsible for assessing control technology and providing sampling and measurement methods for known carcinogens. DSDTT recommends standards on carcinogens, and DTMD conducts training for professionals who are responsible for controlling carcinogens.

AMPUTATIONS, FRACTURES, EYE LOSS, LACERATIONS, AND TRAUMATIC DEATHS: DSR monitors trends in injuries from two primary sources, SDS and NEISS. It also monitors a Fatal Accident Circumstances and Epidemiology program that helps to spot possible relationships between hazards and trauma deaths. DSR also conducts research into the etiology of injuries and deaths.

NEUROTOXIC DISORDERS: The NIOSH Working Group on National Toxicology Program (NTP) activities, consisting of representatives from DBBS, DSHEFS, DRDS, and DSDTT, met quarterly during FY 1983. Material was supplied to the NTP on NIOSH's toxicology program, and collaborative research was continued in the areas of reproductive effects, metabolism, and chemical carcinogenesis. NIOSH furnished chemical managers to NTP for the following chemicals: ethylene oxide, zinc oxide, vanadium pentoxide, and ethyl benzene.

Program Area: Institute Administration
Division, Region and Grants Administration

Goal: 1. Prevent work-related diseases and injuries.
2. Administer NIOSH programs with a sense of total commitment to the highest principles of public stewardship.

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	D. By 1990, the incidence of compensable occupational dermatitis should be reduced to about 60,000 cases.		
Focus: Dermatologic Conditions Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.	D.12 By 1987, stabilize research grants support for dermatologic projects at academia and other eligible institutions. (OD)		

Institute Administration, Division, Region and Grants Administration (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: OBJECTIVE FOR THE NATION Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders	T. By 1985, a program should be developed to: (1) follow-up individual findings from health evaluations, reports from unions and management, and other existing surveillance sources of clinical and epidemiological data; and (2) use the findings to determine the etiology, natural history, and mechanisms of suspected occupational diseases and injury. CROSS REFERENCE: Disorders of Reproduction Neurotoxic Disorders		
Population in need: Blue-collar workers. Service workers. Farm workers. White-collar workers.		a. By 1985, develop and improve (over 1983 activities) procedures for establishing research priorities. (DSHEFS)	
		b. By 1984, complete development of system for inputting priority outputs from union record data, NTP, surveillance, PRAB, etc. (DSHEFS)	
		c. By 1985, complete development of inventory of union records for use in identifying high risk occupations/ industries. (DSHEFS)	

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations and Traumatic Deaths Disorders of Reproduction Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Institute researchers and managers. Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.06 By 1987, NIOSH will have developed 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. (OD)									

Institute Administration, Division, Region and Grants Administration (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Institute researchers and managers. Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.07 By 1987, NIOSH will have explored and developed innovative management techniques which will further refine a more rational approach (purpose precedes action) to the decisionmaking process of the Institute. (OD)									

Institute Administration, Division, Region and Grants Administration (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Institute researchers and managers. Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.08 By 1989, establish a program structure and budget that is classified by objectives which are projected five years into the future. (OD)									

Institute Administration, Division, Region and Grants Administration (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Institute researchers and managers. Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.09 By 1989, publish annually a 5-year program plan that displays a logic to achieve objectives. (OD)		├──────────────────────────────┤

Institute Administration, Division, Region and Grants Administration (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83 84 85 86 87 88 89 90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Institute researchers and managers. Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.10 By 1989, be able to insure that no more than 25 percent of projects to be initiated in Fiscal Years 1985-1988 exceed their budget or schedule. (OD)		

Institute Administration, Division, Region and Grants Administration (continued)

Focus Population in Need	Objectives	Indicators	Fiscal Years 83	84	85	86	87	88	89	90
Focus: Occupational Lung Diseases Musculoskeletal Injuries Occupational Cancers Amputations, Fractures, Eye Loss, Lacerations, and Traumatic Deaths Cardiovascular Diseases Disorders of Reproduction Neurotoxic Disorders Noise-Induced Loss of Hearing Dermatologic Conditions Psychologic Disorders Population in need: Institute researchers and managers. Blue-collar workers. Service workers. Farm workers. White-collar workers.	T.11 By 1989, determine the extent to which objectives, established in Fiscal Years 1984-1988 were met. (OD)		├	─	─	─	─	─	─	┤

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