



**31** Extramural  
Research Projects  
**42** Intramural  
Research Projects

# AGRICULTURE

**NIOSH RESEARCH PROJECTS**  
**April 1997**



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



# Extramural and Intramural Research Projects

## Extramural Research Projects

### Grants

#### Neurological Effects of Organophosphates on Farmworkers

**Researcher:** Matthew C. Keifer, M.D.  
**Affiliation:** University of Washington  
 School of Medicine  
 Department of Medicine & Environmental Health  
 325 Ninth Avenue, ZA-66  
 Seattle, Washington 98104

**Keywords:** Organophosphate pesticides, cross-sectional epidemiological study, female farmworkers, biomarkers

**Purpose:**  
 To investigate the neurological effects of chronic exposure to organophosphate (OP) pesticides in female orchard workers.

**Abstract:**  
 This clinical epidemiological study will determine if farm workers chronically exposed to organophosphate pesticides (OP) in field work have quantifiable nervous system abnormalities after an exposure season and whether these changes are persistent after a several month period of non-exposure. This cross-sectional study with a follow-up component will compare 50 female orchard farmworkers with chronic low-level OP exposure to controls. Exposure estimates will be based on orchard spray logs, work questionnaires, and biological monitoring (cholinesterase testing). A neurological battery will be used at the end of an exposure season and 5-6 months after no exposure. Several biological markers will be evaluated: cholinesterase, paraoxonase, chlorpyrifos oxonase levels, and muscarinic receptor density in lymphocytes.

#### Assessment of Occupational Exposure To Aflatoxin

**Researcher:** Mustafa I. Selim, Ph.D.  
**Affiliation:** University of Iowa  
 College of Medicine  
 Department of Preventive Medicine & Environmental Health  
 137 AMRF - Oakdale Campus  
 Iowa City, Iowa 52242

**Keywords:** Aflatoxin, friable dust extraction, farming, airborne exposure

**Purpose:**  
 To develop and test a processing method to extract friable dust from bulk corn which would correlate with the risk of exposure to airborne aflatoxin (and other mycotoxins).

**Abstract:**  
 This project will develop and test a processing method to extract friable dust from bulk corn which would correlate with the risk of exposure to airborne aflatoxin (and other mycotoxins). In addition,

it will test the correlation of two processing methods, one wet and one dry. These results will be used in conjunction with a cross-sectional study of 32 farms each conducting 3 activities (harvest, livestock feeding, and grain bin clean-out). These results will also characterize the mean and variability of aflatoxin in farming environments. This database will guide the development of future epidemiologic study designs. The possibility of climatic patterns of repeated hot and humid growing seasons creates an increasing need to define the possible role of airborne aflatoxins in the etiology of lung or other cancers.

#### Investigation of ROPS Design For Older Tractors

**Researcher:** Paul D. Ayers, Ph.D.  
**Affiliation:** Colorado State University  
 College of Engineering  
 Department of Chemical and Biosource Engineering  
 Fort Collins, Colorado 80523-1370

**Keywords:** Rollover protective structure, tractor, axles, guidelines

**Purpose:**  
 To evaluate rollover protective structures (ROPS) using finite element modeling to design ROPS for mounting on older tractors and to conduct laboratory and field tests of ROPS to develop suitable guidelines for building and installing ROPS.

**Abstract:**  
 This project will use rollover protective structure (ROPS) testing simulations, laboratory testing and field testing of ROPS to develop suitable guidelines so that ROPS can be mounted on older tractors. The specific objectives are to: (1) identify the kinds of older tractors currently in use in the U.S., (2) categorize the axle designs of older tractors, (3) determine the relative axle strengths and identify which axle category will support ROPS loadings, (4) investigate axle and modifications necessary to mount ROPS on older tractors, (5) use laboratory testing and field testing to investigate ROPS design for the major axle categories of pre-ROPS tractors, (6) investigate vibrational loading of ROPS to examine fatigue failures on pre-ROPS tractor axles, and (7) develop guidelines for the design and mounting of ROPS on older tractors. The design guidelines will concentrate on axle housing support and mounting modifications and locations.

#### Organophosphate Exposure in Migrant Farmworker Children

**Researcher:** Marcia Woodby, M.P.H.  
**Affiliation:** University of California  
 Office of Research  
 Institute for Toxicology and Environmental Health  
 Davis, California 95616

**Keywords:** Organophosphate, children, neurobehavior, migrant farmworker

**Purpose:**  
 To conduct a pilot, cross-sectional study to determine the relationship between prevalence of organophosphate exposures in migrant farmworkers and to conduct neurobehavioral testing in the children of the farmworkers.

**Abstract:**  
 The major goals of this pilot, cross-sectional study are (1) to determine the prevalence of exposure to organophosphate pesticides (OPs), and (2) to determine the prevalence of neurobehavioral problems in the children of migrant farmworkers who live in California-run Migrant Housing Centers (MHCs) and whose parents work in surrounding fields during the regular summer agricultural season, April through September. The importance of this study is four-fold: 1) it will establish the prevalence of exposure to OPs in

this high risk population; 2) it will use biomarkers (the presence of urinary metabolites of OP exposure); 3) it will investigate the prevalence of neurotoxicity in children, a potentially serious health outcome that may be associated with OP exposure; and 4) it will assess parental occupation as a potential source of exposure for children. The findings from this study will have potential significance for establishing the prevalence of exposure to and neurotoxicity of OPs in children who are at high risk.

### Occupational Injury in Hispanic Farmworker Families

**Researcher:** Stephen A. McCurdy, M.D., M.P.H.  
**Affiliation:** University of California  
 MED: Community & International Health  
 Davis, California 95616  
**Keywords:** Organophosphate pesticides, migrant farmworker families, occupational injury

**Purpose:**  
 To conduct a prospective cohort study of occupational injury among migrant Hispanic farmworker families through a harvest season.

**Abstract:**  
 The proposed prospective cohort study will investigate occupational injury among migrant Hispanic farmworker families through a harvest season. The sample will comprise approximately 500 families including 1,000 adults and 1,000 children. The study is unique in two important respects. First, it addresses specific hypotheses regarding remediable risk factors for injury that have not been evaluated in other populations. These include organophosphate pesticide exposure (as indicated by erythrocyte acetylcholinesterase levels), piece-work vs. hourly pay, language, appropriate safety training, and the role of multiple employment. Second, the study focuses on migrant farmworker families—a large, yet understudied at-risk group. These data will be useful for targeting and designing injury reduction programs in this high-risk population.

## Cooperative Agreements

### Agricultural Safety Promotion System (ASPS)

**For more information contact:**  
 The National Institute for Occupational Safety and Health  
 1-800-35-NIOSH (356-4674)  
**Keywords:** Intervention programs, assessment, farmworkers

**Purpose:**  
 The Agricultural Safety Promotion System (ASPS) will stimulate agricultural safety and health intervention programs to reduce agricultural injury and/or to reduce exposure to hazards resulting in injury.

**Abstract:**  
 A primary emphasis of this program is the assessment of the effectiveness of the proposed intervention programs. It is anticipated that this program will reduce the incidence of agricultural occupational injuries and fatalities by implementing intervention projects immediately, and provide practitioners with useful information on the effectiveness of the intervention programs. Projects include (1) the University of CA-Davis—a study of ergonomic interventions in nursery operations using worker questionnaires, hazard analyses, and injury data, (2) the University of MO-Columbia agricultural safety training of secondary youth as an intervention using an adult team to teach primary students, (3) Cornell University (New York)—a controlled study on the

effectiveness of an agricultural hazard abatement and training program, (4) North Carolina A&T—educational strategies to reduce illnesses and injuries among low income farmers in all extension districts, (5) Ohio State University—a randomized controlled study of the effect of safety programming in agricultural businesses, development of a training curriculum, and safety training, and (6) the University of WI-Madison—a review of the structural and process activities on pilot operations that can improve both the safety and profitability of dairy operations.

### Respiratory Exposure Hazards in Composting

**For more information please contact:**  
 The National Institute for Occupational Safety and Health  
 1-800-35-NIOSH (356-4674)  
**Keywords:** Composting, respiratory health problems, exposure hazards

**Purpose:**  
 To obtain information on potential exposure hazards and respiratory health problems among workers in the composting industry.

**Abstract:**  
 This project involves a descriptive, cross-sectional environmental exposure assessment and respiratory health assessments (symptoms questionnaire and spirometry). This project will provide the type of descriptive information (for industry, labor, trade associations, and government agencies) necessary to identify exposure problems and direct control efforts aimed at reducing exposures and preventing respiratory disease in the new and rapidly growing composting industry. This cross-sectional study will also provide information to direct additional, more analytical research efforts. The results from this study provide regulatory agencies such as OSHA or EPA with data necessary to target exposure control through regulatory efforts.

### Farm Family Survey: Respiratory Diseases Technical Support

**For more information contact:**  
 The National Institute for Occupational Safety and Health  
 1-800-35-NIOSH (356-4674)  
**Keywords:** Technical support, spirometry, respiratory disease

**Purpose:**  
 To provide technical support for the farm family survey, the Occupational Health Nurses in Agricultural Communities Project (OHNAC), and other extramural agricultural projects.

**Abstract:**  
 This project is designed to provide technical support for the respiratory disease component of the Farm Family Survey, the Occupational Health Nurses in Agricultural Communities (OHNAC) project, and other extramural agricultural projects. Spirometry support includes lending spirometry equipment, calibration and maintenance of equipment, training technicians, processing data, and ensuring quality control. The spirometry data from this project will be analyzed and used to develop disease prevention, health promotion, and hazard reduction strategies within the agricultural community.

## Occupational Safety and Health Clinics Network

### For more information contact:

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Technical assistance, workshops and conferences, resources, referral

### Purpose:

To establish an occupational safety and health clinics network.

### Abstract:

This project provides technical assistance to clinicians for conferences and educational activities; organizes national and regional workshops; sponsors conferences on occupational health and safety challenges; promotes participation in occupational safety and health clinical database programs; provides resources and referral services for the NIOSH 800 Hotline; and provides technical assistance to employees, employers, and health care providers regarding the Americans with Disabilities Act. Activities in this project support many interest areas including agriculture, construction, small business and service sectors.

## Model Program for Occupational Disease Evaluation and Rehabilitation

### For more information contact:

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Respiratory disease, diagnosis/evaluation/rehabilitation

### Purpose:

To assist in the development, implementation, and maintenance of a program for the diagnosis, evaluation, and rehabilitation of workers with occupational respiratory disease.

### Abstract:

This program will report and disseminate findings, as well as relevant health and safety education and training information to state health officials, health care providers, workers, managers, unions and employers. The program will include an evaluation of current standard and innovative interventions for early identification of occupational respiratory diseases. It will result in recommendations for, or a plan for the development of new methods and techniques to improve the early recognition, rehabilitation and therapy of these diseases. Activities in this project support many interest areas including agriculture, construction, small business and service sectors.

## The Farm Family Health and Hazard Surveys

### For more information contact:

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Farmworkers, surveys, injuries, symptoms, hazardous exposures

**Purpose:** To survey farmers and farm families.

### Abstract:

This project consists of cooperative agreements in several states (California, Colorado, Iowa, Kentucky, New York, and Ohio) which will end in 1997. This project collects information on health

conditions and symptoms, injuries, and hazardous exposures among farmers and their families. The project varies based on the needs of the state. However, standardized components of surveys approved by NIOSH are utilized. Preliminary analyses of some of the early hazard data, collected through the surveys in Ohio and New York, highlighted several health and safety hazards for farmers. These include inadequate use of master shields on tractor power take-off shafts, a high prevalence of tractors lacking rollover protection, inadequate security locking of chemical storage areas, and unsafe placement of fuel storage. Only one-fifth of the farmers reported having training in the prevention of occupational injuries or illnesses, and few farms had received an on-site occupational health or safety consultation or evaluation in the past 12 months. Scientific, educational, and other technical reports and presentations are expected over the next two years.

## Community Partners for Healthy Farming

### For more information contact:

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Surveillance, intervention, sentinel events, communities

### Purpose:

To provide surveillance and intervention for farmworkers exposed to health and safety hazards.

### Abstract:

Community Partners for Health Farming (CPHF) is an intervention and surveillance project. The intervention program for farmers, farmwork, and farm families will provide community-based intervention activities with intensive evaluation and include targeting of vulnerable populations such as migrant workers, seasonal laborers, and children. The surveillance program will identify sentinel cases of injury and illness, identify new or under recognized conditions and hazards, and target prevention efforts. The CPHF project over the next three years will standardize reporting, conduct thorough follow-up, and target surveillance and public health interventions. It will complement the CPHF intervention research project.

## Take-Home Pesticide Exposure

### For more information contact:

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

Dr. Richard Fenske  
University of Washington

**Keywords:** Children, pesticides, take-home, intervention strategies

### Purpose:

To examine take-home pesticide exposure among children of agricultural workers.

### Abstract:

This study will (1) determine if children of agricultural families have higher exposures to pesticides than a comparable reference population, (2) identify pesticide exposure pathways for children of agricultural families, and (3) develop strategies for preventing or reducing exposures in this population. In FY96 field work was completed and urine and handwipe samples were collected for analysis of metabolites from children of agricultural and reference families. Analysis of samples from 71 exposed and 18 unexposed children will be completed in FY97 and a final report generated. Results will be used to isolate those factors responsible for elevated exposures and determine whether intervention strategies can reduce or eliminate exposure. Investigators will implement intervention strategies with post-intervention sampling where appropriate.

## *NIOSH-Supported Centers for Agricultural Disease and Injury Research, Education, and Prevention*

### University of California Agricultural Health and Safety Center

**Director:** Mark Schenker, M.D., M.P.H.  
**Affiliation:** University of California Agricultural Health and Safety Center  
 Old Davis Road  
 University of California  
 Davis, California 95616-8757  
 (916) 752-4050

#### Projects:

#### CANCER AND FAMILY HEALTH

- Cancer and Agricultural Exposure Epidemiology.
- Behavior Related to Organophosphate Exposure in Children of Migrant Farm Workers.

#### INJURY AND ERGONOMICS

- Organizational Dimensions of Farm Enterprises and Injury Reduction.
- Improved Worksite and Community Injury Prevention.
- Reducing Farm Injuries by Safety Law Enforcement.
- Agricultural Ergonomic Intervention Feasibility Analysis.
- Epidemiology of Agricultural Machinery-Related Deaths in California.
- Incident Injury Among a Cohort of California Farmers and Farm Operators.

#### NEUROTOXICITY AND PESTICIDES

- Developing, Improving, and Applying Cost-Effective and Accurate Human Blood Cholinesterase Determinations.
- A Comprehensive Program for Delivering Safety Training and Hazard Information in the Agricultural Industry.
- Epidemiology of Pesticide Illness in California.
- Extending Pesticide Use Best Practices Information to Ethnic Minority, Limited Resource Specialty Crop Growers.

#### RESPIRATORY

- Incident Injury and Disease Among a Cohort of California Farmers and Farm Operators.
- Determinants of Respiratory Disease Among California Farmers and Farm Operators.
- Pulmonary Fibrosis and Mineral Content of Lung Tissues From Deceased California Farm Workers.
- In-vivo Toxic and Fibrogenic Potential of Agricultural Dusts.
- California Farm Workers Dust and Endotoxin: Level, Dose, Respiratory Effects and Respiratory Protection Evaluation: A Longitudinal Interdisciplinary Study.

### High Plains Intermountain Center for Agricultural Health and Safety

**Director:** Roy M. Buchan, Dr. P.H.  
**Affiliation:** Colorado State University  
 Fort Collins, CO 80523-1681  
 (970) 491-6152

#### Projects:

- Molecular Biomarkers of Grain Dust Exposures.
- Silica and Respiratory Organic Dust Exposures of Potato Harvest and Processing.
- Economic and Social Impact of Agricultural Fatalities. Engineering Control Strategies Based on Tractor Stability.
- Community Outreach Services: Information, Education, and Consultation:
  - 1) Intervention Needs Assessment.
  - 2) Training and Education Program Development.
  - 3) Training and Education Presentations.
  - 4) Training and Education for Specific Client Requests.
  - 5) Technical Assistance Bulletins.
  - 6) Dissemination Plan.
  - 7) Train the Trainer Workshops.
  - 8) Hazard Audits Program Assistance.
  - 9) Model Health and Safety Plans for Workers Compensation Cost Containment.
  - 10) Migrant Groups.
  - 11) Video-Based Agricultural Health and Safety Education Support Materials Database.
  - 12) World Wide Web.
  - 13) Hi-CAHS Annual Report.
  - 14) Finalize FY 96 Products.
- Program Assessment.

### Great Plains Center for Agricultural Health

**Director:** James Merchant, M.D., Dr. P.H.  
**Affiliation:** University of Iowa  
 Iowa City, Iowa  
 (319) 335-4415

#### Projects:

#### TRAINING CORE

- Provide Graduate Student Education in Agricultural and Rural Environmental Health and Safety.
- Provide Training in Agricultural and Rural Environmental Health and Safety.
- Train Post-doctoral Level Researchers in Agricultural Health and Safety.

#### EDUCATION AND OUTREACH CORE

- Implementation of an Agricultural Occupational Health Nurse Education Program.
- Short Course Training for Primary Care Physicians, Veterinarians and Students.
- Training and Reference Materials for Health Professionals in Agricultural Medicine.
- Farm Safety 4 Just kids Chapter Development, Leadership Conferences, and Safety Competition.
- Clearinghouse-Developing, Implementing and Evaluating an Information Dissemination Model.

### INDUSTRIAL HYGIENE CORE

- Field Evaluation of Respirator Protection for Ammonia in Agricultural Environments.
- In-field Anhydrous Ammonia Applications.
- Development of Improved Illumination for the VITAE System.
- Evaluation of Occupational Exposures at Composting Facilities.
- Oil Mist Generation as a Dust Reduction Method in Swine Confinement Facilities.
- Design of Tractor Cabs to Reduce Exposure to Dusts and Pesticides.

### TOXICOLOGY CORE

- Causative Agents of Organic Dust-Induced Lung Inflammation.
- Molecular Biology Methods for Bioaerosol Exposure Assessment.
- Reference Organic Dust Repository.
- Inhalation Toxicology Models for Agricultural Dust-Induced Pulmonary Disease.

### ERGONOMICS CORE

- Development of a Database to Support Guidelines for Children's Agricultural Tasks.
- Evaluation of Assistive Technologies in Agricultural and Rural Settings.

### THE KEOKUK COUNTY RURAL HEALTH STUDY CORE

- Risk Factors for Respiratory Disease in a Rural Cohort.
- Prevalence of Respiratory Disease and Dysfunction in a Rural Cohort.
- Determinants of Respiratory Disease in a Rural Cohort.
- Case Control Studies of Respiratory Disease in a Rural Cohort.
- Prevalence and Incidence of Respiratory Disease and Dysfunction in a Rural Cohort.
- Genetic Determinants of Organic Dust Induced Airway Disease.
- Behavioral and Environmental Risk Factors for Injury in Keokuk County.
- Injury Rates Among Residents of Keokuk County.
- Determinants of Injury in Keokuk County.
- Risk from Injury from Domestic Violence in a Rural Cohort.
- Farm Community-Based Domestic Violence Prevention Intervention Evaluation.
- Cross-Sectional Description of Environmental Risk Factors.
- Environmental Questionnaire Validation.
- Indoor Air Quality in Residences.
- Longitudinal Evaluation of Environmental Factors.
- Evaluation of Children's Agricultural Exposures.
- House Dust Mites and Barn/Storage Mites in Rural Iowa.
- Evaluation of the Relation Between Pesticide Exposures and Biological Samples.
- Rates of Depression and Factors and Conditions Associated with Depression.
- Relationship Between Depressive Symptomatology and Self-Report of Depression.
- Comparison of Rates of Depression in KCRHS with Urban Samples.
- Predictors of the Future Onset of Depression in a Rural Cohort.
- Rates of Depression and Factors and Conditions Associated with Depression Airways Focus on Rural Adolescents
- Rural Depression: Implications for Mental Health Services.
- Effects of Untreated Depression on Health, Occupational and Other Functional Status Measures.
- The Relative Contribution of Genetic and Environmental Factors in the Etiology of Depressive Disorders in a Rural Population.
- Assessment of Risk Factors and Prognostic Factors for Dermatitis in Keokuk County.

### Southeast Center for Agricultural Health and Injury Prevention

**Director:** Robert McKnight, M.P.H., Sc. D.  
**Affiliation:** University of Kentucky  
 Department of Preventive Medicine  
 Lexington, Kentucky 40536  
 (606) 323-6836

#### Projects:

- Southwest Mississippi Implementation of a Community-Based Agricultural Health and Safety Programs for African Americans.
- Translating Agricultural Injury Surveillance Data Into Community Interventions: Partnerships in Prevention.
- Kentucky Partnership to Empower Farm Women to Reduce Hazards to Family Health and Safety.
- Implementing the Occupational Health Options Within the Agricultural Engineering Masters Degree Program.
- The Next Steps in Bridging the Gaps for Kentucky's Migrant Farm Workers.
- Kinematic Motion Analysis by Farmers with Leg Amputation.
- Farm Safety 4 Just Kids.
- Integrating Interactive Stories into Agricultural Safety Training on a Web Site.
- Incidence of Logging-Related Injury in Four Rural Alabama Communities.
- Occupational Health Services for Farmers.

### Northeast Center for Agricultural and Occupational Health (NEC)

**Director:** John J. May, M.D.  
**Affiliation:** New York Center for Agricultural Medicine and Health  
 One Atwell Road  
 Cooperstown, NY 13326  
 (607) 547-6023

#### Projects:

#### NOISE, HEARING LOSS AND ITS EFFECTS

- Developing Hearing Conservation Interventions.
- Noise on Farms, Spectral Characteristics.
- Studies on Age, Hearing Loss, and Balance.

#### MECHANICAL INJURY

- Improving the Quality of Agricultural Injury Surveillance.
- Tractor Stability Information Processing.

#### RESPIRATORY DISEASE IN NORTHEASTERN FARMERS

- Outcomes of Occupational Asthma in Farmers.

#### ECONOMIC IMPACT OF AGRICULTURAL TRAUMA

- The Cost of non-Fatal Agricultural Injuries.
- Fatal Farm Injuries, the Impact After 10 Years.

#### HIGH RISK POPULATIONS

- Exposure to Environmental Hazards in Pregnant Farm Women.
- Studies of Injuries in Migrant Farm Workers.
- The Cost of Childhood Injuries in the Northeast.
- The Work Activities of Elderly Farmers in the Northeast.

#### ERGONOMIC EVALUATION

- Ergonomic Problems in Fishers.

**TRAINING**

- Safety Newsletter for High-school Teachers.
- Participatory Development & Experimental Testing of Agricultural Risk and Safety Messages.
- Northeast Compendium Update.
- Farm Safety 4 Just Kids Outreach.
- Economical Farm Rescue Training.
- Regional Health Screening/Education Activities.

**Southwest Center for Agricultural Health Injury, and Education**

**Director:** Arthur Frank, M.D., Ph.D.  
**Affiliation:** University of Texas Health Center at Tyler  
 P.O. Box 2003  
 Tyler, TX 75710  
 (903) 877-5896

**Projects:**

- Migrant Farmworkers: Perceived Occupational Health and Safety Risks, Risks to Children, and Access to Health Care.
- Reducing Injuries Associated With Animal Handling: Cow/Calf Operations.
- Texas Initiatives for Women's and Children's Health and Safety on Farms and Ranches.
- Surveillance of Trauma Incidents Within the Logging Industry of Deep East Texas.

**Pacific Northwest Agricultural Safety and Health Center**

**Director:** Richard A. Fenske, Ph.D., MPH  
**Affiliation:** University of Washington  
 Department of Environmental Health  
 Seattle, WA 98195-7234  
 (206) 543-0916

**Projects:**

**ADMINISTRATIVE CORE**

- Budget.
- Oversee Pilot Project Review.

**OCCUPATIONAL MEDICINE AND EPIDEMIOLOGY CORE**

- Assessing the Impact, Characteristics the Causes and Reducing the Burden of Occupational Skin Disorders in Region X Farming, Forestry and Fishing.
- Symptoms Survey of Seafood Processors.

**INDUSTRIAL HYGIENE AND SAFETY CORE**

- Health Hazards of Physical Agents in Farming, Forestry, and Fishing.
- Farm Safety Incentive Project.
- Children's Pesticide Exposure Intervention Project.
- Tracer Evaluation to Reduce Applicator Exposure.

**OUTREACH, TRAINING AND EVALUATION CORE**

- Evaluation of Rollover Protective Structures Standard.

**Midwest Center for Agricultural Research, Education and Disease and Injury Prevention**

**Director:** Paul D. Gunderson, Ph.D.  
**Affiliation:** National Farm Medicine Center  
 Marshfield, WI 54449-5790  
 (715) 387-9298

**Projects:**

- Enteric Infections in Farm and Non-farm Children: Potential Role of Zoonotic Transmission.
- Farming Practices as a Selection Mechanism for Zoonotic Pathogen Virulence.
- Fertility Outcomes for Women Working and Living in Agricultural Settings.
- North American Guidelines for Children's Agricultural Tasks.
- Evaluation of Safety Sensors and Encouraging the Technology Transfer Process.
- Reducing Fatality Risks From Livestock Manure Storage Facilities.
- A Prospective Randomized Outcome Analysis for Treatment of Acute Low Back Pain in Agricultural Occupations.

***NIOSH-Supported Educational Resource Centers (ERC) Agricultural Training Programs***

**Northern California Center for Occupational and Environmental Health**

**Director:** Robert Spear, Ph.D.  
**Affiliation:** School of Public Health  
 University of California at Berkeley  
 Berkeley, CA 94720  
 (510) 642-0761

**Summary:**

This program is carried out at the University of California's Berkeley and Davis campuses and focuses on the agricultural health and safety education needs of the largest farming state in the country. The program at Berkeley concentrates on the education of academic students in agricultural health and safety policy-making. The program at Davis concentrates on agricultural health and safety training for occupational medicine residents, and continuing medical education courses in agricultural safety and health.

**Great Lakes Center for Occupational and Environmental Health**

**Director:** Daniel Hryhorczuk, M.D.  
**Affiliation:** School of Public Health  
 University of Illinois at Chicago  
 Chicago, IL 60680  
 (312) 996-7887

**Summary:**

This program is carried out at the University of Illinois at Chicago campus and focuses on the agricultural safety and health education

needs of Illinois and surrounding states. The program has conducted a needs assessment in Illinois that included a survey of farm families to determine what type of training was needed for health care and public health professionals. The program has an active continuing education and outreach activity that is carried out through short course offerings and presentations on agricultural safety and health at agricultural meetings and conferences.

### Midwest Center for Occupational Health and Safety

**Director:** Ian Greaves, M.D.  
**Affiliation:** School of Public Health  
 University of Minnesota  
 Minneapolis, MN 55455  
 (612) 626-0900

**Summary:**  
 This program is carried out by the University of Minnesota and focuses on the agricultural safety and health education needs of the upper Midwest region. The major elements of the program include: the revitalization of an agricultural safety and health academic course; course development at both the University and community education levels; creation of agricultural-related medical electives; a regional needs assessment; and a training plan for medical students in rural areas.

### Rocky Mountain Center for Occupational and Environmental Health

**Director:** Royce Moser, M.D.  
**Affiliation:** School of Medicine  
 University of Utah  
 Salt Lake City, UT 84112  
 (801) 581-8719

**Summary:**  
 This program is carried out in the Rocky Mountain region in collaboration with the Department of Agricultural Systems Technology and Education, Utah State University. The program is focused on academic training in agricultural safety and health and includes a new graduate level course offered by the University of Utah, as well as the support of trainees at both campuses. The new course is offered to trainees at Utah State via interactive video.

## Sentinel Event Notification System for Occupational Risks (SENSOR) Programs

### SENSOR Pesticides

**For more information contact:**  
 The National Institute for Occupational Safety and Health  
 1-800-35-NIOSH (356-4674)  
**Keywords:** State-based surveillance, pesticides, follow up and intervention

**Purpose:**  
 To develop models for state-based surveillance of pesticide health effects.

**Abstract:**  
 New York, Oregon, and Texas are participating in this program. In Texas this program has been responsible for better surveillance of pesticide activities to alert the state to potential pesticide poisonings. An example of this is the reporting by Field Agriculture Inspectors in Texas to the Department of Health when pesticide misapplication occurs. This helps to increase the number and timeliness of case reports coming to the surveillance system and has increased opportunities for follow up and intervention. A joint investigation between NIOSH and Texas on the use of a smoke fumigant in greenhouses has resulted in information that is being used by the EPA to justify a labeling change for the fumigant.

### Development of National Pesticide Surveillance Model

**For more information contact:**  
 The National Institute for Occupational Safety and Health  
 1-800-35-NIOSH (356-4674)  
**Keywords:** Pesticide poisoning, standardized variables, coding, electronic database, manual

**Purpose:**  
 To develop standardized variables and coding for aggregating pesticide poisoning data for dissemination.

**Abstract:**  
 New York, Oregon, Texas, Arizona, California, and Washington are participating in this program. The immediate goal of this project is to aggregate and disseminate one year's data from the six states. The ultimate goal is to develop an electronic database and "how-to-do-it" manual to facilitate multisite data aggregation and make it easier for new states to initiate pesticide surveillance. Currently, a standardized list and case classification system has been developed, electronic samples of data from the six states are under evaluation for possible reformatting for aggregation. A manual will be developed in FY97.

### Pesticide Hazard Surveillance

**For more information contact:**  
 The National Institute for Occupational Safety and Health  
 1-800-35-NIOSH (356-4674)  
**Keywords:** Hazard surveillance, pesticide risks, state-based

**Purpose:**  
 To conduct hazard surveillance of pesticide-related risks.

**Abstract:**  
 This project has been instituted to carry out hazard surveillance of pesticide-related risks, identified through state-based surveillance. Several projects for in-depth follow up have been identified.

## Research Opportunities-Requests for Applications

### Childhood Agricultural Safety and Health Research

**For more information contact:**  
 The National Institute for Occupational Safety and Health  
 1-800-35-NIOSH (356-4674)

**Keywords:** Children, farming, child labor, injuries

**Purpose:**

To advance scientific knowledge needed to protect the safety and health of children and adolescents exposed to agricultural production hazards.

**Abstract:**

NIOSH is soliciting grant proposals for research on childhood agricultural safety and health. Projects are sought to conduct research on etiology, outcomes, and intervention strategies, and to rigorously evaluate the effectiveness of commonly used educational materials and methods in preventing childhood agricultural injuries and illnesses. Findings from these projects are intended to advance the scientific base of knowledge needed to maximize the safety and health of children and adolescents exposed to agricultural production hazards by expanding the knowledge base regarding etiology, outcomes, intervention strategies, and the effectiveness of commonly utilized educational materials and methods. Research may address children directly involved in work tasks and/or other children exposed to agricultural production hazards. The funded research projects should cover a variety of types of agricultural production in different geographical regions (e.g. tomato harvesting in California, dairy farms in Wisconsin, and blueberry picking in Maine).

### Intervention Studies in Agricultural Safety and Health

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Intervention, economics, health promotion, engineering, farming

**Purpose:**

To demonstrate the effectiveness and technical or economic feasibility of interventions for preventing injuries and illnesses among agricultural workers.

**Abstract:**

NIOSH is soliciting grant proposals for research and demonstration of innovative projects relating to the development and evaluation of the effectiveness of methods or approaches for preventing injuries and illnesses among agricultural workers. This research aims to prevent work-related diseases and injuries in the agricultural production industry by designing, implementing, and evaluating measures to reduce occupational hazards. Intervention research-including control technology, educational programs, health promotion activities, and community-based initiatives-examines the utility and impact of new and existing preventive measures in the workplace. Research should demonstrate the effectiveness of an intervention, either on a pilot or full-scale basis, and the technical or economic feasibility of implementing a new or improved innovative procedure, method, technique, or system for preventing occupational safety or health problems. A demonstration project should be conducted in an actual workplace where a baseline measure of the occupational problem will be defined, the new/improved approach will be implemented, a follow-up measure of the problem will be documented, and an evaluation of the benefits will be conducted.

## NIOSH-Supported Training Project Grants (TPG) Agricultural Training Programs

### Alaska Marine Safety Education Associates

**Director:** Mr. Jerry Dzugan  
**Affiliation:** AMSEA  
P.O. Box 2592  
Sitka, Ak 99335  
(907) 747-3287

**Summary:**

This program is designed to prevent loss of life and injury in the Alaskan marine environment through safety education. The training program is provided to commercial fishermen by a statewide network of qualified marine safety instructors. Training courses are delivered at three levels:

- 1) Training courses (16 hrs.) for mariners to become Drill Instructors who are required to conduct monthly emergency drills on documented fishing vessels.
- 2) Marine Safety Instructor-Trainer courses (48 hrs.) that represent the only active USCG approved marine safety instructor course in the U.S.
- 3) Refresher training courses for Drill Instructors.

**Funding:**

NIOSH support for this program was initiated in FY 1993.

## Intramural Research Projects

### Occupational Injury Prevention in Alaska

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Surveillance, prevention, high risk workers, Alaska

**Purpose:**

To conduct surveillance and prevention research for high risk groups in Alaska.

**Abstract:**

This project conducts surveillance and prevention oriented research for high risk groups within the state of Alaska (e.g., commercial fishing, air transport, and logging). For the period 1980-1989, Alaska had an occupational fatality rate 5 times higher than the national average (35/100,000 vs 7/100,000), and the high number of fatalities among commercial fishermen, pilots, fish processors and loggers contributed significantly to this high rate for the 6 year period of 1990-95. The 1980-89 occupational division of farmers/foresters/fishers had a fatality rate of 330/100,000. The targeted fatality rate is 174/100,000, and for 1990-96 it has been 165/100,000 or lower.

### Development of Automatic ROPS

**For more information contact:**

The National Institute for Occupational  
Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Rollover protective structure, prototype, tractor

**Purpose:**

To develop a rollover protective structure (ROPS) deployment mechanism.

**Abstract:**

This project seeks to answer the research questions "Can a structural design for a prototype, automatically deployable ROPS meet SAE J2194 ROPS structural loading requirements?" and "Can that structure be deployed reliably?" The goal of the project is to develop a ROPS deployment mechanism and it is heavily dependent upon an overturn sensor being developed in another NIOSH project entitled Development of an Automatic ROPS Overturn Sensor. This project is using computer-aided design to develop a retractable ROPS with a mechanism which will automatically deploy the ROPS to achieve tractor operator protection from roll-over fatalities. The prototype is being developed specifically for agriculture tractor operations which are performed in low clearance areas such as orchards and in-barn work.

### Development of an Automatic ROPS Overturn Sensor

**For more information contact:**

The National Institute for Occupational  
Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Rollover protective structure, overturn sensor

**Purpose:**

To develop the overturn sensor that will deploy the rollover protective structure (ROPS).

**Abstract:**

This project will develop the overturn sensor that will deploy the ROPS. Sensor development for this project is dependent upon an algorithm that reliably predicts actual overturns without false alarms. A simple computer overturn simulation has been developed, and sensor technologies have been selected. Current work involves the development of a tractor computer simulation to verify overturn parameters and algorithms and initial development of prototype sensor circuitry. This passive system should result in better protection for the operator. The concept of a deployable roll-bar design has already been demonstrated. Myers and Snyder (1995) estimated that 1,302,000 tractors were in use in 1993 for which a ROPS was commercially available or was assumed to be available due to the tractor's age. Their study further estimated a fatality rate of 57.1 deaths per 200,000,000 hours of operation. Based on this fatality rate, it was estimated that placing ROPS on the 1,302,000 tractors would save 1,478 lives in 24 years.

### Anthropometry of Construction and Agriculture Populations

**For more information contact:**

The National Institute for Occupational  
Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Agricultural and construction worker, human-form database, personal protective equipment

**Purpose:**

To establish a human-form construction and agriculture worker database to evaluate the interaction of workers with their tasks, tools, machines, vehicles, and personal protective equipment.

**Abstract:**

A state-of-the-art 3-D laser scanning system will be utilized to scan and reconstruct human images in the database. These data will initially be used to develop optimal facial and hand models for designing eye/head/face/hand protection apparatus, such as eye goggles, helmets, masks, gloves and protective clothing. It will be extended to (1) determine the optimal clearance for ROPS for farm tractors, (2) determine optimal height and step clearance for construction vehicles, and (3) enhance computerized human modeling applications for high risk job activities, such as operating machinery, thus reducing involvement of human subjects in studies of hazardous environments. The human size data for protective clothing is 57 years old and based on military personnel. This project will develop a standardized procedure for computerized anthropometry measurement, including establishment of sampling strategies. The final products will be a database of agriculture and construction workers for use in developing improved designs for equipment and personal protective equipment.

### Occupational Traumatic Injury Surveillance of Farmers

**For more information contact:**

The National Institute for Occupational  
Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Lost-time injuries, farmers, research needs, interventions, survey

**Purpose:**

To determine the frequency and incidence of lost-time work injuries occurring on U.S. farms.

**Abstract:**

This surveillance project is designed to determine the frequency and incidence of lost-time work injuries occurring on U.S. farms using a two-stage sampling design (to allow state and national estimates to be made). During the period 1993-95, between 15 and 19 states were sampled each year with a 4-page mail survey, with 1,400 farming operations surveyed per state in the study. Data collected indicate an average of 166,000 lost-time injuries occur annually to farm workers. The survey was conducted through an interagency agreement with the USDA National Agricultural Statistical Service (NASS). The data will be used to provide the basis for prioritizing research needs and determining what interventions are needed to reduce farm-related injuries. It is the only known nonfatal injury database which provides representative national, regional and state specific injury data for farms, regardless of their size. The first statistical abstract for the year 1993 is scheduled for release during the spring, 1997, with the remaining 2 years (94 & 95) scheduled for release in the fall, 1997.

### Analysis of Surveillance Data for Agricultural Injuries

**For more information contact:**

The National Institute for Occupational  
Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Agriculture production industry, fatalities, injuries, surveillance data analysis

**Purpose:**

To define the fatalities and injuries which occur annually in the agriculture production industry.

**Abstract:**

Approximately 650 fatalities and 165,000 nonfatal injuries occur annually in the agriculture production industry. In this project data will be analyzed from various sources, including the: National Traumatic Occupational Fatalities (NTOF) surveillance system; National Electronic Injury Surveillance System (NEISS); Census of Fatal Occupational Injuries (CFOI); Traumatic Injury Surveillance of Farmers (TISF) database, and the Bureau of Labor Statistics (BLS) Annual Survey, to determine the major causes of work-related agricultural injuries and fatalities and to define the characteristics of these injuries. Emphasis will be placed on utilizing the literal information available in the NTOF, NEISS, CFOI and TISF to define the circumstances of the injury. This should provide valuable information on what intervention and research projects are needed and which will have the most impact in reducing farm-related injuries.

### Child Agricultural Injury Surveillance

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Children, agriculture, injury, surveillance

**Purpose:**

To analyze existing data sources to determine how they can contribute to knowledge of childhood agricultural injuries.

**Abstract:**

This project will involve analyses of existing sources of data (e.g. mortality data from the National Center for Health Statistics, Fatality Assessment and Control Evaluation project, National Electronic Injury Surveillance System, and Farm Family Health and Hazard Survey) to determine how these systems can contribute to the knowledge of childhood agricultural injuries, coding issues, and strengths and limitations of each system. Information from this project will be used to identify promising systems for ongoing surveillance and reporting of childhood agricultural injuries. In addition, a peer meeting will be conducted on methods to obtain data for child agriculture injury surveillance.

### Child Agricultural Injury Prevention

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Children, agriculture, injury, prevention

**Purpose:**

To evaluate agricultural injuries to children.

**Abstract:**

This project is designed to: 1) convene a federal task force to examine and consider recommendations developed by the National Committee on Childhood Agricultural Injury Prevention (NCCAIP); 2) assist in the development of NIOSH documentation of the scientific base for regulatory and programmatic recommendations; and 3) assist in the development of a NIOSH grant and cooperative agreement program to stimulate research and the use of empirical data to reduce agricultural injuries to children.

### National Traumatic Occupational Fatality (NTOF) Surveillance System

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Work-related fatalities, agriculture, risk factors, policy, prevention

**Purpose:**

To identify potential risk factors, set occupational injury prevention priorities, monitor, and provide data for national safety policy.

**Abstract:**

The National Traumatic Occupational Fatality (NTOF) project provides a nationwide surveillance system for fatal occupational injuries. Through the purchase and automation of all U.S. death certificates for those who died from a workplace injury, NIOSH is able to describe the national and State-specific nature, magnitude, risk, and characteristics of fatal occupational injuries. NTOF data are continuously analyzed to describe workplace fatal injuries at the national and State level, and for specific industries, occupations, and causes of death. NTOF data are used to identify potential risk factors, set occupational injury prevention priorities, monitor trends over time, and provide quantitative data for national safety policy. These findings are disseminated through journal articles, NIOSH Alerts, and scientific presentations and are used by numerous State and Federal agencies and academia to support occupational injury prevention research and programs. Approximately 12% of the annual work-related fatalities occurring in the U.S. are within the Agriculture Industry.

### Fatality Assessment and Control Evaluation (FACE) Project- Technical Assistance

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Fatal injuries, high risk, prevention strategies

**Purpose:**

To prevent fatal work injuries in the workplace by identifying work situations at high risk for fatal injury and developing prevention strategies.

**Abstract:**

This project is designed to prevent fatal work injuries by identifying work situations at high risk for fatal injury and developing prevention strategies for those who can intervene in the workplace. Through on-site fatality investigations, agent, host, and environmental data from the pre-event, event, and post-event phases of the fatal incident are collected via a case-series design to facilitate descriptive analysis of selected occupational fatalities (falls from elevations, machine-related, logging). The resulting analyses identify factors contributing to these fatalities and aid in the development of recommendations for preventing similar deaths. To date, over 180 individual Fatality Assessment and Control Evaluation (FACE) investigations have been conducted for the agriculture, forestry, and fishing sector. The results of FACE investigations are disseminated through NIOSH Alerts and technical reports, journal articles, MMWR's, and presentations.

### State Based Fatality Surveillance Using the Fatality Assessment and Control Evaluation (FACE) Model

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Fatalities, work-related injuries, agriculture, surveillance, prevention

**Purpose:**

To prevent fatal work-related injuries through a program of surveillance, on-site investigation, dissemination, and prevention activities.

**Abstract:**

State-based Fatality Assessment and Control Center (FACE) is a continuing extramural program of identification and epidemiologic investigation of selected fatal occupational injuries. This project is implemented through cooperative agreements with health departments in 14 States which use the NIOSH FACE investigative methodology. State-based FACE identifies cases through active surveillance of all external causes of occupational death. In-depth evaluations of risk factors are conducted for targeted categories of fatal injuries as determined by national and regional priorities. Detailed epidemiologic data are collected on the circumstances of selected fatalities through on-site investigations, using a standardized investigation protocol and data collection instruments. Agent, victim and environment data are evaluated in relation to the present-event and post-event phases of the incident. The project's ability to couple case identification with on-site case investigation yields detailed data beyond that normally produced by other surveillance systems. Because the project is State-based, the resulting recommended preventions will be readily adaptable to specific regional needs and rapidly disseminated to the audience able to implement workplace controls. A number of the 14 state-based FACE programs have an emphasis on agricultural-related fatalities, and have published Alerts, Bulletins and other materials related to agricultural safety and prevention.

### Agricultural Dusts: Field Based Evaluation of Exposures and Respiratory Illness

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Dust, respiratory disease, prevention, medical and field studies

**Purpose:**

To identify relationships between organic dust exposure and respiratory disease as a foundation for providing control recommendations for prevention.

**Abstract:**

This project involves medical and environmental field studies in various agricultural settings to collect data on relationships between dust exposures and respiratory disease that can be applied to prevention efforts. Study results and control recommendations are disseminated in Health Hazard Evaluation reports, through peer reviewed journal articles, and in larger NIOSH reports such as alerts.

### Microbial Toxins in Occupational Diseases

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Organic dusts, airborne toxins, fungi, inflammatory response

**Purpose:**

To define the critical variables associated with the measurement of airborne endotoxins in various work environments and the role of fungi in the health effects associated with exposure to microbial aerosols.

**Abstract:**

This project should produce standardized protocols for the measurement of airborne endotoxins in organic dusts. More accurate and quantitative techniques for the detection of specific fungi or their toxic metabolites will be developed. In addition, it is hoped that better understanding of the direct toxic effects of, or the inflammatory response to fungal agents will lead to enhanced recognition of the hazards associated with exposure to these agents.

### Identification of Occupational Allergens

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Occupational allergies, airborne contaminants, preventive strategies

**Purpose:**

To develop improved techniques to detect occupational allergens.

**Abstract:**

This project will develop improved techniques for the detection of occupational allergies before adverse clinical outcomes occur, and improved techniques for the detection and identification of occupational allergens. The project will involve both analyses of clinical samples, experimental studies in animals, and the application of immunochemical techniques to environmental assessment techniques. It is hoped that this project will provide tools for more objective evaluations of airborne contaminants that can cause occupational allergies, and more specific measures of health effects associated with exposure to such leading to the development of an effective prevention strategy for some occupational allergies and asthma.

### Emerging Technology for Respiratory Disease Evaluation

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Occupational respiratory disease, pulmonary function technology

**Purpose:**

To develop technologies and tools to detect occupational respiratory disease.

**Abstract:**

This project will refine current technologies and develop new tools to allow more efficient and sensitive detection of occupational respiratory disease. Traditional volume spirometers have been evaluated and improvements have been made to increase the

sensitivity and accuracy of these devices. In addition, an innovative new spirometer has been developed that allows for better detection of respiratory hazards in the workplace. The continued testing and improvements in pulmonary function technology will improve the ability to detect respiratory disease by providing more reliable and accurate instrumentation. Innovative new technology such as the belt-worn spirometer will become commercially available for widespread use in the medical community.

### Occupational Asthma Identification Methods

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Occupational asthma, screening methods, risk factors, agricultural workers

**Purpose:**

To evaluate screening methods and risk factors for occupational asthma and its occurrence in agriculture and other workers.

**Abstract:**

This project is a prospective field based study designed to evaluate screening methods and risk factors for occupational asthma. The primary objective of the study is to examine the potential of different asthma screening approaches as surveillance tools when employed serially over time among workers at risk. The second major objective is to characterize the occurrence of occupational asthma in several industries with specific focus on agriculture (insect raising workers), isocyanate using workers, and other occupational groups with different exposure profiles. The development of simple, objective, standardized methods and criteria for identifying cases of occupational asthma will encourage both case reporting by physicians and surveillance efforts by state health departments.

### Dose Assessment in Field Studies: Task-related Variation

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Ventilatory requirements, respiratory tract deposition, environmental dust exposure

**Purpose:**

To develop a guide to ventilatory requirements used in combination with environmental dust exposure measurements.

**Abstract:**

This investigation will result in the development of a practical guide to ventilatory requirements of elemental job activities, useful in combination with environmental dust exposure measurements. The project will also identify job-task related variations in the profile of particle-size dependent respiratory tract dust deposition. A database of current information related to the ventilatory patterns associated with elemental industrial and commercial job activities will be developed. Revised models of respiratory tract deposition will enable clinicians, physiologists, physicists, industrial hygienists, and safety officers to more accurately estimate biological dosing in the work environment which will reduce the prevalence of occupational respiratory disease in a variety of settings including agriculture.

### Direct Reading Device for Dose Assessment

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Atrazine, urinary metabolites, monitoring system

**Purpose:**

To develop a low cost, easy, disposable system to monitor urinary metabolites of atrazine in humans.

**Abstract:**

The goal of this project is to develop an inexpensive, disposable, easy-to-use system for monitoring human urinary metabolites of atrazine (or other herbicides of interest). This developed system will be used to analyze worker urine samples collected in the NIOSH project "Assessment of Exposure to Herbicide Applicators". This new approach to biological monitoring offers the potential for real-time results and therefore the opportunity for quicker identification of situations requiring immediate intervention.

### Immunochemical Biological Monitoring of Agricultural Workers

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Herbicides, workers, immunochemical methods

**Purpose:**

To develop immunochemical methods for alachlor, metolachlor, atrazine, cyanazine, and 2-4 D to use in biological monitoring of herbicide workers.

**Abstract:**

In this project, results from the application of the immunochemical methods to a NIOSH field study will be correlated with results obtained from the analysis of the same samples by traditional biochemical biological monitoring to assess the utility of immunochemical methods for future studies. Progress to date includes adapting commercially available immunoassay kits developed for the analysis of the herbicides in groundwater, to the analysis of human urinary metabolites of the target herbicides. Procedures have been developed to eliminate urine matrix effects and cross reactivity between herbicides. Analysis of some preliminary urine samples collected by our partners from herbicide applicators having multiple herbicide exposures have shown that the kits are excellent screens for exposure. The developed methods have considerably higher analytical throughput, require less sample, and improved limits of detection compared to conventional (chromatographic) methods. In FY96, several hundred field samples were collected by NIOSH and analyses initiated. In FY97, analyses will be completed and workers will be notified of their exposures and methods will be presented and published.

### Biological Monitoring Research and Support

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Biological monitoring, clinical analytical support

**Purpose:**

To provide biological monitoring and clinical analytical support to field investigations.

**Abstract:**

In past years, this project has provided the biological-monitoring and clinical analytical support required by NIOSH's health-hazard evaluations and other field investigations. For FY 1997, this present project has been expanded and will provide all required biological monitoring analytical support by a) developing new urinalysis methods for parent compounds or metabolites targeted in field studies; b) using the developed methods to analyze field samples; and c) purchasing commercially-available routine analyses. This project has provided analytical results for health hazard evaluations, published newly developed techniques in government documents, journals, and transferred these methods to the private sector.

### Behavioral Health Risks in Farm Families

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Neurobehavioral disorders, stress-related injury

**Purpose:**

To examine neurobehavioral disorders and stress-related injury among farm families.

**Abstract:**

This project consists of three elements to investigate neurobehavioral disorders and stress-related injuries in farm families. In Element 1, NIOSH and the Ohio State University (OSU) have initiated a followup study of Ohio farmers who previously self-reported excessive pesticide exposures and neurobehavioral symptoms. Objective neurobehavioral tests, pesticide bioassays, and environmental samples, are being used to validate the self-report findings. In Element 2, NIOSH has initiated development of an expanded sensory-motor test battery with improved sensitivity to pesticide effects. Tests of tremor, postural sway, motor control, temperature sensitivity, vision, audition, and olfaction have been pilot tested, and will be formally evaluated by the Oregon Health Sciences University in a study of individuals with extensive pesticide exposures and pesticide illness. In Element 3, work by NIOSH and the University of Kentucky has identified linkages between stressful job demands and injury among family farmers. Based on this work, interventions to reduce stress and injury were developed and pilot-tested. Trial evaluations of these interventions will be concluded, and a report summarizing the results of this developmental effort will be prepared and disseminated to agricultural safety and health experts. A grant supplement to Colorado State University will investigate: 1) job tasks performed by children of all ages on the farm; 2) parental attitudes and behaviors related to high risk activities of children on farms, and 3) work-related injury patterns of children on these farms.

### Application of Biomarkers to Human Field Studies

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Occupational carcinogens, intervention/prevention strategies, biological monitoring methods, field studies

**Purpose:**

To assess human exposure and risk of exposure to occupational carcinogens and toxicants and to develop intervention/prevention strategies.

**Abstract:**

The goal of this project is to apply biological monitoring methods to human field investigations to assess exposure and risk of that exposure to occupational carcinogens and toxicants, which can be used to develop intervention/prevention strategies. Three peer-reviewed manuscripts have been published from the results of this project. Six biological monitoring methods have been developed and/or used for field studies in FY96. These methods include: NAT2 phenotyping, acetylator phenotyping, DNA repair capacity for methyl adducts, and 2E1 genotyping (all Biomarkers for Host Susceptibility) and repaired DNA adducts in urine and methylated DNA adducts (Biomarkers for Exposure).

### Hearing Conservation Programs for Underserved Workers

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Survey tool, occupational hearing, loss, interventions, construction workers

**Purpose:**

To plan and evaluate interventions for training and educating construction workers to prevent occupational hearing loss.

**Abstract:**

A survey tool has been developed for workers in construction. The survey is designed to be useful in planning and evaluating interventions for training and educating construction workers to prevent occupational hearing loss. This survey tool will enable hearing health professionals to evaluate the effectiveness of hearing loss prevention efforts in 2-3 years. Current methods require at least 5 years in which to evaluate a program. A training video is also under development. It specifically addresses the barriers to hearing protector use that have been identified by this population through focus groups and union surveys. Additionally, a novel data management system utilizing optical card technology and our CRADA-developed computer software system is being beta-tested. This system will permit tracking of mobile workers across job sites, and give workers and management immediate access to pertinent health and training records.

### Determining the Effects of Chemicals on Reproduction Using Cell Culture

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Xenoestrogens, endocrine disrupting chemicals, reproductive effects, Leydig cells, Sertoli cells, ovarian follicles, apoptosis

**Purpose:**

To establish in vitro cultures of rat gonadal cells to evaluate the effects and mechanism(s) of action of pesticides and occupational chemicals that disrupt reproductive function.

**Abstract:**

This project will establish primary cultures of testicular Leydig and Sertoli cells from male rats of varying ages (neonatal, immature and young adult) and of granulosa cells and intact follicles from gonadotropin-primed immature female rats. It will evaluate the effects of increasing concentrations of the test chemicals on differentiated functions, replication and/or apoptosis of these cultured cells. These studies may provide new data to address the recent concern over the possible role of these chemicals in causing the increased incidence of reproductive disorders in humans.

### Adverse Reproductive Outcomes Among U.S. Forest Service Personnel

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Forestry industry, adverse reproductive outcome, occupational exposure

**Purpose:**

To determine if occupational exposure to hazards in the forestry industry causes adverse reproductive outcomes.

**Abstract:**

NIOSH will conduct a retrospective reproductive survey of a select group of Forest Service Employees. The study will be limited to actively employed female Forest Service workers of reproductive age (18-43). A self administered questionnaire will be mailed to all women of reproductive age during the study period (approx. 10,000 women) to gather information on reproductive history and exposure to potential reproductive hazards on the job.

### A Case-control Study of Primary Intracranial Gliomas among Rural Residents

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Pesticides, gliomas, farm exposures, brain tumor tissue, actual vs. proxy information

**Purpose:**

To determine if pesticides increase the risk of developing gliomas.

**Abstract:**

This case-control study will evaluate associations between rural or farm exposure and primary intracranial gliomas among rural residents in four upper Midwestern states (Iowa, Michigan, Minnesota, and Wisconsin). Other factors that will be examined include exposure to N-nitroso compounds, electromagnetic field radiation, biological agents (viruses and mycotoxins), and solvents. This study will be conducted over 3 years. Six to seven hundred identified cases and twelve hundred to fourteen hundred controls will be interviewed. Brain tumor tissue is also being collected from cases for the assessment of exposure biomarkers. This study will evaluate actual cases rather than use proxy information and determine if this effectively reduces the potential for misclassification. Data collection will be completed in FY98.

### Neurological Effects of Organophosphate Pesticides in Structural Applicators

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Chlorpyrifos, neurotoxic effects, low level exposure

**Purpose:**

To determine if chronic low level exposure to chlorpyrifos is associated with neurotoxic effects.

**Abstract:**

This investigation will study 100 pesticide applicators who apply primarily chlorpyrifos and 100 controls to assess peripheral and

central nervous system effects. Peripheral effects will be measured by nerve conduction and vibrometry and central nervous system effects via computerized neurobehavioral tests. Exposure assessment will consist of interviews, site visits with dermal and air sampling, and tests of urine to measure metabolites of chlorpyrifos. The relationship between the measures of exposure to chlorpyrifos and neurological effects will be determined statistically.

### Ovulatory Function Studies of Workers Exposed to Potential Reproductive Toxicant

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Ovulatory function, pesticides, solvents, shift-work

**Purpose:**

To determine if ovulatory function is effected in occupational groups exposed to potential reproductive toxicants

**Abstract:**

This study will evaluate ovulatory function by using urine hormone assays to detect subtle hormone changes. Potential reproductive toxicants that may be evaluated are pesticides, including endocrine disrupters such as methoxychlor, solvents/solvent mixtures, and shift work/sleep disruption effects.

### Agriculture Emerging Problems

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Initiatives, worker exposure, pesticides

**Purpose:**

To evaluate emerging areas of concern regarding exposure to workers using pesticides.

**Abstract:**

There are five emerging initiatives in agriculture based on discussions with EPA.

- (1) Concern that restricted-entry intervals (REIs) and decontamination procedures for workers exposed to pesticides are not effective is the reason for conducting this study. The objective is to identify work populations that must enter areas such as vineyards, vegetable fields, etc. after they have been sprayed with pesticides. This study will measure workers skin, hand, and inhalation exposures to determine whether the REIs are adequate to reduce exposures to a safe level.
- (2) This project will identify pesticides which contain inert ingredients with known toxic effects and measure the exposures of pesticide applicators to both the active and inert ingredients. If substantial exposures are found the potential health effects from exposure to these compounds will be evaluated.
- (3) The objective of this study is to identify and measure the pesticide exposures of import inspectors, cargo handlers, and workers who handle and market these products for sale. This study will document the type and level of pesticide exposures of workers in this industry and evaluate techniques for reducing their exposures.
- (4) The objective of this project is to measure the skin exposures and absorbed doses of workers in the animal groomers industry who apply pesticides to animals during grooming procedures and evaluate the health effects associated, with this practice.
- (5) This project will evaluate the general health and safety hazards associated with worker exposure to ethylene and carbon monoxide generated in the ripening of fruit for grocery stores.

### Field Evaluation of a New Method for Measuring Mancozeb and Maneb Exposure

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Mancozeb and maneb measurement, laboratory method development, hand sampling

**Purpose:**

To evaluate the performance of a new method for measuring mancozeb and maneb in field samples.

**Abstract:**

This study will assess 24 workers and evaluate the method for measuring mancozeb and maneb in field samples. The proposed method is a substantial improvement over existing methodology. A second priority is to determine the better method for hand sampling, hand washing or hand wiping. Hand wipes are easier to ship but may be more difficult to standardize. A replicated Latin Square will be used to test the comparison.

### Cancer Control Demonstration Projects

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Cancer control services, intervention strategies, demonstration projects

**Purpose:**

To identify barriers which prevent farmers and their families from accessing the full range of cancer control services and the development and implementation of interventions to mitigate those barriers.

**Abstract:**

The projects focus on cancer screening and education programs about cancer prevention, early detection, risk factors, screening, and safe handling of pesticides. They also include migrant farmworkers education and screening programs for breast and cervical cancer, and surveys of migrant farmworkers' knowledge and attitudes about sun exposure and protection, and cervical and breast cancer. This project has included eight organizations in 12 states (California, Delaware, Iowa, Georgia, Maryland, Michigan, Minnesota, Nebraska, North Carolina, Virginia, West Virginia, and Wisconsin). Project results will be published in FY97.

### Pesticide Exposures of Greenhouse Workers

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Greenhouse and nursery workers, organophosphate and carbamate pesticides, Worker Protection Standard, exposure assessment, questionnaire

**Purpose:**

To assess pesticide exposure, evaluate intervention strategies, and make recommendations to the EPA for regulatory assessment of pesticides.

**Abstract:**

Greenhouse and nursery workers will be evaluated in this study which will initially focus on organophosphate and carbamate pesticides. Biological monitoring and exposure monitoring will be conducted to estimate workers' absorbed doses of pesticide. A questionnaire, neurological function tests, and skin evaluations will also be conducted. Initial surveys will determine if workers are following the regulations in the Worker Protection Standard and pesticide labels and whether standards provide adequate protection. Based on the results of the exposure assessment and questionnaire, interventions will be proposed to reduce exposures and illnesses. Follow-up investigations will determine the effectiveness of the interventions.

### Herbicide Exposure Assessment Among Custom Applicators

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)  
University of Washington

**Keywords:** Applicators, herbicides, exposure assessment, analytical methods development

**Purpose:**

To assess the exposure of custom applicators to seven herbicides.

**Abstract:**

This study consists of two components: exposure assessment and analytical methods development. The exposure assessment will measure herbicides in skin, air, urine and saliva samples. In addition, it will determine the degree of exposure to applicators. The analytical methods component includes the development of procedures necessary to evaluate the samples taken for the exposure assessment. Herbicides being evaluated are atrazine, cyanazine, simazine, alachlor, metolachlor, and two esters of 2-4 D used heavily on corn, and soybean fields. Workers and companies will be informed of the study findings and any recommendations. Results of the study will be published in peer reviewed journals and presented at scientific conferences.

### Health and Hazard Surveillance of Migrant Farm Workers

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Data sources, surveillance, occupational safety and health problems

**Purpose:**

To evaluate the feasibility of using available data sources and active surveillance to measure the types and extent of occupational safety and health problems among farmworkers.

**Abstract:**

Multiple data sources, cross-sectional surveys, and clinical records will be used by staff who are experienced in surveillance, survey research, and agriculture. Current activities focus on the Camp Health Aide project. Through an Interagency Agreement with the migrant health program, we have developed surveillance methods and tools. Accomplishments include scientific presentations of National Occupational Mortality Surveillance System analyses, development, piloting and utilization of an Occupational health training model, survey of available data sources to be published as a NIOSH document, a report and recommendations from an outside advisory group on surveillance and research priorities for farmworkers, to be published.

### National Occupational Mortality Surveillance System (NOMS)

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Mortality, workers, surveillance

**Purpose:**

To provide a national occupational mortality surveillance system.

**Abstract:**

This is a collaborative project with the National Center for Health Statistics (NCHS), the National Cancer Institute (NCI), and State health departments. The project involves training State personnel to code the occupation and industry information from death certificates and partially reimburses State health departments to provide these data. To date, 250 State personnel have been trained. Eighteen states have submitted data. Over 600,000 records are added yearly to the system which has been in existence since 1984. This is a low cost, wide geographical ranging, recent information system. Information on all causes of deaths in 500 occupations and 250 industries with race designation are included. There have been many publications from this project on all types of cancer, mortality of workers in specific occupations and how the surveillance system can be used.

### Farm Family Health and Hazard Survey (FFHHS) Database Development and Statistical Analysis

**For more information contact:**

The National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** survey data results, database

**Purpose:**

To incorporate results from all Family Farm Health and Hazard Survey data.

**Abstract:**

This database will be available for the research needs of intramural and extramural partners. During FY97 the necessary computer systems, statistical analysis, and other support activities will be developed. In FY98-99 the program will be conducted. The information collected from this data will be disseminated through the NIOSH Home Page and other appropriate media.

### Analysis of Workplace Air Samples by Immunoassay Technology

**For more information contact:**

National Institute for Occupational Safety and Health  
1-800-35-NIOSH

**Keywords:** Sampling and analytical methods, pesticides, enzyme-linked immunosorbent assay

**Purpose:**

To adapt commercially available immunoassay methods for the analysis of workplace air samples.

**Abstract:**

This study will investigate the use of the enzyme-linked immunosorbent assay method to address the need for an air sampling and analytical method for alachlor and other pesticides. Sampling and analytical methods should result from this project that have the

potential for field analysis. These methods will be published in the NIOSH Manual of Analytical Methods and will enable the collection of both qualitative (field analysis) and quantitative (laboratory analysis) data on agricultural workers' exposures to airborne pesticides.

### Analytical Method Development for Emerging Problems

**For more information contact:**

National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Sampling and analytical problems, analytical method development, industrial hygiene, metal working fluids

**Purpose:**

To investigate feasibility and perform initial research on emerging industrial hygiene-related sampling and analytical problems.

**Abstract:**

Initial feasibility studies and research on emerging industrial hygiene-related sampling and analytical problems may lead to the development of separate research projects on specific sampling and analytical methods. Successful methods initiated or modified under this project include airborne lead particulates, methyl bromide, organophosphorus and organonitrogen pesticides, and gaseous and particulate fluorides. Currently, methods to measure dermal exposure to pesticides are being studied. Methods developed under this project will be published in the NIOSH Manual of Analytical Methods for dissemination to the industrial hygiene community.

### Control Technology for NIOSH Surveillance Activities

**For more information contact:**

National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Engineering controls to minimize injuries/disease, surveillance, intervention, Sentinel Event Notification System for Occupational Risks (SENSOR)

**Purpose:**

To identify, evaluate, and/or develop engineering controls to minimize the incidence of injury/disease identified by surveillance.

**Abstract:**

This project is the intervention component of the NIOSH surveillance activities related to the Sentinel Event Notification System for Occupational Risks (SENSOR). SENSOR identifies disease/injury cases from a variety of chemical and physical agents through state health department reporting. Field studies are conducted to evaluate, develop, or recommend appropriate engineering controls to minimize injuries/diseases identified through surveillance. Current research involves controlling carbon monoxide poisonings from small, gasoline engines used in construction- and agriculture-related activities. This project assists state health departments by providing technical expertise during field surveys.

### Method Development for Fungi Involved in Occupational Diseases

**For more information contact:**

National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Molecular bioanalytical techniques, pathogenic fungi

**Purpose:**

To develop DNA analytical methods to identify pathogenic fungi in the workplace.

**Abstract:**

The project utilizes state-of-the-art molecular bioanalytical techniques in order to identify pathogenic fungi in the workplace. These fungi may be present in bird or bat droppings or in contaminated soil. When these sources are disturbed during activities, such as construction or agriculture, the potential for worker exposure to fungi-containing aerosols exists. The goal is to develop a DNA analytical method that will permit rapid simultaneous screening for *Histoplasma capsulatum*, *Cryptococcus neoformans*, *Blastomyces dermatides*, and *Coccidioides immitis* without culturing. The results will be published in the NIOSH Manual of Analytical Methods. This information is important because no fast, specific, sensitive, or inexpensive analytical method is available for the detection of pathogenic fungi in the workplace.

### Agriculture Environmental Enclosures

**For more information contact:**

National Institute for Occupational Safety and Health  
1-800-35-NIOSH

**Keywords:** agricultural vehicle enclosures, occupational lung diseases, filtration controls

**Purpose:**

To evaluate the effectiveness of control technology within agricultural cabs and to identify areas where efficiency can be improved.

**Abstract:**

This project evaluates the use of enclosures on agricultural vehicles to reduce operator air contaminant exposure. It involves both field evaluations on working farms and equipment evaluations conducted in collaboration with equipment manufacturers. The results will contribute to the continuing development of test procedures for assessing the effectiveness of control technology within environmental enclosures. The project will make an important contribution in the reduction of asthma morbidity and nonfatal poisoning.

### Work-related Lung Disease Surveillance Report

**For more information contact:**

National Institute for Occupational Safety and Health  
1-800-35-NIOSH (356-4674)

**Keywords:** Reports, occupational respiratory disease, surveillance

**Purpose:**

To provide comprehensive surveillance data for occupational respiratory diseases in the United States,

**Abstract:**

The Work-Related Lung Disease Surveillance (WoRLD) Reports provide ongoing comprehensive surveillance data for occupational respiratory diseases in the United States. The series of reports contain condition specific, case-based and rate-based surveillance data, including counts, crude and age-adjusted mortality rates, years of potential life lost to age 65 and to life expectancy, geographic distributions of occupational respiratory diseases, proportionate mortality ratios, etc. for selected occupational respiratory diseases (e.g., asbestosis, malignant neoplasms of the pleura, coal workers' pneumoconiosis, silicosis, byssinosis, hypersensitivity pneumonitis, other and unspecified pneumoconiosis and occupational asthma).

**For Information on Other  
Occupational Safety  
and Health Concerns**

Call NIOSH at:  
1-800-35-NIOSH (356-4674)

or visit the NIOSH Homepage at:  
<http://www.cdc.gov/niosh/homepage.html>

