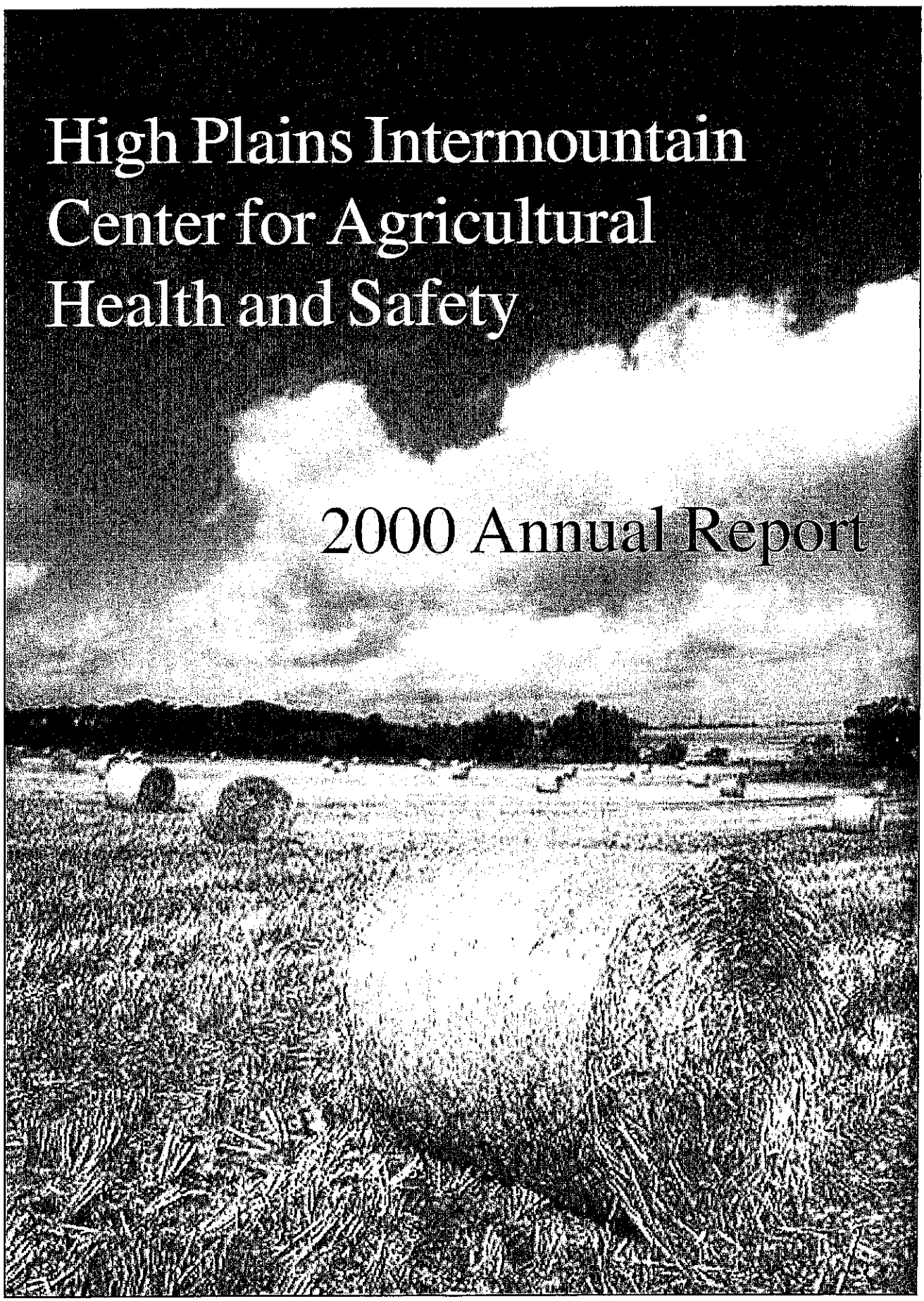
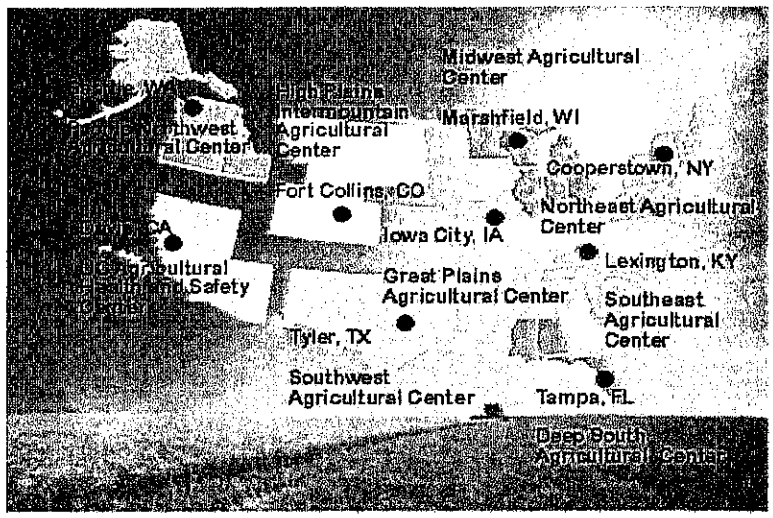
High Plains Intermountain Center for Agricultural Health and Safety

2000 Annual Report



2000 Report Contents

NIOSH Agricultural Centers: By Agricultural Boundaries



Director's Statement

The High Plains Intermountain Center for Agricultural Health and Safety (HICAHS) was established by the National Institute for Occupational Safety and Health (NIOSH) in 1991 to serve Public Health Safety (PHS) Region VIII in the delivery of agricultural health and safety. HICAHS is now one of nine centers strategically located around the United States. HICAHS was founded on the premise, and continues to value the importance of preventing occupational disease, injury, disability and death, due to working conditions in the agricultural sector of our economy. It is a multi-disciplinary program utilizing expertise in occupational hygiene, occupational safety, social work, agricultural science, engineering, toxicology, epidemiology, adult education and communications technology. Although being a truly regional center, covering nearly 20 percent of the land mass of the continental United States, we have become more and more successful in serving all of the states in our region.

Agriculture is one of the most dangerous occupations in this country, and has been for decades. It is a chemically intensive industry that becomes more dangerous each year as agriculture becomes more and more mechanized. NIOSH estimates that at a minimum, 800 agricultural workers die each year on the job, and children, fifteen years of age and younger, account for an additional 100 deaths each year. In the past five years, 47,000 people in agriculture have died from chronic obstructive pulmonary disease, much of which can be attributed to irritant and toxic materials in the air that agriculturalists breathe on a continual basis as part of their jobs. Furthermore, 200,000 debilitating injuries and illnesses account for billions of dollars in annual economic losses and drastic changes in the quality of life for those engaged in agriculture. It is obvious that prevention is the key to addressing this terrible tragedy that continues to play out each year. Thus, our programs in research, education and outreach, through our established network of colleagues, friends and collaborators, are focused on prevention.

Dr. Roy Buchan
Director

Outreach: Health and Safety Activities

Del Sandfort, Lori Berberet, Tina Daniels, Brit Todd

Outreach continues to be an ever-evolving process within HICAHS. We are constantly evaluating ways to get our safety message to the agricultural workers throughout the region. Our ties to agricultural associations and organizations remain strong, provide us with injury data and allow access to farmers, ranchers and their employees. Essential components of our outreach program include work with:

- commodity organizations
- migrant workers
- training, education and hazard surveys
- Cooperative Extension

Commodity Organizations

Outreach personnel have remained active on several agricultural producer safety committees. The Colorado Corn Growers, Colorado Onion Association and the Colorado Livestock Association have formed safety committees that address the safety concerns of their members. We all share the common objective of reducing injuries in agriculture.

Outreach personnel worked closely with the Colorado Corn Growers to develop this years' safety program. The focus of the annual safety training was proper lifting techniques. Improper lifting is one of the leading causes of injuries in agriculture and one of the most costly as well. The program was presented several times throughout the state. HICAHS's involvement with the Colorado Livestock Association has provided an opportunity to reach areas such as feedlots and dairies. The Association and HICAHS have worked together to create a safety reference manual. The manual will provide information on a number of topics including sections on safety programs and their management, best animal handling practices and an employee section. Parts of the manual are being translated into Spanish to match the demands of a diverse work force.

Migrant Workers

Summer interns and outreach staff continued the HICAHS involvement of past years in working with migrant workers (see photo). Water samples were collected and evaluated to ensure good-quality drinking water was available. Sixty workers were trained in the San Luis Valley on working safely with pesticides. The training was part of the requirement for our summer intern, who was co-sponsored by the Association of Farmworker Opportunity Programs (AFOP). Colorado State University was the first university in the U.S. to use AFOP interns. Safety manuals were also translated to Spanish by Tom Walsh and Gretta St. Martin.

Training, Education and Hazard Surveys

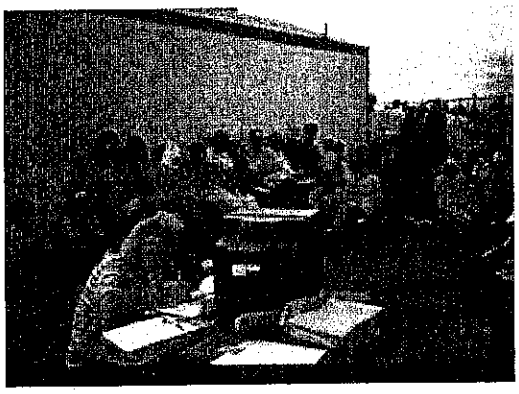
Outreach staff members conducted 43 training and education sessions reaching an audience of over 5,850 people. Covered in professional sessions were presentation topics such as grain dust exposures, endotoxins in grain dust and aerosol science. Training topics focused on pesticide-related information, personal protective equipment, machine guarding and home shop safety. Included in the training and education efforts were several educational activities for children and youth. Our efforts were focused on a wide array of potential farm hazards, highlighting on tractor roll-overs, chemical safety and pinch points in farm equipment. Over 3,000 youngsters attended these programs. Outreach personnel also conducted 27 health and safety visits, covering nearly 600 employees during the 1999 fiscal year.

Businesses that were served ranged from small farms to large feedlot operations. Several of the visits were for the evaluation of carbon monoxide exposures and health hazards in potato packing warehouses.

Outreach: Health and Safety Activities (Continued)

Cooperative Extension

HICAHS and Colorado State University Cooperative Extension continue to share a position. Tina Daniels served as both the Farm Safety Specialist for Cooperative Extension and as a health and safety consultant for HICAHS. This shared position provides health and safety support to both organizations.



This joint effort provides another avenue for HICAHS to disseminate information from it's outreach and research activities. It has also improved our communications with Cooperative Extension agents in other states in the region, which include Colorado, Utah, Wyoming, Montana, North Dakota and South Dakota. Also, a *Weekly Safety Message*, which originates from the joint position, is forwarded to the Farm Safety Specialist in these states and is frequently used in communications with Extension agents in their respective states.

The Fence Post, a publication with a paid circulation of 25,000, has used some of the *Weekly Safety Messages* to increase reader awareness of farm safety issues. The magazine has subscribers in all 50 states as well as Canada, Australia and Europe. The connection between HICAHS and Cooperative Extension in the region has enabled us to help financially support and assist projects in Utah, Wyoming, Montana, North Dakota and South Dakota. South Dakota has used the funding to provide a Farmedic Instructor Course to train rescue workers on proper response techniques in the event of rural accidents. North Dakota developed educational materials for the Tractor Safety School Program and had 50 students attend. In addition, North Dakota held 14 Safety Day Camps which 420 children attended to learn more about safety in agriculture. Utah developed a presentation on the dangers associated with agriculture, which was designed for schools and 4-H groups. The program was presented before 17 different groups and had 441 participants. Handouts were developed and supplied to youth attending the presentations. Montana and Wyoming had projects similar to Utah, however the number of people that took part in their programs was not recorded. These projects made significant impacts in their respective states and beyond. The principle investigators for each of the states were also curious about the activities in other states and wanted to exchange information on programs and other materials that were developed.

Looking Forward

HICAHS is excited about new developments for 2001.

♦ The HICAHS web page is currently being revised and updated to become the immediate source of information regarding all aspects of research, education and outreach for agricultural health and safety in the region. The revised web page will provide easily accessible information about center activities and programs. The web page address is:

www.hicahs.colostate.edu

♦ AgriAction information is a resource for agriculturists. It will now be available on the web in English, Spanish and Navajo.

♦ A new course in Agricultural Health and Safety will be offered as a joint effort through HICAHS, Environmental Health and the College of Agricultural Sciences. Plans for making the course available via distance education for off-campus students are in the works for next year.

♦ The High School Agricultural Health and Safety Curriculum is in the pilot testing stage and will be available to Vocational Agriculture instructors beginning in the Fall.

♦ Additional outreach workshops are planned for this year.

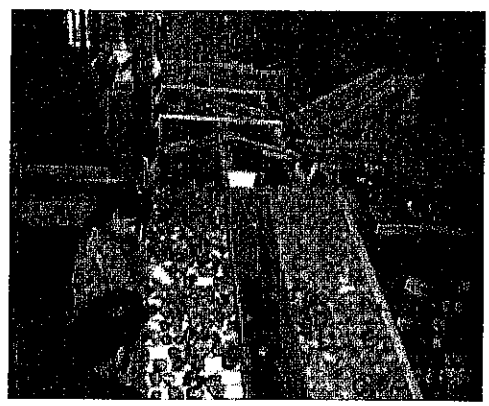
Research: Risks to Agricultural Workers

In the High Plains-Intermountain region, agricultural work frequently takes place at higher altitudes with lower atmospheric oxygen and a higher intensity of solar irradiation. Two examples of the HICAHS research programs highlighted this year involve efforts to identify and evaluate region specific risks due either to the geography of our region and/or the high concentration of specific agricultural activities in our region.

Carbon Monoxide Exposure

Carbon monoxide often results from the incomplete combustion of fossil fuels. The hazards from this gas arise because carbon monoxide combines with hemoglobin, the oxygen carrying protein in blood, and interferes with oxygen delivery to important organs in the body. Occupational exposure standards for carbon monoxide are set so that no more than 5% of the available hemoglobin is carbon monoxide bound instead of oxygen. Workers with heart disease or chronic pulmonary disease are at greater risk than healthy workers. Dangers from carbon monoxide are also greater when the atmosphere has lower than normal concentrations of oxygen. In some parts of the Intermountain area, heavy work occurs at elevations in excess of 9000 feet. At these elevations, the air contains less oxygen than that at sea level. What special precautions are necessary to protect workers at high altitudes? This HICAHS research project investigates this question by assessing exposures (and planning to assess the changes in oxygen carrying ability of blood in those exposed) in crop processing.

In this project, Mr. Seth Calkins and Mr. Del Sandfort of HICAHS, measured carbon monoxide exposures in potato processing warehouses located in the San Luis Valley. The exposure to carbon monoxide comes from the propane-fueled forklifts that are used in potato warehouses. Twelve sites were evaluated in this project. Personal dosimeters assessed employee exposure to carbon monoxide. Employees were monitored to determine which job group, sorters (see picture), baggers, boxers, forklift drivers, etc., had the highest exposures. Emissions from all forklifts, including carbon monoxide, carbon dioxide and unburned hydrocarbons, were recorded at each site. The presence of ventilation was also recorded and any additional sources of carbon monxide noted.



Approximately ninety employees were monitored to assess their average exposure to carbon monoxide over the workshift. Several employees monitored in this study exceeded the OSHA PEL (permissible exposure limit) for carbon monoxide (50 ppm/8 hour time-weighted average). Peaks of up to 600 ppm carbon monoxide occurred at some sites. Several employees exceeded the five-minute carbon monoxide ceiling limit set by OSHA (200 ppm/5-minute ceiling). The job title with the greatest risk of exposure was the potato bagger, followed by the forklift driver. This assessment evaluated the exposure of these personnel. Future studies will evaluate the concentrations of carbon monoxide in blood to see if exposures at these higher altitudes cause more carbon monoxide in blood than do similar exposures at lower elevations. Workplace evaluations of the carbon monoxide levels will provide important information to improve work practices and ensure a healthful work environment in these potato warehouse operations.

Research Continued

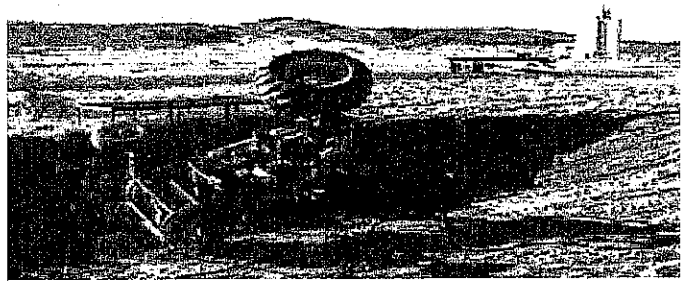
Improving Measures of Chemical Exposures

In a second project aimed at assessing the safety of farming chemicals, Ms. Jill Ruble, Dr. John Tessari and Dr. Mel Andersen are developing chemical methods to measure the exposure of workers to specific herbicides. Large amounts of chemicals are applied to crops by a variety of methods. Atrazine controls broad leaf and grassy weeds in corn, sorghum, and fallow. Atrazine is applied to crops in our region as both a pre- and post-emergent herbicide. When in the body, these herbicides have a small chance of binding to hemoglobin or to proteins in growing hair. To determine the absorption of this compound in workers, this study develops methods to detect atrazine that may be bound in blood or in hair.

Initial studies evaluated the reactivity of atrazine toward hemoglobin and hair proteins in laboratory animals and determined if the binding with these proteins might be useful for measuring exposures of various farm populations. Due to the ease of collecting hair samples, we are looking to see if atrazine binds to proteins in hair. Direct measurements of compounds or their by-products in blood or hair provide a better measure of absorption and a more clear evaluation of the risks posed by certain work activities. Developing accurate biomarkers for absorbed doses of compounds, such as these bound forms of chemical in blood and hair, allow better assessment of the safety of work practices with these compounds in the High Plains Intermountain areas of the U.S.

Tractor Safety and Engineering Control Strategies for Tractors Equipped with Roll-Over Protective Structures (ROPS)

Farm tractor accidents are the leading cause of death in the farming industry. From 1990 to 1995, the yearly average number of tractor-related fatalities was 123, a rate of 5.5 per 100,000 workers. ROPS have been developed as an engineering technology to protect operators from injury when a tractor overturns. Because ROPS changes the center of gravity of the tractors, the stability and safety of the tractor may be altered.



In a continuation of on-going studies on development, installation and testing of ROPS, Dr. Johua Liu and Dr. Paul Ayers, in the Department of Civil Engineering, have begun to evaluate the influence of ROPS on the safety of retrofitted tractors. This project develops and evaluates a tractor stability monitoring system that provides site-of-operation specific stability mapping and related technology for tractor operators. A monitoring system studies the dynamic ROPS deflection and timing of events during tractor roll-overs and determines the effectiveness of protective structures. These field roll-over studies use radio-controlled tractors and traditional tractors equipped with the stability monitoring system for field data aquisition. In these tests, tractors are subjected to rear and side roll-overs to see the effect of the ROPS design and installation pattern on the tractor safety in these simulated accidents. The relationship between position, stability, deflection of ROPS and the field upset tests of ROPS were done with a John Deere A and an Allis Chalmers D17 type tractor. The modified ROPS design for the two types of tractors met all established safety requirements.

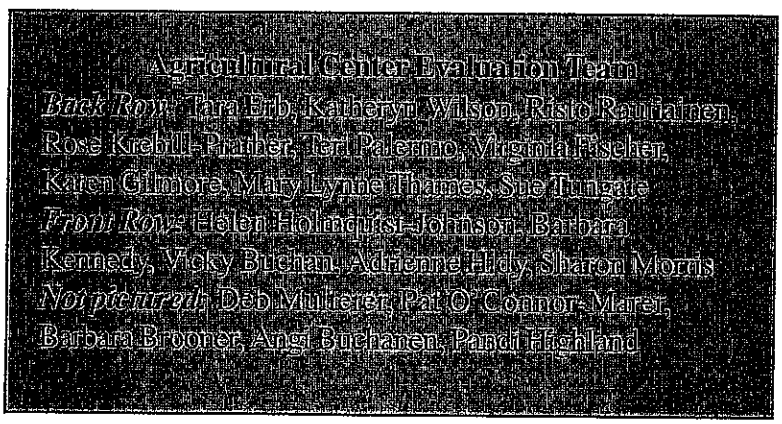
Research Continued

In the near future, concepts of tractor stability and ROPS safety will likely be extended to study ROPS installation on other types of vehicles used in agricultural activities. For instance, All Terrain Vehicles, (ATVs) are also a safety concern on farms. ATV's have been used as a recreational vehicle since the 1970's. By the mid-eighties, they had invaded many agricultural and farm areas where ATV's are efficient and economical substitutes for the pick-up truck, the horse, the tractor and even for walking. Since ATV's are operated off-road or in rural areas, safety has become an increasing concern. Between1985-1997, ATV accidents accounted for nearly 3000 fatalities according to the United States Consumer Product Safety Commission (CPSC). Approximately 36% of ATV-related deaths occurred among children under 16 years of age. Crashes and roll-overs cause many of the deaths. The methods pioneered by HICAHS supported research should not only be important for improving tractor safety but also for the safety of these other types of farm vehicles.

Agricultural Center Initiative Evaluation Fiscal Year 2000 Data and Report Update

A national evaluation project on the NIOSH funded Agricultural Health and Safety Center Initiative was proposed by HICAHS in 1996. A representative from each center first met in May 1997 in Fort Collins, Colorado, to explore the potential of a multi-site approach to evaluation of the NIOSH funded initiative. Since then, Center representatives formed the Agricultural Centers Evaluation (ACE) Team, and have met twice annually to collaboratively develop and implement the multi-site evaluation model. The ACE Team adopted a program monitoring approach to evaluation; tracking initiative progress over time, rather than at one point only. Early in the process, the team generated, prioritized and defined a set of indicators to track centers' collective progress on the NIOSH Agricultural Center Initiative Objectives.

The ACE Team recently completed the first full year of data collection utilizing the database developed and distributed to all nine centers by HICAHS. Data collection procedures and the database were pilot tested in fiscal year 1999 by the individual centers. A draft *Initiative Report* was written and distributed by HICAHS for feedback from a variety of Agricultural Center personnel across the country. A report on the NIOSH Agricultural Center Initiative Multi-Site Evaluation for fiscal year 2000 is slated for January 2001. The ACE Team has not only developed and implemented a program monitoring system for the Agricultural Center Initiative, but has prompted additional collaborative projects and resource sharing among the centers.



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