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FINAL PERFORMANCE REPORT

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Ergonomics Education for Union Health Professionals

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Ergonomics Education for Union Health Professionals

ABSTRACT

The Workplace Health Fund has successfully established a network of five institutions offering a 32-hour training program on basic ergonomics principles (Ergonomics I). Topics covered included Repetitive Motion Injuries and Illnesses; Manual Material Handling; Tool and Fixture Design; Work Organization; Technology and Design; and Office Ergonomics.

Labor professionals usually function in multiple capacities that mandate short-term educational programs that enable effective communication and interaction with professional ergonomists and management safety specialists. The program helps to accomplish the NIOSH objective of having an adequate supply of "para-professional occupational safety and health personnel to carry out the purposes of the Occupational Safety and Health Act."

The growing demand of training in ergonomics mandates that this program be supplemented by a 16-hour program of advanced ergonomics principles (Ergonomics II) to provide additional "hands-on" education.

SUMMARY OF SIGNIFICANT FINDINGS

The Ergonomics Education for Union Health Professionals program of the Workplace Health Fund was established nearly seven years ago with the goal of providing national and local union health and safety staff with the information they need to effectively deal with the ergonomics problems facing their members. A total of 226 union health professionals were trained in the five-year project period (07/01/87 - 06/30/93) covered by this report.

The program was designed to offer background information and analytic skills in the field of ergonomics by teaching trainees the importance of the relationship between the mechanics of the body and work station design. The program teaches trainees how to recognize the conditions of the workplace which put workers' bodies at risk of injury or illness; how to identify solutions for effective change; and how to use epidemiological and other methods to identify problem areas and to establish the need for change.

This knowledge permits union health professionals to be active participants in joint labor-management health and safety or ergonomics committees.

REPORT ON PROGRESS ACHIEVED
DURING THE PROJECT PERIOD 07/01/87 - 06/30/93

The major accomplishments of the program are described in relation to two principal goals: (1) To develop curriculum and training materials, (2) to establish a network of resource centers to conduct programs. The objectives have been identified, modified and accomplished during the five-year reporting period of 07/01/87 - 06/30/93. (The first project year, 07/01/87 - 06/30/88, was extended at no cost to the grant through 06/30/89.) This report is presented according to the following outline.

Goal 1. Develop curriculum and training materials

Objective 1: Create a small group of union and academic experts to design and conduct the program

Objective 2: Develop curriculum and training materials

Objective 3: Demonstrate/evaluate curriculum and materials

Objective 4: Revise and publish curriculum

Objective 5: Develop new module on human factors in control room and emergency response

Objective 6: Develop pamphlet on cumulative trauma disorders for general public distribution

Goal 2: Establish network of resource centers to conduct programs

Objective 1: Identify centers of excellence with which to work to present the ergonomics training program.

Objective 2: Identify and recruit national and local experts to serve as faculty

Objective 3: Identify training candidates

Objective 4: Present the Workplace Health Fund Ergonomics Education Program at various centers around the country

Objective 5: Hold meeting of all training program partners to plan for the future

Goal 1. Develop curriculum and training materials

Objective 1: Create a small group of union and academic experts to design and conduct the program

Results: An advisory committee composed of union and academic experts was established to guide the Workplace Health Fund in designing and conducting the program.

From the beginning, the Ergonomics Education Program has benefitted from the guidance of its advisory committee. The Committee is composed of the members of the Health and Safety Staff Committee of the Industrial Union Department active in ergonomics, especially when the program was started. On a larger scale, the program is guided by the Science Advisory Committee of the Board of Directors of the Workplace Health Fund. The board of directors has among its members distinguished leaders from labor, industry and academia. The board receives updates on the program at its annual and special meetings and staff receives specific comments.

Mr. David LeGrande, the Associate Program Director maintains contact with the advisory board. Several members of the committee have reviewed drafts of the training manual in its various developmental stages.

These individuals have provided guidance, both formally and informally, to the program. Many of the committee members listed below attended the pilot course and provided invaluable feedback on the program. They have been active participants in the trainee recruiting process, usually identifying representatives from their unions whom they felt would benefit the most from training. Most have reviewed the training materials and provided suggestions for improvement. While some committee members are now affiliated with other unions, they remain part of the advisory committee.

Ergonomics Education Program Advisory Committee

Dave LeGrande, Chair
Health and Safety Director
Communications Workers of America

Louis Beliczky, Director (Retired)
Industrial Hygiene, Safety & Workers Compensation
United Rubber Workers International Union

Walter Lypka (Retired)
Brian Bobal (Replaced Mr. Lypka)
Safety & Health Department
Graphic Communications International Union

David Eisen, Director
Research & Information
The Newspaper Guild

Eric Frumin, Director
Occupational Safety & Health
Amalgamated Clothing and Textile
Workers Union

Vernon McDougall
Health & Safety
United Brotherhood of Carpenters and Joiners of America
(formerly with the International Brotherhood of Teamsters)

David Ortlieb
Occupational Safety & Health
United Paperworkers International Union
(formerly with the Chemical Workers Union)

Becky Plattus
Health and Safety Director
International Ladies' Garment
Workers Union

Peg Seminario, Director
Department of Occupational Safety & Health
AFL-CIO

Michael Wright
Health and Safety Director
United Steelworkers of America

Objective 2: Develop curriculum and training materials

Results: Basic materials and curriculum were developed and pilot tested. The first drafts of the training manual were developed by Dr. Jerry Purswell of the University of Oklahoma and his graduate students. With input from the advisory committee, Dr. Purswell also prepared the course agenda for the pilot course presented at the University of Oklahoma.

The training materials were extensively revised based on the evaluations of the pilot program participants. Continued revision and refinement of training manual have been guided by the results of the evaluation of the current materials. (See Objective 4 and Results.)

Objective 3: Demonstrate/evaluate curriculum and materials

Results: The curriculum and training materials are being evaluated and revised continuously.

The initial demonstration and evaluation of the curriculum and materials took place during the pilot course held at the University of Oklahoma on April 11-15, 1989. As mentioned above, several members of the advisory committee participated in the pilot course.

For subsequent evaluation of the program, Elizabeth Averill of the Workplace Health Fund designed a questionnaire to be used to evaluate the program. The questionnaire was tested in the second Wisconsin course. It was found that a comprehensive questionnaire requires longer time for completion and that it should be shortened for future use.

Ms. Averill also designed a pre- and post-course evaluation. Concern about testing in a traditional academic sense prompted the design of a questionnaire based on the trainees' perception of their understanding of the material presented.

More extensive evaluation is being planned for the current year. Future evaluation efforts will concentrate on the impact of training on the behavior of participants, that is, how they have been able to use their acquired knowledge of ergonomics principles to improve conditions at work.

The students attending this type of training often have little or no formal education beyond high school. They are very knowledgeable, and are usually called upon to put their knowledge to work in practical settings.

Over the course of the program, participants have completed evaluation forms which included ratings of the instructors and usefulness of the information and encouraged comments and suggestions. Overall, the program has received very good to excellent ratings. The participants have felt that the program successfully provides them with knowledge to better protect their members from occupational injury and illness related to ergonomic factors by teaching them how to recognize, analyze and correct problems. The course has given trainees the technical background to more effectively communicate with employer, academic and outside ergonomics experts.

Participants have been less enthusiastic about the use of the traditional lecture format and have suggested using an activity-oriented format. At times, it seems they have been overwhelmed by the level of technical information presented in the course. Efforts to revise the training manual have been focused on achieving a balance between technical and scientific information and its practical application.

Objective 4: Revise and publish curriculum

Results: Revision of the training manual has been an ongoing activity. In a major revision, the curriculum was reorganized in modular format. Participants have suggested a number of changes to the training manual which have been incorporated. For example, the addition of "hands-on" activities and exercises, the inclusion of small group discussion sessions, and the use of factsheets and recent news articles.

The manual was further revised and submitted to the advisory committee and to NIOSH for review. Changes suggested by both groups of reviewers were incorporated. Formal publication was postponed due to lack of funding. The manual is reproduced and placed in a three-ring binder for use in the training sessions.

The manual is organized into chapters in the following sequence:

Chapter 1 provides an **introduction** to ergonomics, the approach and application of the various disciplines used in the design of better work stations.

Chapter 2 covers principles and examples of basic **anatomy** and **physiology**. Knowing about the body's basic organ systems--the musculoskeletal system, the cardiovascular system and the nervous system--is vitally important to understanding the causes of cumulative trauma disorders: How they begin, how they are aggravated, and what signs and symptoms they present.

Chapter 3 illustrates the use of injury and illness **epidemiology**: How injury and illness data, worker questionnaires, and worksite/risk maps may be used to develop useful diagnostic tools to identify and analyze risk factors and trends. Before workers can expect an employer to respond with ergonomic solutions, they have to demonstrate a problem exists. One way to do this is to show where the ergonomics-related injuries and illnesses are, who they affect, and what impact they have.

Chapter 4 begins a segment of industrial engineering applications, concentrating on fundamentals of **biomechanics**, which is a tool that aids in understanding posture and body movements and identifying risk factors and potential solutions. Sometimes it is not enough to simply identify jobs, tasks or work groups in need of ergonomic intervention--sometimes it is necessary to actually measure the amount of risk present. Biomechanics is a way to assess the risks posed by certain body movements, work postures and tool designs.

Chapter 5 develops two additional tools of industrial engineering, **job analysis** and **time and motion study**, which are used to break down jobs into elements or motions, to identify and categorize risk factors, and develop recommended corrective action. Job analysis and time-motion studies are important tools in identifying ergonomic risk factors so that effective ergonomic interventions can be designed and implemented.

Chapter 6 deals with **manual material handling**, particularly **lifting**. It discusses the NIOSH Work Practice Guidelines for Manual Material Handling and how the guide can be applied to specific problem areas. Manual material handling activities, (i.e., lifting, pushing, pulling and carrying) are associated with more low back injuries than any other work activity. Lifting is the material handling task most often cited as the cause of low back injuries. This chapter focuses on how to assess the risks presented by lifting tasks and how to reduce the risk.

Chapter 7 presents the **industrial hygiene** applications to workplace ergonomics, focusing on how key workplace health and physical hazards such as lighting, temperature, noise, ventilation and vibration can be measured and controlled. Besides the job itself and the work station, there are other factors present in the work environment which affect workers' health and which cannot be ignored in ergonomic interventions.

Chapter 8 completes the manual with a discussion of workplace **stress**. It explains how industrial psychology and the use of biochemical and behavioral measures help identify problem areas and develop corrective actions. This chapter discusses ways in which stress is related to the workplace, how these causes can be assessed, and what are some appropriate stress-reduction interventions.

The **Appendix** provides a **resource directory** which includes information on where to obtain further assistance with ergonomics problems and relevant publications, and a **glossary** of terminology used in each chapter and in the field of ergonomics.

Chapters 1 and 2 are being strengthened to approach anatomy and physiology from a developmental perspective and to follow more closely the concept of ergonomics expressed in E.R. Tichauer's The Biomechanical Basis of Ergonomics (Wiley-Interscience, New York, 1978).

Additionally, a set of slides compiled by Dr. Purswell is available and has been used for presentations made by WHF staff.

Objective 5: Develop new module on human factors in control room and emergency response

Results: A module on environmental ergonomics dealing specifically with chemical control rooms and personal protective equipment was developed with other program funding (OSHA New Directions Grant to the WHF Center for Emergency Response Planning). It was piloted at an Empire State course held in October 1990. Because it concentrated on control room ergonomics, it has not been included in the manual, but is retained as a stand-alone module for groups of trainees for whom it may be relevant.

Objective 6: Develop pamphlet on cumulative trauma disorders for general public distribution

Results: The pamphlet entitled "CTD's: Big Disabilities from Small Injuries" was written by Workplace Health Fund Senior Research Associate Thomas C. Brown. It was published with WHF funding.

Goal 2: Establish network of resource centers to conduct programs

Objective 1: Identify centers of excellence with which to work to present the ergonomics training program.

Results: Over the five-year project period, four universities and one union education center were identified as collaborators and co-sponsors of the program. In addition to presenting the training program, the centers have agreed to serve as technical resource centers.

The network of technical resource centers was established to provide trainees with assistance on identifying hazards, substantiating the need for change, and implementing or evaluating ergonomics programs. They also refer trainees to ergonomic professionals for consultations when a higher level of expertise is required that is not available at the technical resource center.

Two changes have been made in the original network of technical resource centers. The University of Oklahoma, which piloted the program, was replaced as the principal center with the School for Workers because Dr. Purswell was not able to participate due to other commitments. Administrative changes at Empire State College, prompted the need to identify a new training partner. Hunter College was selected as the new technical resource center, and a course was held there on September 30, October 1, 4 and 5, 1993 (Budget Year 06), for 25 trainees.

The current technical centers are:

School for Workers
University of Wisconsin-Extension
Contact: Neil DeClercq, Associate Professor

Labor Occupational Health Program
University of California, Berkeley
Contact: Robin Baker, Director

Center for Labor Education and Research
University of Alabama, Birmingham
Contact: Judith Catlett, Associate Professor

Center for Occupational and Environmental Health
Hunter College
Contact: Dan Kass, Co-Director

IAM Education Center/Workplace Health Fund
International Association of Machinists and Aerospace Workers (IAM)
Contact: Mike Flynn, IAM Health and Safety Representative or Milly Rodriguez, WHF Ergonomics Program Manager

The Workplace Health Fund itself fulfills the need for assistance and technical information in ergonomics. The project manager, Milly Rodriguez, has made several presentations on the Workplace Health Fund Ergonomics Education Program and on ergonomics in general. In addition to directing and teaching in the IAM/WHF courses, Ms. Rodriguez has also directed the coordination of a series of four regional health and safety conferences on ergonomics sponsored by the American Federation of Government Employees.

Objective 2: Identify and recruit national and local experts to serve as faculty

Results: Ergonomics experts from labor, academia, and government have been recruited to teach in the course. Their expertise greatly enhances the training materials. They often provide trainees with copies of their own teaching materials.

The principal university faculty who have served as faculty for the eight courses held during the reporting period are:

Jerry Purswell, Professor
College of Engineering
Department of Industrial Engineering
University of Oklahoma

Don B. Chaffin, Director
Center for Ergonomics
The University of Michigan

George Hagglund, Professor and Former Director
John Lund, Associate Professor
Neil DeClercq, Associate Professor
School for Workers, University of Wisconsin-Extension

Michael J. Smith, Professor
Department of Industrial Engineering
University of Wisconsin at Madison

Judith Catlett, Associate Professor
Center for Labor Education and Research
University of Alabama at Birmingham

Robin Baker, Director
Barbara Plog and Laura Stock, Associate Directors
Labor Occupational Health Program
University of California at Berkeley

Diane Factor, Curriculum Developer
Marianne Brown, Director
Labor Occupational Safety and Health Program
University of California at Los Angeles

Daniel Kass, Co-Director
Amy Manowitz, Project Director
Center for Occupational and Environmental Health
Hunter College

Other individuals who have taught in the various programs include among others, Dr. Tim Key, Department of Occupational Medicine, UAB; Dr. Higdon C. Roberts, Jr., UAB-CLEAR; Michael Seey, Auburn Engineers, Inc.; Dr. Thomas Hales and Dr. Sherry Barron, NIOSH; Dr. Laura Punnett, Lowell University; Dr. Mary Louise Skovron and Dr. Fredric Gerr, Mt. Sinai Medical School.

Experts from labor have also taught in WHF courses, including Dave LeGrande, M.A., Communications Workers of America, Rex Tingle, Industrial Hygienist, AFL-CIO Department of Occupational Safety and Health; Scott Schneider, Industrial Hygienist, Center to Protect Workers' Rights; and Vernon McDougall, M.S., United Brotherhood of Carpenters and Joiners of America. Several courses have also included labor panels in which members discuss a systems approach to dealing with ergonomics problem, that is, the respective roles of workers/union members and management and joint committees.

Objective 3: Identify training candidates

Results: The trainees are health and safety leaders or professionals of various labor unions representing women and men working in different aspects of American industry. Some are from heavy industrial plants and others from the service industry.

Students are recruited by the health and safety directors of the unions affiliated with the Industrial Union Department. They are also recruited by the directors of the center with which we work on this project. The criteria for selection include a demonstrated interest in health and safety generally, and in ergonomics specifically; prior training in health and safety; and membership in a health and safety committee. Students must be in a position to put their newly acquired skills to use for the benefit of their members and/or co-workers.

Trainees are often very knowledgeable in a specific problem area within their industry. Many have surpassed the boundaries of the program with respect to their own processes and technologies since attending the program. Others are only recently becoming involved with the ergonomics approach, although they have dealt with the safety problems faced by their members.

Twelve (12) unions affiliated with the Industrial Union Department, which initiated the Workplace Health Fund, have participated in the program by sending 5 or more representatives to the ergonomics program. With over 40 trainees, the Communications Workers of America have the largest representation, due largely to the active recruiting role of its health and safety director, Dave LeGrande who is also Associate Director of the WHF ergonomics program.

The United Steelworkers of America, the United Food and Commercial Workers Union, and the United Rubber Workers have each had twenty or more representatives attend the WHF courses. Other unions representing a wide variety of industries such as electrical workers, auto workers, restaurant workers, clothing and textile workers, carpenters, and office workers have also participated.

Objective 4: Present the Workplace Health Fund Ergonomics Education Program at various centers around the country

Results: Eight (8) courses have been presented in five (5) technical centers during the current reporting period (07/01/87 - 06/30/93. A total of 226 trainees have participated in the programs. (An additional 177 union leaders have been trained since then, for a grand total of 403 trainees.)

Ergonomics Programs

April 11-15, 1989	University of Oklahoma (Pilot)	16
February 11-16, 1990	University of Wisconsin	16
October 29- November 1, 1990	Empire State College	25
April 15-18, 1991	University of Alabama	22
June 17-20, 1991	University of California, Berkeley	43
December 7-10, 1992	University of Alabama	29
May 3-8, 1992	University of Wisconsin	52
May 17-20, 1993	University of California, Berkeley and Los Angeles	23
	TOTAL THROUGH 6/30/93	226
August 29- September 3, 1993	IAM/WHF	102
September 27- October 1, 1993	IAM/WHF	28
September 30, October 1, 4, 5, 1993	Hunter College	25
February 27- March 4, 1994	University of Wisconsin	22
	TOTAL THROUGH 3/23/94	403

Objective 3: Hold planning meeting of all training program partners

Results: The meeting was rescheduled to a date beyond the current reporting period due to travel scheduling. It was held on August 26 and 27, 1993. In attendance were Dave LeGrande, Robin Baker, Neil DeClercq, Mike Flynn, Dan Kass, NIOSH Project Officer John Talty, and WHF staff Shel Samuels and Milly Rodriguez. Representatives of institutions which are interested in collaborating with WHF on the Ergonomics program were also invited. These included Charlie Barrett with the Alice Hamilton College of the Oil, Chemical and Atomic Workers International Union, and Milan Racic with the International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers.

CONCLUSIONS

As increasing attention is focused on ergonomics, union health professionals are becoming more aware of the ergonomic factors associated with occupational injury and disease. The Workplace Health Fund Ergonomics Education for Union Health Professionals Program was initiated to provide basic education necessary to go beyond awareness to preventive and corrective action by teaching them how to recognize, analyze and correct problems. This goal has been accomplished over the grant period for more than 200 trainees during the first five years of the program (and more than 400 to date). The program is expected to continue its present curriculum and to expand to provide advanced training.

BIBLIOGRAPHIC INFORMATION

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Abstract: Over the period of this project, 226 union health professionals were trained in recognizing workplace conditions which put workers at risk of injury or illness, in identifying solutions for effective change, and in using epidemiological and other methods to isolate problem areas and begin to effect change. This knowledge should allow the union health prefessionals to actively participate in joint labor management health and safety, or ergonomic committee work. An advisory committee composed of union and academic experts was established to guide in the development of curriculum and training materials. Continued revision and refinement of the training manual have been guided by the results of an evaluation of the current materials. Students completed evaluation forms which included ratings of the instructors and usefulness of the information and encouraged comments and suggestions. Participants were not enthusiastic about the use of the traditional lecture format, and suggested using an activity oriented format.