Tractor Risk Abatement and Control

THE POLICY CONFERENCE

September 10-12, 1997
The University of Iowa
Iowa City, IA

FINAL REPORT

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Tractor Risk Abatement & Control

FINAL REPORT

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Introduction

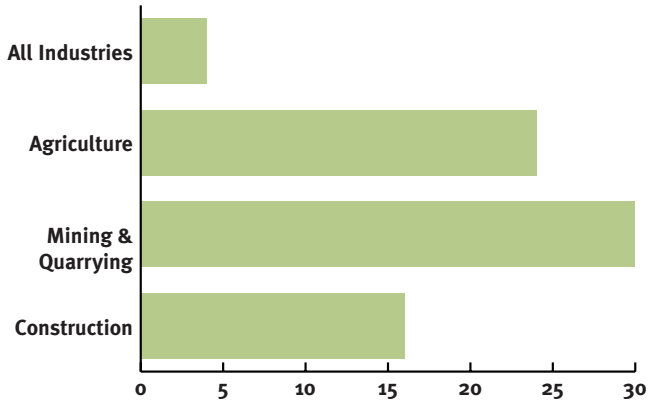
This report contains the results of the first consensus process to establish a national strategy for controlling the number one killer of American farm family members and farm workers: tractor-related injuries. A very rigorous and formalized process was used to achieve consensus from a broad range of stakeholders. The report is in three parts:

1 **Consensus Process**
Results of a consensus process of 40 individuals, representing a broad range of stakeholders of this issue.

2 **Action Plan**
A guiding document for public and private organizations to carry out the recommendations of the consensus process.

3 **Model Legislation**
A guide for federal and state governments to assist them in carrying out the intent of the consensus recommendations.

Fig. 1
Occupational injury and death rates, (Deaths per 100,000) United States, 1992-1995[10]

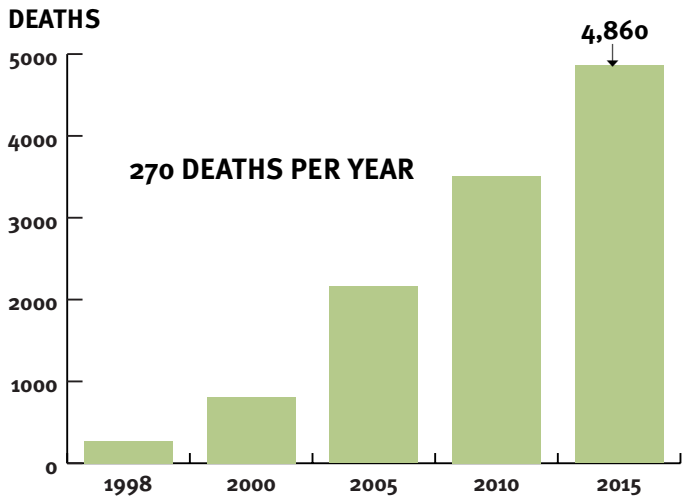


This report represents the framework of a progressive, national plan, incorporating incremental incentives and deterrents, that will save more than 2,000 lives of farm workers and farm family members over the next 15 years. A description of the need for and the process of this program follows.

Agriculture is one of the nation's most hazardous industries, competing only with mining and construction in its danger to workers (Figure 1). The farm tractor is the primary source of fatal agricultural injuries. Tractor-related injuries account for approximately 32% of the deaths and 6% of non-fatal injuries in agriculture. Incidents involving

farm tractors result in about 270 deaths annually in the U.S. (Figure 2), and account for 264,651 restricted workdays and 10,939 lost-time injuries each year. About 550 (5%) of all lost-time injuries are permanent disabilities.[1,2,3]

Fig. 2
Projected Tractor-related Fatalities (In the U.S. Cumulative Estimate)



Many western European countries have nearly eliminated the primary source of death on farms—tractor overturns—by requiring the use of roll-over protective structures (ROPS). In Sweden, where a ROPS law was enacted in 1957, deaths from tractor overturns have decreased more than 56-fold from 17 to 0.3 per 100,000 tractors over the period of 1960 to 1990 (Figure 3). Ninety-eight percent of Sweden's tractors are now in compliance with the law. In Norway, which also passed a ROPS requirement at about the same time, fatalities decreased 6-fold from 24 to 4 per 100,000 tractors over the same period.[4]

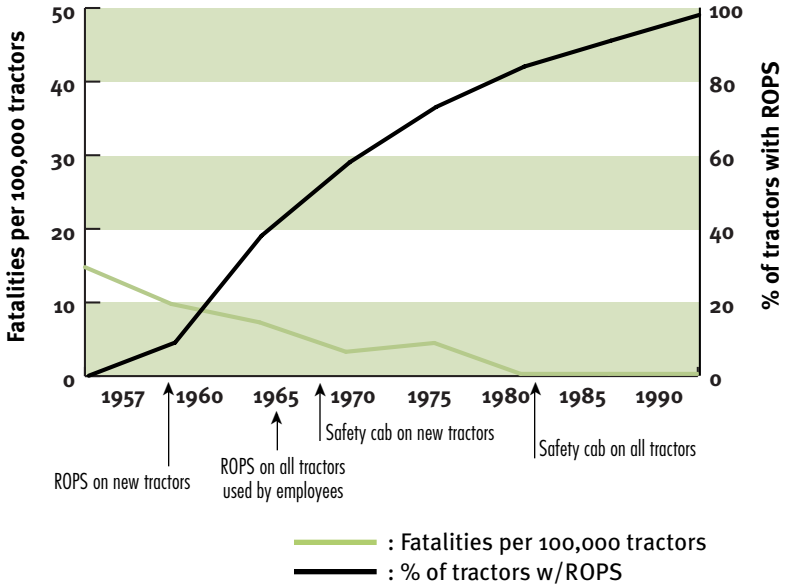


Fig. 3
Policy measures, ROPS use and fatalities in Sweden, 1957-1990
Source: Springfeldt, B. 1998

Much has been done over the last decade to bring agricultural hazards into the realm of public policy, but little has been accomplished in abating and controlling the major source of agricultural fatalities, the farm tractor. Several recommendations were made at a 1988 conference (Agricultural Occupational and Environmental Health: Policy Strategies for the Future) regarding tractors, which addressed ROPS retrofit programs and private sector incentives, but little has been accomplished in fulfilling those recommendations. That conference led to a report[5] and a national program in agricultural safety and health funded by the National Institute for Occupational Safety and Health (NIOSH). In launching that program, the Surgeon General's Conference on Agricultural Safety and Health in 1991 focused atten-

tion on the problems of tractor safety. Dr. James Merchant of The University of Iowa said, "If we cannot develop a U.S. model for a proven intervention on the single most important cause of agricultural mortality (tractor overturns), how can we succeed in addressing less dramatic yet still important causes of agricultural diseases and injuries?" From these programs, a community-based education and behavior change project entitled, Tractor Risk Abatement and Control (TRAC) emerged. NIOSH published and distributed a manual for this program, which had some local successes.[5,6,7]

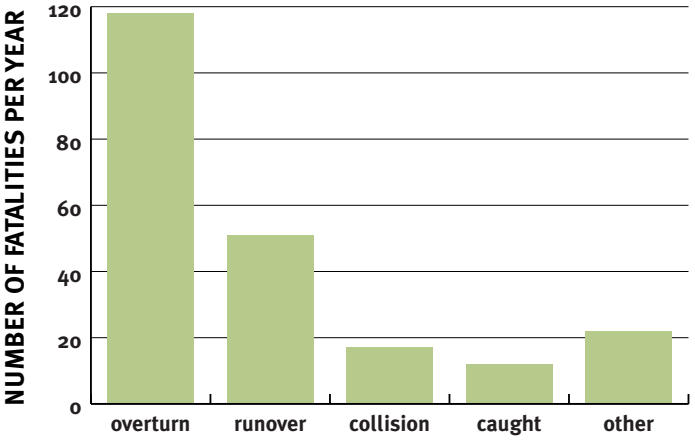


Fig. 4
Tractor-related Fatalities

Tractor manufacturers have voluntarily installed ROPS on all new tractors since 1985, and most manufacturers will sell ROPS at cost to retrofit older tractors. There have been a number of tractor safety education programs as well. However, a nationally integrated, sustained and institutionalized program committed to reducing tractor-related injuries is still lacking. In 1995, eight multidisciplinary stakeholders formed a planning committee (Appendix 1) to convene a TRAC Policy Conference dedicated to the goal of preventing as many tractor-related deaths and injuries to farm workers and their children as possible. The conference, which resulted in this report, was held in at The University of Iowa in September of 1997.

One of the reasons that there has never been a comprehensive effort until now to establish an effective public policy to reduce tractor injuries has been the anticipated opposition from those who could be adversely affected by new policies. Concerns about issues such as industry liability risk and added costs and inconvenience for farmers discouraged action on the problem. In order to move forward, it was imperative to gain a consensus among a broad range of stakeholders so that all concerns could be aired and addressed. Forty individuals were invited to the conference, selected from the breadth of stakeholders, including agricultural equipment manufacturers and dealers, farmers and farm organization representatives, researchers, co-operative extension service personnel, legislators, public health representatives, and lawyers (see Participant List, Appendix 2).

The primary mission of the TRAC conference was to generate action-oriented programs, and to gain consensus among stakeholders for policies to support practices that will reduce injuries related to the operation of agricultural tractors.

At the conference, 40 stakeholders convened and achieved agreement on 25 recommendations shown in Section 1, using a consensus process designed by the conference co-chairs (details of the process are shown in Appendix 3).[8] The conference organizers recognized that recommendations alone will not necessarily lead to actions that will effect the prevention needed and intended. Therefore, following the conference, the chair, co-chairs and rapporteur worked as a committee, with extensive consultation and input from all conference participants, to develop two additional sections to the report. Section 2 is an action plan, with assignments and recommendations that include specified dates that action should occur. Section 3 is model legislation for federal and state governments which suggests directions needed to accomplish the recommendations where appropriate authority and resources are lacking.

Conferees addressed four types of tractor injuries: tractor rollovers, tractor runovers, roadway incidents, and injuries to youth operators. According to the Census of Fatal Occupational Injuries (for the years 1992-1995), and the National Traumatic Occupational Fatality surveillance system (for the years 1990-1993), the three leading causes of tractor-related deaths were overturns (54%), runovers (24%), and highway transportation incidents (13%). Although children are not included in many surveillance systems, they are part of the affected population (Figure 4).[9,10,11] The following are brief descriptions of each of these four kinds of injuries.

THE SPECIFIC OBJECTIVES OF THE CONFERENCE WERE:

- To review existing scientific data regarding the causative factors in tractor-related fatalities;
- To identify and review effective preventive measures;
- To develop interdisciplinary public and private sector policies and strategies;
- To develop model legislation that may be used by states to help establish effective public policy;
- To identify and promote methods for policy management, implementation and evaluation.

THE SPECIFIC ISSUE AREAS INCLUDE INJURIES FROM:

- Tractor overturns
- Runovers
- Roadway Incidents
- Youth Operators

Overturns

A 15-year-old boy was killed when this tractor overturned.

Overturns consistently account for more than 50% of all tractor-related fatalities. Victims are overwhelmingly male, accounting for 97% of the fatalities. Age is also a factor. Farmers over 65 are at 3.5 times greater risk compared to all ages, and account for 40% of the victims; farmers aged 55 years and older account for 60% of all overturn fatalities. The median age of a U.S. farmer is about 50 years.[12]

"HOW DO WE ASSURE THAT EVERY TRACTOR THAT NEEDS A ROPS HAS ONE?"

ROPS (including seat belts) are a proven technology to essentially eliminate these fatalities. Nearly two out of every three tractors in the United States lack a ROPS, and tractors manufactured before 1973 are almost universally without ROPS.[10] Accordingly, the consensus conference addressed the question, "How do we assure that every tractor that needs a ROPS has one?" Conferees agreed on 11 recommendations in response to this question (detailed in Section 1).

Runovers

Extra riders account for a high proportion of runover injuries. Children are too often the victims in these incidents.

The second leading cause of tractor-related fatalities is runovers. Most runovers occur when an operator or an extra rider (often a child) falls from and is run over by the tractor (50%). The next most common runover event is to a bystander in the vicinity of the tractor (27%), often when the tractor starter is bypassed with a metal conductor and the tractor is started in gear. Also, if not braked, unattended tractors may roll down an incline over a pedestrian. Runover fatalities occur predominantly among farmers who are 65 years and older (48%). When farmers 55 years and older are included, this percentage increases to 70%.

The workshop attendees addressed the question, "What combination of public and private policies are needed to prevent injuries from tractor runovers?" Conferees achieved consensus on four recommendations in response to this question.

"WHAT COMBINATION OF PUBLIC AND PRIVATE POLICIES ARE NEEDED TO PREVENT INJURIES FROM TRACTOR RUNOVERS?"

Youth Operators

About 20% of agricultural deaths involve children or adolescents under the age of 18. Based on a study of deaths in Indiana and Wisconsin, tractors were involved in half of all fatalities to children ages 1 to 17. The three leading causes of these fatalities in order of frequency were runovers (22%), overturns (20%), and entanglements (10%). Another study in New Zealand showed that the highest rate of tractor-related hospitalizations was for males, ages 15-19 years (37.8 per 100,000), 1.6 times the incidence for all age groups (22.3 per 100,000).[15,16,17]

"WHAT PUBLIC AND PRIVATE POLICIES ARE NEEDED TO ELIMINATE TRACTOR-RELATED INJURIES AMONG YOUTH?"

Children riding on or operating tractors is a serious challenge for the field of prevention. Studies found that many farm parents allow their children to ride with them as well as operate tractors. Findings vary, however, with anywhere from 37 to 100 percent of parents allowing their children to ride on tractors and between 64 and 100 percent allowed to operate tractors. A survey in Indiana revealed that 98% of children on farms ride as passengers and 50% operate tractors by age 10 years, and 94% begin tractor operations by age 14 years.[18,19,20,21]

The conferees addressed youth operator injuries only in part because the issue was formerly addressed through recommendations by the National Committee for Childhood Agricultural Injury and Prevention. In addition, the recent Childhood Agricultural Injury Prevention Strategy Workshop: A Private Sector Perspective addressed issues raised by the National Committee and presented recommendations in their final report.[22] For the youth operator issue, participants of the TRAC conference addressed the question, "What public and private policies are needed to eliminate tractor-related injuries among youth?" In response, they agreed on three recommendations.

Roadway Incidents

At least 13% of all tractor-related fatalities occur on public highways. Although overturns are the leading cause of fatalities on highways, they also occur from runovers, falls, and collisions. In one study of 31 overturns, three incidents involved youths (ages 10, 12, and 16). They were all killed on public highways. All three were related to inability or lack of experience of these young operators to handle the tractor safely.[1,10]

Most highway vehicle collisions result from sideswipes and angle crashes, and most of these crashes occurred with both the farm and second vehicles driving straight on the roadway. Inadequate marking and lighting of farm equipment is the predominant problem (42%), especially when it is dark at night. A particularly hazardous maneuver for the farm vehicle is a left turn, and for the second vehicle the hazard is passing. These maneuvers resulted in a high frequency of both angle and sideswipe passing crashes.[13,14] For roadway incidents, conferees addressed the question, "What combination of public and private policies are needed to prevent tractor-related collisions on roads?" In response to this question, conferees achieved consensus on six recommendations (detailed in Section 1).

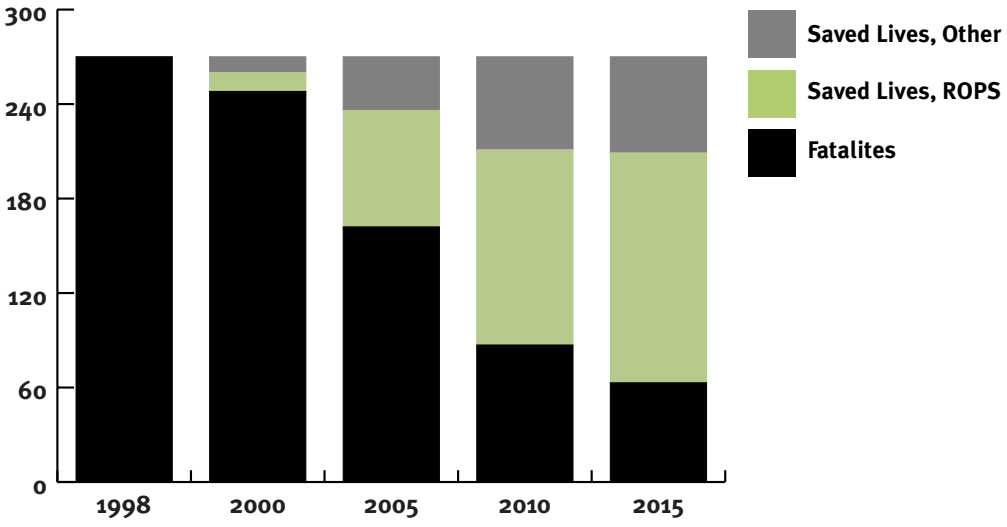
Photo courtesy of LaMar Grafft

WHAT COMBINATION OF PUBLIC AND PRIVATE POLICIES ARE NEEDED TO PREVENT TRACTOR-RELATED COLLISIONS ON ROADS?"

Conclusion

This report is a summation of strategies for reducing the frequency and severity of tractor-related injuries. The proposed national agenda provides an opportunity for us to systematically ensure tractor safety for farmers, their families, and employees across our country. If a comprehensive program of the nature outlined here is not enacted, then we may have to accept the inevitable. Farm family members, including children and workers, will continue to die at high rates from tractor-related events. Overturn deaths in particular will continue until tractors without ROPS have matriculated out of service, which may take 30 years and as many as 5,000 new and needless deaths. However, if all the recommendations made at this conference are implemented (Figure 5), annual deaths could be reduced by nearly 80% by the year 2015. This annual reduction would lead to a total of 2,000 lives saved by 2015 (Figure 6).

Fig. 5
Fatalities, Saved Lives due to ROPS, and Saved Lives due to other efforts
ANNUAL ESTIMATE



Note on Graphs

The estimate for lives saved (ROPS) is calculated utilizing the Swedish experience in ROPS retrofitting (Springfeldt B, Thorson J, Lee BC, 1999). The population of tractors with ROPS increases gradually from the current 38% level to a 99% level by the year 2015, with the mean annual increase of 3.6%. ROPS are assumed 100% effective in reducing rollover fatalities.

The estimate for lives saved (other) is calculated assuming that all efforts described in this document will gradually lead to a 50% reduction of non-overturn fatalities by the year 2011, with a mean increase of 4% in saved lives per year. The reduction will continue at that level.

For both estimates, it is assumed that if nothing is done fatalities will continue at a 270-per-year level.

The following sections include the results of the **Consensus Process.** Section 1 describes 25 specific recommendations which, if implemented, can bring us to the goal we seek. Sections 2 and 3, which lay out a process to achieve the recommendations, were prepared by the conference co-chairs, based on, but outside, the consensus process. Section 2 is an **Action Plan** for public and private agencies to carry out parts of the recommendations. Section 3 is **Model Legislation** for the state and federal level to assist in enabling the recommendations.

The driver of this tractor, which flipped backwards during a tractor pull event, miraculously survived extensive injuries. A ROPS would have allowed him to walk away from this one.

Photos courtesy of Tom Hollinger

Fig. 6
Fatalities, Saved Lives due to ROPS, and Saved Lives due to other efforts
CUMULATIVE ESTIMATE

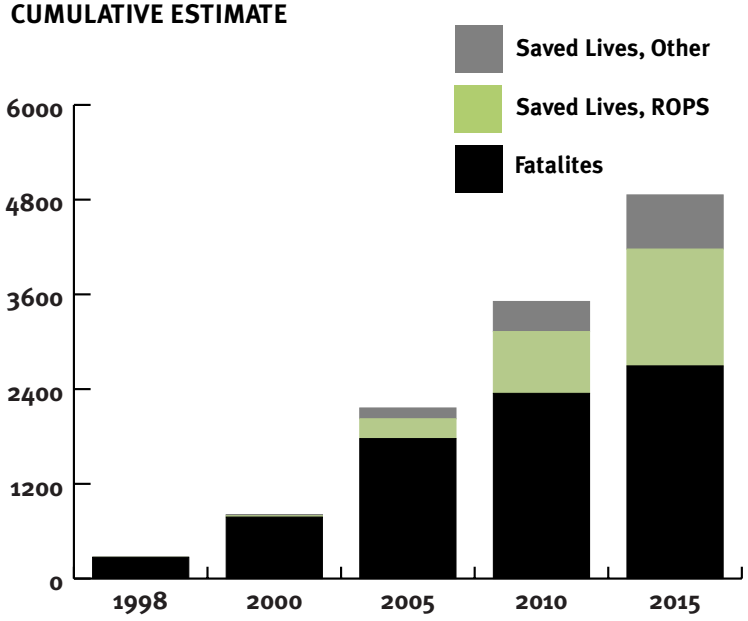


Photo courtesy of Virginia Farm Bureau

SECTION 1

Results of the Formalized Consensus Process

SECTION 1:

Results of the Formalized Consensus Process

These are the detailed results of the formalized consensus process, as described in Appendix 3. For a list of the Planning Committee and conference participants, see Appendices 1 and 2.

1. How can it be assured that every tractor that can potentially overturn has a ROPS (with some reasonable exceptions)?

A. Develop an educational/social marketing system in cooperation with manufacturers and producer groups to create a change in social norms regarding acceptance of rollover protective structures (ROPS).

B. Monitor tractor injuries and regularly publish occurrence and pertinent facts (teaching messages) regarding prevention in a national dissemination to farmers. This monitoring effort should go through The National Safety Council (NSC) and/or National Institute for Occupational Safety and Health (NIOSH), and be modeled on the programs of the National Transportation Safety Board (NTSB) regarding aircraft failures.

C. Establish a tax rebate and/or direct subsidy program in an amount to be finally determined through research, but initially set at $250 per tractor for each tractor on which a ROPS system is installed. This rebate would be for private operators or dealers who intend to resell the tractor.

D. Fund a research program on ROPS designs for pre-ROPS tractors and on ROPS designs for tractors used in special work environments such as low clearance applications and orchards.

E. Define the extent of manufacturer and dealer liability when ROPS are designed, manufactured, and installed on pre-ROPS tractors. Seek ways to prevent liability risks from deterring ROPS development, manufacturing, and installation. Determine if government subsidies, liability limits, or other intervention will enable manufacturers and dealers to develop, manufacture, and promote ROPS adoption and installation.

F. Promote the development and evaluation of safety incentive programs, exemplified by the Certified Safe Farm program, through insurance and other incentives. The Certified Safe Farm is a project of The University of Iowa, designed to rate the agricultural safety and health attributes for an agricultural operation, then provide insurance and other incentives to those achieving a safe standard.

G. Require, by July 1, 2003, that all tractors operated by youths (persons under 18 years of age) or employees shall have a ROPS.

H. Require, by July 1, 2005, that, in order to sell a new or used tractor, the tractor must be equipped with approved ROPS, if available. Approved is defined as conforming to the American Society of Agricultural Engineers (ASAE) specifications (e.g. S 519), or the model tractor code (See item 2F).

I. Establish, by July 1, 2005, a program to provide incentives to recycle or remove from service tractors that cannot be fitted with a ROPS system, or tractors deemed of insufficient value to warrant the cost of installing a ROPS system.

J. Require, by July 1, 2007, that all tractors operated on public roads shall have approved ROPS installed. In the case of tractors used in special agriculture work (e.g. orchards and other low clearance sites), tractors can have ROPS that are deployable. ROPS must be deployed when not in low-clearance situations. The exceptions include tractors without available approved ROPS, and antique tractors.

K. Require, by July 1, 2010, that ROPS systems be installed on all tractors which were manufactured to accept ROPS, and for those pre-ROPS tractors for which there are approved ROPS available. The

available approved ROPS will be listed in the most current version of the "ROPS Directory," National Farm Medicine Center, Marshfield, Wisconsin. A study will be mandated to prioritize ROPS development and target dates for makes and models of tractors for which there are currently not approved ROPS available. The most "risky" tractors and those present in the greatest numbers should be targeted first.

L. Enact, by July 1, 2015, federal legislation to mandate ROPS on all tractors. (Exceptions: Tractors used as stationary power sources and antique tractors manufactured prior to 1955 and not used for commercial farming or residential maintenance.)

2. What combination of public and private policies is needed to prevent tractor-related collisions on the roads?

A. Promote improving the visibility of farm equipment, and promote and expand the "FARM" (Fewer Accidents with Reflective Material) concept from Illinois to other states and evaluate the effectiveness of the program.

B. Prohibit, by the year 2005, driving of tractors on public roads without a valid motor vehicle driver's license.

C. Include questions regarding traffic safety relative to interacting with farm machinery on roadways on driver's license examinations.

D. Develop, implement and evaluate an ongoing educational program targeted at the general driving public regarding traffic safety when driving on public roads where farm machinery may be present.

E. Assure, via the Certified Safe Farm program or other safety incentive programs, that tractor operators have a fundamental knowledge of safe tractor operation, and that appropriate marking and lighting are present on farm machinery.

F. Implement uniform model codes for tractor lighting and marking based on the American Society of Agricultural Engineers (ASAE) standards. If a state has not adopted such a code by July 1, 2005 a companion federal code should apply.

3. What combination of public and private policies is needed to prevent injuries from tractor-related runovers?

A. Develop an ongoing social marketing program, in collaboration with manufacturers and producer groups, to promote a social norm discouraging extra riders on tractors.

B. Develop and implement an ongoing educational/social marketing program about the hazards and injuries resulting from tractor runovers.

C. Promote the sale and installation of safety devices that prevent bypass start injuries.

D. Promote the manufacture, sale, and installation of approved extra rider seats in new tractors with cabs, and promote the proper use of such seats, especially where youth are involved. In addition, fund research to prioritize, develop and promote extra rider seats for used tractors.

3. What public and private policies are needed to eliminate tractor-related injuries among youth?

A. Require youths to have formal tractor operator training before operating a tractor on their parents' farm or on any other farm.

B. Promote the social norm that parents need to closely supervise all youth working under their direction and management. Also, develop appropriate educational material for parent use.

C. Develop, promote and disseminate guidelines for parents regarding the age at which youth normally develop the ability to perform certain tasks in tractor operation.[1]

[1] Guidelines are being developed at the National Farm Medicine Center in Marshfield, Wisconsin, titled "The North American Guidelines for Children's Agricultural Tasks."

Photo courtesy of Virgina Farm Bureau

SECTION 2

Directions to Public and Private Agencies

SECTION 2:

Directions to Public and Private Agencies

This section was prepared by the conference Executive Committee (Kelley Donham, David Osterberg, Mel Meyer, and Carol Lehtola) based on the consensus report, and with extensive input and editing from all conference participants.

Question 1: How can it be assured that every tractor that can potentially overturn has a ROPS (with some reasonable exceptions)?

INITIATE A NATIONALLY COORDINATED EDUCATION PROGRAM TO PROMOTE SOCIAL NORMS FOR ROPS ACCEPTANCE.

NIOSH, working with the United States Department of Agriculture (USDA), should create a cooperative/coordinated national plan. The NIOSH Agricultural Health Centers, the USDA, the National Safety Council (NSC), and the National Institute of Farm Safety (NIFS) should work together to develop the plan, materials, and assistance to states to operate their own local programs.

MONITOR TRACTOR INJURIES AND PUBLISH THE RESULTS.

A national reporting system managed by NIOSH should be created. This system should include current statistics regarding tractor-related injuries and specific incidents that have a potential teaching message. The surveillance activities of the NSC should be integrated with the Department of Labor (DOL) and NIOSH.

A reporting publication should be developed by a joint effort of NSC, USDA, and NIOSH, and include specific cases that provide teaching examples, such as success stories where ROPS or other tractor injury interventions have saved lives.

DESIGN ROPS FOR PRE-ROPS TRACTORS AND FOR TRACTORS IN SPECIAL WORK SITUATIONS.

The TRAC Committee should solicit contributions from the machinery manufacturers industry to partner with NIOSH and the Universities in funding programs to design and develop new ROPS for pre-ROPS and special-use tractors (e.g., in orchards). NIOSH should take the lead in contacting the Equipment Manufacturers Institute (EMI) to establish the proposed research.

EVALUATE INCENTIVE PROGRAMS SUCH AS CERTIFIED SAFE FARM.

NIOSH and Centers for Disease Control (CDC) - Division of Unintentional Injuries should make funds available and initiate Requests for Applications (RFA's) on evaluation of programs like the Certified Safe Farm project. Positive evaluation should lead to expansion of such programs. NIOSH and CDC should cooperate with insurance companies and their trade groups to elicit their support in trial programs and their evaluation.

Question 2: What combination of public and private policies is needed to prevent tractor-related collisions on the roads?

PROMOTE EFFECTIVE MARKING PROGRAMS LIKE THE "FEWER ACCIDENTS WITH REFLECTIVE MATERIALS" (FARM) PROGRAM IN ILLINOIS.

The USDA should develop promotional materials for state extension services, Farm Safety 4 Just Kids (FS4JK), and the National FFA Organization to promote and distribute materials. The Equipment Dealers Associations should promote and have materials on display and available at equipment dealers' show rooms. The Farm Bureau and National Farmers Union in individual states should also promote the system.

DISCOURAGE THE OPERATION OF TRACTORS ON PUBLIC ROADS BY DRIVERS WITHOUT A VALID DRIVER'S LICENSE.

The School Board Association in each state shall increase awareness in public schools about the hazards of driving on public roads where farm machinery may be operating, and on current or proposed laws about tractor operators without valid motor vehicle drivers' licenses.

INCLUDE QUESTIONS ABOUT FARM MACHINERY ROADWAY SAFETY ON DRIVER'S LICENSE EXAMS.

USDA-Extension, the National Highway Transportation Safety Administration (NHTSA), and "Partners in Rural Road Safety," a community-based program on tractor safety, shall work with CDC and NSC to promote and provide specific materials to each state to carry out a campaign to include safety issues regarding the operation of a motor vehicle on roads where farm machinery may be present.

State Departments of Transportation shall enact, as part of the driver's training course, the training specified regarding hazards of farm machinery on roads. State and Federal Departments of Transportation shall insure that

the appropriate material regarding rural roadway safety is included on state driver's license exams.

State Departments of Education should include, in the driver's training course for high school students, information on safe driving when agricultural equipment is present on the roadways.

Incentive programs such as the Certified Safe Farm should be expanded to insure that youth operators on farms take the tractor operator's safety course.

ADOPT A MODEL TRACTOR CODE.

The ASAE, working in conjunction with NSC and NIFS, should develop and publish a model tractor vehicle code for lighting and marking.

Question 3: What combination of public and private policies is needed to prevent injuries from tractor-related runovers?

DEVISE A SOCIAL MARKETING EFFORT TO DISCOURAGE EXTRA RIDERS.

The Co-operative Extension Service and FS4JK should devise a national campaign to discourage extra riders through 4-H, FFA, and FS4JK Chapters. This should also be lead by the state cooperative extension services in conjunction with farm safety organizations and the National Farmers Union within individual states.

CDC should initiate educational programs discouraging extra riders at the national level, and involve state health departments as well.

Equipment dealers should promote anti-extra rider educational programs in their stores.

ENCOURAGE BYPASS START SHIELDS AND WARNINGS.

Equipment dealers should develop promotional material and distribute them in their stores. They should also develop policies that no tractor (whether in for resale or repair) should leave without bypass start shields in place.

ENCOURAGE THE SALE OF EXTRA RIDER SEATS IN TRACTORS WITH CABS.

USDA and NIOSH should fund projects to study the design, implementation, and overall safety ramifications of extra rider seats for combines and tractors with cabs.

Question 4: What public and private policies are needed to prevent tractor-related injuries among youth?

ENCOURAGE FORMAL TRACTOR OPERATOR TRAINING.

USDA and state extension services should proactively publicize formal tractor operator training and offer the approved courses in their states. FS4JK should advocate and publicize this as well. The National FFA Organization should develop programs in the schools to promote this training.

EDUCATE PARENTS ABOUT AGE-APPROPRIATE FARM TASKS.

Parents who supervise youth should be made aware of minimum ages at which children and adolescents can perform specific farm tasks safely. To accomplish this, NIOSH and CDC must develop research initiatives on which tasks are appropriate for each age group. Also, Extension, FS4JK and the National Agricultural Youth Injury Center should initiate parent education programs on tasks appropriate to age.

Question 5: Directions for all Four Questions.

ACTIVITIES SUPPORTING PROPOSED REGULATORY PROGRAMS.

The National Farmers Union, American Farm Bureau Federation, and other farm and commodity organizations mentioned in this report should educate members on the need for the proposed national and state tractor injury prevention program. ASAE should define certified ROPS. Equipment Manufacturers Institute should work with the Dealers' Association to support the proposed program. Universities should work with NSC to inform and elicit support of the public health community such as the American Public Health Association (APHA).

NIOSH and USDA should issue a joint RFA (competitive grant process) to study and recommend the prioritization of ROPS development for pre-ROPS tractors and special-use tractors by May 1, 1999, for funding July 1, 1999.[2]

[2] The National Science Foundation has a center grant program that could become a model for conducting joint government-industry research. For a description of this program on Internet, see: *http://www.nsf.gov/pubs/1998/nsf97164/nsf97164.htm*

Photo courtesy of Virgina Farm Bureau

SECTION 3

Model Legislation

SECTION 3:

Model Legislation

This section was prepared by David Osterberg, rapporteur, and Kelley Donham, Mel Meyer, and Carol Lehtola, based on the consensus process report and with extensive input from all conference attendees.

Model for Federal Tractor Injury Prevention Act

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1: SHORT TITLE

This Act may be cited as the "Tractor Injury Prevention Act of 1999."

SECTION 2: FINDINGS AND POLICY.

Congress finds that:

A. Farm and ranch owners and workers in the United States are at excessive risk of injury and death from tractor-related incidents. Each year, approximately 270 farmers and ranchers lose their lives and 11,000 are injured in incidents involving farm tractors.
B. Other nations have devised programs to greatly reduce the risk of tractor-related fatalities. Many western European countries have all but eliminated the primary source of occupational death on farms—tractor overturn fatalities.

SECTION 3: DEFINITIONS

As used in this Act:

A. An "Approved Rollover Protective Structure (ROPS) system" is a cab or overhead frame with seatbelt for the protection of operators of agricultural tractors to minimize the possibility of serious operator injury resulting from accidental upset.
B. A "Pre-ROPS tractor" means a tractor, which was not originally designed or manufactured to accept a ROPS system.
C. A "Rollover event" occurs when the operated tractor has inadvertently turned 90 degrees or more from the horizontal position.
D. An "Antique tractor" is a tractor more than forty (40) years of age which is not used in farm work and is used only for recreational purposes including, but not limited to, parades and shows.
E. A "Certified Safe Farm Program" is a program that provides incentives for farm operators and a system of documentation to designate a farm as free of certain prescribed safety hazards.
F. "Special agricultural work" means farm operations that take place in low clearance areas such as commercial orchards where ROPS systems are generally not deployed.
G. A "Tractor Operator Training Course" is a course that meets the requirements of federal labor law.
H. The "Fewer Accidents with Reflective Materials (FARM) program" is a program under copyright of the Illinois State Patrol that provides marking for equipment used on public roadways.

SECTION 4: RESEARCH PROGRAMS

A. The Economic Research Service (ERS) of the United States Department of Agriculture shall undertake a study to determine whether safety or liability concerns of installers of ROPS for tractors for which there are not presently ROPS available, is a significant impediment to designing and installing ROPS on tractors. The ERS shall further undertake a study to determine whether liability concerns are a significant impediment to designing and installing seats for extra riders.
B. The National Institute of Occupational Safety and Health (NIOSH) and the National Center for Injury Prevention and Control (NCIPC) at the Centers for Disease Control and Prevention (CDC) shall test the effectiveness of the Certified Safe Farm Program designed by The University of Iowa. Furthermore, NIOSH shall collaborate with the Cooperative Extension Service of the United States Department of Agriculture to disseminate the results of CDC's evaluation and to support replication of the successful parts of the certified safe farm concept through a series of grants or cooperative agreements.
C. The National Institute of Occupational Safety and Health (NIOSH) shall collaborate with the National Safety Council to compile and distribute a periodic tractor incident report to the agricultural press and state farm organizations. The report shall include case studies of all tractor deaths. The report shall

also include case studies of selected incidents where injuries were reduced or avoided because of ROPS systems and other safety devices and precautions.

D. The Cooperative State Research, Education, and Extension Service (CSREES) of the United States Department of Agricultural shall issue a Request for Proposals (RFP) to the Experiment Stations at the various Land Grant Colleges to undertake a research program to design: a) ROPS systems for Pre-ROPS tractors and b) ROPS systems for tractors used in Special Agriculture Work Environments. This RFP shall be for work beginning in FY1999 and continuing through FY2003.
E. The National Transportation Safety Board shall conduct a study of agricultural tractor-related injuries on public roads and recommend governmental actions to reduce these injuries. This study will include a review of the adequacy of injury reporting, including the Fatal Accident Reporting System for reporting tractor-related fatalities on public roads. This study will also address the use of fatality reports for preventing tractor-related fatalities on public roads, including the dissemination of these reports.

SECTION 5: INCENTIVE PROGRAMS

A. The United States Department of Commerce shall develop a program to encourage any interested manufacturers to develop approved ROPS for tractors for which there are not presently ROPS available. This encouragement may consist of tax credits or direct payments to manufacturing firms.
B. The United States Department of Transportation (DOT) will grant funds to individual states from the excise tax on rubber tires to finance a) the purchase by the DOT of tractors for which no ROPS are available and b) an inducement for agricultural tractor owners to install ROPS on tractors for which they are available. From the same tax, the United States Department of Transportation shall also grant to the States funding for the adoption of the Fewer Accidents with Reflective Materials or equivalent programs.
C. The United States Departments of Transportation, Labor, Commerce, Agriculture, and Health and Human Services shall engage in programs to encourage the development of ROPS for pre-ROPS tractors. These programs shall include the use of the Small Business Innovation Grants and agreements with private enterprises for this purpose under the Cooperative Research and Development Act.

SECTION 6: REGULATORY PROGRAMS: DEADLINES

A. Only tractors equipped with a certified ROPS system may be operated by an employee not directly related to the farm owner on or after January 1, 2003.
B. Only tractors equipped with a certified ROPS system may be operated by a person under the age of sixteen (16) years on or after January 1, 2003.
C. On or after January 1, 2005, any person under the age of eighteen (18) may operate a tractor anywhere in the United States only if he or she has in his or her possession: a) a valid drivers license or b) proof that the driver has taken and completed a formal tractor operator training course.
D. Only tractors equipped with a certified ROPS system may be sold in the United States after January 1, 2005. Exceptions to the above requirements apply to: a) tractors which are antique tractors as defined in Section 3 of this Chapter, and which are not engaged in farming operations and b) tractors used in a Special Agricultural Work Environments as defined in Section 3 of this Chapter.
E. All tractors operated in the United States shall be fitted with a ROPS system on or before January 1, 2012. Exceptions to the above requirements apply to: a) tractors which are antique tractors and which are not engaged in farming operations and b) tractors operating in a Special Agricultural Work Environment as defined in Section 3 of this Chapter.

SECTION 7: AUTHORIZATION OF APPROPRIATIONS.

A. Except as provided in sections 4, 5 and 6, nothing in this Act shall constitute a new authorization for the appropriation of funds.

Model for State Tractor Injury Prevention Act

SECTION 1: SHORT TITLE

This Act shall be known as the "Tractor Injury Prevention Act."

SECTION 2: FINDINGS

The general assembly of the state of _____ finds that:

A. Farm and ranch owners and workers in the United States and the state of _____ are at excessive risk of injury and death from tractor-related incidents. Each year in the United States, approximately 400 farmers and ranchers lose their lives and 3000 are seriously injured in incidents involving farm tractors. In the state of _____ these numbers are _____ and _____ respectively.
B. Other nations have devised programs to greatly reduce the risk of tractor-related fatalities. Many western European countries have all but eliminated the primary source of death on farms—tractor overturn fatalities.

SECTION 3: DEFINITIONS

As used in this Act:

A. An "Approved Rollover Protective Structure (ROPS) system" is a cab or overhead frame with seatbelt for the protection of operators of agricultural tractors to minimize the possibility of serious operator injury resulting from accidental upset.
B. A "Pre-ROPS tractor" means a tractor that was not originally designed or manufactured to accept a ROPS system.
C. A "Rollover event" occurs when the operated tractor has inadvertently turned 90 degrees or more from the horizontal.
D. An "Antique tractor" is a tractor more than forty (40) years of age which is not used in farm work and is used only for recreational purposes including, but not limited to, parades and shows.
E. A "Certified Safe Farm Program" is a program that provides incentives for farm operators and a system of documentation to designate a farm as free of certain prescribed safety hazards.
F. "Special agriculture work" means farm operations that take place in low clearance areas such as commercial orchards where ROPS systems are generally not deployed.
G. A "Tractor Operator Training Course" is a course that meets the requirements of federal labor law.
H. The "Fewer Accidents with Reflective Materials (FARM) program" is a program under copyright of the Illinois State Patrol that provides marking for equipment used on public roadways.

SECTION 4: RESEARCH AND EDUCATION PROGRAMS

A. The _____ state Department of Transportation shall develop and implement an educational program targeted at the general driving public regarding risks when driving on public roads where farm machinery may be present. This program shall: a) design appropriate questions to be included on the driver's license exam; b) add this material to the state drivers license study guide; and c) design appropriate materials for high school driver's education courses.
B. The state of _____, with the assistance of the National Education Center for Agricultural Safety, shall develop an ongoing social marketing program to: a) enhance the acceptance and installation of ROPS systems; b) prevent extra riders on tractors for whom seats equipped with seatbelts along with ROPS are not installed; c) demonstrate to parents the need to closely supervise all youth who are working under their direction; d) develop programs to help parents understand when youth normally develop the ability to perform certain tasks using a tractor and e) promote the use and installation of bypass start shields and warnings on tractors.
C. The Cooperative Extension Service at _____ University shall establish and manage a Tractor Operator Training Course. The course shall be designed by the state extension safety specialist and consist of: a) training of instructors; b) providing training sites around the state; and c) developing educational and evaluation materials.

SECTION 5: INCENTIVE PROGRAMS

A. The _____ Department of Agriculture or appropriate agency shall establish a buy-back program for the purchase of tractors for which no ROPS are available. To be part of the buy-back program, an eligible tractor must: a) have been used in the state during the last five (5) years and b) function in agricultural operations where overturn is a risk.
B. A direct payment in the amount of $250 shall be made available to any tractor owner who installs an approved ROPS system. Installation of a ROPS

system shall consist of: a) installation of a cab, frame, four point post or two point post designed to protect the driver area of a farm tractor; b) installation of a seat belt with a frame and c) certification that the recipient of the grant has read and understands materials provided by the manufacturer of the ROPS equipment. If the owner is a machinery dealer, the materials should be included in sale documents.

C. The _____ State Police shall adopt as a pilot program in six counties, the Fewer Accidents with Reflective Materials (FARM) or equivalent program. The pilot program shall consist of promoting and providing appropriate reflective material to farmers and ranchers as well as an evaluation of the success of the program.

SECTION 6: REGULATORY PROGRAMS: DEADLINES

A. Only tractors equipped with a certified ROPS system may be operated by an employee not directly related to the farm owner on or after January 1, 2003.

B. Only tractors equipped with a certified ROPS system may be operated by a person under the age of sixteen (16) years on or after January 1, 2003.

C. On or after January 1, 2003, any person under the age of eighteen (18) may only operate a tractor on a public highway if he or she has in his or her possession: a) a valid drivers license or b) proof that the driver has taken and completed a Tractor Operator Training Course.

D. On or before January 1, 2003, at least five (5) questions shall be included on the state drivers license examination regarding traffic safety when operating a vehicle on a public road where farm machinery may be present. Materials on this aspect of highway safety shall be prepared by the _____ Department of Transportation for distribution to persons engaged in the training of new drivers.

E. On or before January 1, 2005, the _____ Department of Transportation shall adopt a tractor vehicle code, based on ASAE standards for lighting and marking.

F. On or after January 1, 2005, any person under the age of eighteen (18) may only operate a tractor in the state of _____ if he or she has in his or her possession: a) a valid drivers license or b) proof that the driver has taken and completed a Tractor Operator Training Course.

G. After January 1, 2005, any tractor sold in the state of _____ must be equipped with a certified ROPS system and meet current ASAE marking and lighting standards. Exceptions to this requirement will be allowed for: a) antique tractors as defined in Section 3 of this Chapter and; b) tractors used in a Special Agriculture Work Environment as defined in Section 3 of this Chapter.

H. Tractors without an approved ROPS system and which meet current ASAE marking and lighting standards shall not be permitted to be operated on a public highway after January 1, 2007. Exceptions to this requirement will be allowed for: a) antique tractors as defined in Section 3 of this Chapter and b) tractors used in a Special Agriculture Work Environment as defined in Section 3 of this Chapter.

I. All tractors in the state of _____ shall be fitted with a ROPS system and meet current ASAE marking and lighting standards on or before January 1, 2012. Exceptions to the requirements will be allowed for: a) antique tractors as defined in Section 3 of this Chapter and b) tractors used in a Special Agriculture Work Environment as defined in Section 3 of this Chapter.

SECTION 7: APPROPRIATIONS

A. A Farm Safety Fund is established in the state treasury. Moneys received from sources designated for purposes related to tractor safety shall be deposited in the fund. Any unexpended balances in the Farm Safety Fund at the end of each fiscal year shall be retained in the fund. Interest or earnings on investments or time deposits of the moneys in the Farm Safety Fund shall be credited to the fund. The fund may be used for the purposes established in section 4 and section 5 of this Act.

B. The sum of one million dollars ($1,000,000) shall be deposited in the Farm Safety Fund for fiscal year 2000. In any fiscal year after FY2000 that the Farm Safety Fund falls below one million dollars ($1,000,000), an additional amount shall be appropriated to increase balance at the beginning of the fiscal year to one million dollars ($1,000,000).

C. A fee of one hundred dollars ($100) per new tractor sold or twenty-five dollars ($25) for each used tractor sold shall be deposited in the Farm Safety Fund. On the last day of any fiscal year in which the balance of the Farm Safety Fund exceeds four million dollars ($4,000,000) the fees shall not be collected.

References

1. Pratt SG, Hard DL. Injury risk factors associated with agricultural workplace fatalities. J Agric Safety & Health. 1998; Special Issue 1:29-38.

2. Murphy D, Yoder AM. Census of fatal occupational injury in the agriculture, forestry, and fishing industry J Agric Safety & Health. 1998; Special Issue 1:56-66.

3. Myers JR. Injuries among farm workers in the United States, 1993. DHHS (NIOSH) Publication No. 97-115. Cincinnati (OH): NIOSH. 1997.

4. Springfeldt B. Rollover. Encyclopedia of occupational health and safety. 4th ed. Geneva: International Labor Organization. 1998; II: 58.67-58.69.

5. Merchant, J.A., Kross, BC, Donham, KJ, Pratt, DS. *Agriculture at Risk: A Report to the Nation*. National Coalition for Agricultural Safety and Health. 1989.

6. Lehtola CJ, Donham KJ, Marley S. Tractor Risk Abatement and Control: A Community-Based Intervention for Reducing Agricultural Tractor-Related Fatalities and Injuries. *Practical Applications of Agricultural Health and Safety, Workplace, Environment, Sustainability*. HH McDuffie, JA Dosman, KM Semchuk, SA Olenchock and A Senthilselvan (Eds), Lewis Publishers. 1995; 385-389.

7. Myers ML, Herrick RF, Olenchock SA, Myers JR, Parker JE, Hard DL, Wilson K. Eds. Papers and Proceedings of the Surgeon General's Conference on Agricultural Safety and Health. DHHS (NIOSH) Publication Number 92-105. Cincinnati (OH): NIOSH. 1992.

8. NIOSH. TRAC-SAFE: A community-based program for reducing injuries and deaths due to tractor overturns-facilitator's manual. Cincinnati (OH): NIOSH. 1996.

9. Moore CM. Group techniques for idea building. 2nd ed. London: Sage Publications. 1994.

10. Lehtola CJ, Marley SJ, Melvin SW. A study of five years of tractor-related fatalities in Iowa. Applied Engineering in Agriculture. 1994; 10(5): 627-632.

11. Myers JR, Snyder KA, Hard DL, Casini VJ, Cianfrocco R, Fields J, Morton L. Statistics and epidemiology of tractor fatalities-a historical perspective. J Agric Safety & Health. 1998; 4(2): 95-108.

12. National Committee for Childhood Agricultural Injury Prevention. Children and Agriculture: Opportunities for Safety and Health-A National Action Plan. Marshfield (WI): Marshfield Clinic. 1996.

13. Whitman SD, WE Field. Assessing senior farmers' perceptions of tractor and machinery-related hazards. J Agric Safety & Health. 1995; 1(3): 199-214.

14. Glascock LA, Bean TL, Wood RK, Carpenter TG, Holmes RG. A summary of roadway accidents involving agricultural machinery. J Ag Safety and Health. 1995; 1(2): 93-104.

15. Glascock LA, Bean TL, Wood RK, Carpenter TG, Eicher LC, Holmes RG. State codes for lighting and marking of agricultural equipment. J Agric Safety & Health. 1995; 1(1): 17-26.

16. Stallones L, Gunderson P. Epidemiological perspectives on childhood agricultural injuries within the United States. J Agromed. 1994; 1(4): 3-18.

17. Sheldon EJ, Field WE. Fatal farm work-related injuries involving children and adolescents in Wisconsin and Indiana. In Agricultural Health and Safety: Workplace, Environment, Sustainability, eds. HH McDuffie, JA Dosman, KM Semchuk, SA Olenchock and A Senthilselvan, 355-362. Boca Raton (FL): Lewis Publishers. 1995.

18. Langley JD, Clarke J, Marshall SW, Cryer PC, Alsop J. Tractor fatalities and injury on New Zealand Farms. J Agric Safety & Health. 1997; 3(3): 145-160.

19. Hawk C, Donham KJ, Gay J. Pediatric Exposure to Agricultural Machinery: Implications for Primary Prevention. J Agromedicine. 1994; 1(1): 57-74.

20. Darragh AR, Stallones L, Sample PL, Sweitzer K. Perceptions of farm hazards and personal safety behavior among adolescent farmworkers. J Agric Safety & Health. 1998; Special Issue 1: 159-169.

21. Freeman SA, Whitman SD, Tormoehlen RL. Baseline childhood farm safety data for Indiana. J Ag Safety and Health. 1998; 4(2): 119-130.

22. Tevis C, Finck C. We kill too many kids. Special report from Successful Farming. Successful Farming. 1989; 89(2): 18a-18p.

23. Purdue University. Final Report: A Summary of Strategies and Successes. The Childhood Agricultural Injury Prevention Strategy Workshop: A Private Sector Perspective. PHS-CDC NIOSH Purchase Order Number 0009756278. West Lafayette (IN): Agricutural Safety and Health Program. 1998.

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APPENDIX 3

TRAC Policy Conference Process

By Mel Myers

A structured process was used to meet the five conference objectives. The steps in the process included a conference with a plenary session and a consensus workshop, report writing and consensus review of the report, and an evaluation. Appendices 1 and 2 list planning committee members and conference participants. The conference objectives and the steps (shown parenthetically) used to meet them are listed below.

- Review existing data regarding the causative factors in tractor-related fatalities (plenary session).
- Identify and review effective preventive measures (plenary session, consensus workshop).
- Develop interdisciplinary public and private sector policies and strategies (consensus workshop).
- Develop model legislation that may be used by states to help establish effective public policy (report writing, consensus review).
- Identify and promote methods for policy implementation and evaluation (report writing, consensus review, evaluation).

TABLE 1. Categories of Stakeholders Used in the Consensus Process

Stakeholder Category	Number of Stakeholders		
	Planning Committee	Consensus Conference	Consensus Workshop
Federal Sector — Public Health	1	3	2
OSHA (Federal, State)	1	3	2
Manufacturer/Dealer	1	4	4
Insurer		2	2
University – Public Health	1	4	2
University – Injury Control	1	4	1
University – Agriculture	2	6	4
State Legislator (includes 2 farmers)		3	3
National Safety Council	1	2	1
Farmer, Farmer Organization		4	4
Traffic Control (includes 1 farmer)		2	2
Lawyer		3	0
Economist		1	1
Total*	**8**	**41***	**28***

*** includes double counting of 3 farmers**

The Conference

Stakeholder involvement in the conference was critical. Table 1 shows the categories and number of stakeholders that participated in the Conference. Eight stakeholders participated on a conference planning committee, and 38 stakeholders convened for the conference. The stakeholders participated in the plenary session on the first day of the conference, and 25 participated in the consensus workshop in the second and third days of the conference.

The plenary session included a series of presentations that helped define the causative factors in tractor-related injuries and identify preventive measures. The plenary session included 26 presentations, and it served to establish a common knowledge base for the stakeholders prior to the consensus workshop.

The workshop was dedicated to generating recommendations for actions that would be required to reduce injuries in four issue areas: 1) rollovers, 2) roadway injuries, 3) runovers, and 4) youth operator injuries.[3] The stakeholders generated consensus recommendations through a facilitated process. At the workshop portion of the conference, options were elicited for each of the four areas, and each area was addressed independently.

The participants addressed youth operator injuries only in part because the issue was formerly addressed by recommendations by a National Committee for Childhood Agricultural Injury and Prevention in their report entitled, *"Children and Agriculture: Opportunities for Safety and Health, A National Action Plan."*

A consensus approach was used in which every person must agree or at least accept a suggested option. If one or more persons did not agree, then the option was further discussed or modified until agreement was reached. In a deadlock, a 2/3 majority voting procedure was used. However, no option was selected using this procedure. The participants also reached a consensus by concentrating on ideas and not personalities.

A consensus was achieved by following a cycle of steps to produce policy options for each issue: 1) validate trigger questions, 2) generate ideas, 3) discuss the ideas, and lump or split them, and 4) vote on which ideas to retain as important to reducing tractor-related injuries. The original technique selected for this effort was the Nominal Group Technique (NGT) [Moore CM. *Group techniques for idea building*. 2nd ed. London: Sage Publications, 1994]. This technique requires the four steps described above.

The purpose of the trigger questions was to elicit responses for each of the issues. Draft trigger questions were distributed during the plenary session. Participants were asked to review and comment on the draft questions. At the workshop the next morning, each draft question was written on a flip chart and validated by the group as each issue was addressed. The four validated trigger questions were:

1. **How do we assure that every tractor that needs a ROPS for an application has a ROPS?**
2. **What combination of public and private policies is needed to prevent tractor-related collisions on roads?**
3. **What combination of public and private policies is needed to prevent injuries from tractor runovers?**
4. **What public and private policies are needed to eliminate tractor-related injuries among youth?**

[3] The workshop participants decided not to address the entanglement issue since the conference was limited to tractor injuries, and the principal entanglement problem extends beyond the tractor's power take-off stub shaft. However, the report would make a general statement on the importance of guarding.

TRAC POLICY CONFERENCE PROCESS: A QUICK OVERVIEW

Planning Committee

PART A

Planning: Develop Objectives & Concepts; Generate Speaker & Participant Lists

CONFERENCE CO-CHAIRS

A1. Develop Details of Process

A2. Develop "Trigger Questions"

A3. Appoint Discussants

PART B

Plenary Session (September 10)

Presentations by Invited Speakers and Discussion

B1. Develop common scientific and socioeconomic basis for discussion

B2. Identify potential policy options

B3. Discussants lead and summarize main points and policy options relative to "trigger questions"

PART C

Consensus Policy Workshop (September 11)

(Nominal Group Technique)

C1. Review/modify "trigger questions" based on B3. above

C2. Formulate policy options relative to the "trigger questions"

C3. Discuss policy options

C4. Lump and sort policy options

C5. Vote for final 5-10 policy options per issue area

PART D

Post Conference Program Planning (September 12 A.M.)

D1. Develop consensus on concept and process of policy document writing and review

D2. Assign tasks and obtain commitment

D3. Elect post conference committee and chair

(THE FOLLOWING IS A DETAILED NARRATIVE OF THE PROCESS)

The first issue addressed was "rollovers" starting with question number 1. Using the NGT, each participant was asked to write separate responses to the trigger question on individual index cards. After sufficient time to write their responses, they were asked in round-robin fashion (one-by-one around the table) to provide one response. They read their response from each card with an explanation if necessary. The facilitator collected the index card from the participant, placed an identification number on each card, and taped the card on a wall. This cycle was used until the ideas were exhausted.

A variation from the NGT was used to cluster the ideas, which was a technique called the affinity diagram. [Gryna FM. Quality improvement. Juran's quality control handbook. Juran JM, Gryna FM (eds.). (1988), pp. 22.1-22.74.] The participants were divided into groups of five. Each group in turn went to the wall and silently rearranged the cards into clusters that made sense to them. In the first round, each group was allowed five minutes. After all groups had a chance to rearrange the cards, the first group returned, but had only two minutes. At the end of this cycle, any person could go to the wall and rearrange the cards. The process stopped when the participants made no further changes. The facilitator then asked for a name for each cluster of ideas, derived a consensus on the names, and listed them on a flip chart.

NGT procedures were then used for voting. From the total options that were selected, each participant was asked to write down five of their preferred options on index cards using the identification number, stack the cards in priority order, then enumerate them in priority order from one to five with one as the highest priority. These cards were collected, and the votes were recorded on the flip chart by category. The highest ten options were selected and given a priority ranking by the groups based upon the observed number and weight of the scores.

The process was then repeated for the remaining three issues, but a brainstorming technique was used for idea generation [Rees, Fran. How to lead work teams: facilitation skills. San Diego: Pfeiffer & Co., 1991]. The brainstorming depended upon oral responses rather than written suggestions. The responses were recorded on flip charts. The generation of ideas was followed by a discussion of the options with some clustering of the ideas.

For these last three issues, a multi-voting technique was used to reduce the options down to five. In the first round, each participant could vote by a show of hands for as many ideas that they wished. Options that received few votes were marked off of the list. Then each participant was given a limited number of votes, further reducing the list. This technique was used until five or fewer options remained. The number of options for the "youth operators" issue was restricted even further because of a previously mentioned report that recommended several options related to preventing child injuries on farms. By the end of the conference, the stakeholders had reached a consensus on several options, which a conference rapporteur would translate into "Consensus Policy Recommendations." At the conclusion of the conference, participants enlisted two co-chairs to communicate with the stakeholders in gaining closure on the process following the conference.

Report writing and consensus review

The conference rapporteur wrote a report that included the Consensus Policy Recommendations and an implementation strategy. This strategy included directions to agencies and, for authority when it did not exist, model legislation. The Planning Committee had designed the strategy as an essential component of the document.

The post-conference process was designed to gain a consensus on the strategy to the degree possible by taking broad input from all participants, via mail, fax, e-mail, and follow-up telephone calls, and processing this input into subsequent versions of the document. The conference rapporteur drafted the report, which was distributed on October 14, 1997 to 34 stakeholders for their comments. Twenty-four stakeholders (70%) responded with a range of comments about the final wording of the recommendations and the strategy. Stakeholder responses to this draft (draft 1) are tabulated in Table 2. The sequence of this and later reviews are listed below:

DRAFT 1

October 14	Rapporteur completes first draft.
Oct 14-Nov 15	Stakeholders review first draft.

DRAFT 2

Nov 15-Dec 15	Rapporteur and Conference Chair incorporate comments. Additional comments included from phone conference with Brian Ahlschwede and John Crowley.
Dec 15-Jan 15	Program Committee reviews revised draft.
February 25	Planning committee reviews revised draft.
Feb 25-Mar 2	Rapporteur and Conference Chair organize the report into three sections.

DRAFT 3

March 4-18	Stakeholders review section 1, "Consensus Policy Recommendations."
Mar 23-Apr 6	Stakeholders review section 2, "Directions to Agencies to Implement Recommendations."
April 10-22	Stakeholders review section 3, "Model Legislation."

FINAL REPORT

May 22-Jun 15	Two post-conference co-chairs, Conference Chair, and Rapporteur revise the report.
June 15-Jul 3	Stakeholders review the final report.
June 20-Jul 10	Conference Chair, and post-conference co-chairs call each participant for final input.
August 1	Rapporteur completes final document for printing.

The rapporteur and conference chair incorporated the comments into a second draft. A Program Committee consisting of the two post-conference co-chairs and University of Iowa staff reviewed the second draft and made further revisions. The original Planning Committee then reviewed the revised draft. Because it appeared that the stakeholders saw the translation of information into agency directions and model laws as complex, the Planning Committee recommended staging the process with a three-section approach for a rapid and thoughtful review.

In this approach, the post-conference co-chairs sent out three main sections of the document (draft 3) in sequence for consideration by the stakeholders. The three sections were: the "Consensus Policy Recommendations," "Directions to Agencies to Implement Recommenda-

tions," and "Model Legislation." Comments for each stage of the review were welcomed. A tabulation of responses by stakeholder category is also shown in Table 2. Program Committee staff called those individuals and modified the wording so as to accommodate the individual concerns. A final draft (draft 4) of the report was sent to each stakeholder with a cover letter (or e-mail) explaining the progress to date and requesting their final review. An interviewer from the Program Committee called stakeholders, confirmed their receipt of the document, and scheduled a follow-up call. The interviewer made the follow-up call and gathered their affirmation and/or comments. Following minor revisions, the final report was completed.

TABLE 2. Responses from Participants in the Consensus-Building Process

Stakeholder Category	**Number of Responses**			
	draft 1	Draft 3.1	Draft 3.2	draft 3.3
Federal Sector — Public Health				
OSHA (Federal, State)		7	3	7
Manufacturer/Dealer		9	6	
Insurer		6	2	10
University — Public Health				
University — Injury Control		1		
University — Agriculture		7	10	17
State Legislator				
National Safety Council				31
Farmer, Farmer Organization				
Traffic Control				
Lawyer				
Economist				11
Total	24+	30	21	76

Evaluation

Conference objective 5 includes the need to identify and promote methods for evaluation. The effort described in this report constitutes the first step in the evaluation, a needs assessment. The needs assessment represents an evaluation for relevancy and adequacy based upon two methods, review of available data and expert opinion. Appropriate options for fulfilling critical injury control needs established the relevancy of the recommendations in this report, and the range of options across four issue areas that address the most important injury control needs established the adequacy of the recommendations.

Plans for evaluating the implementation and assessment of results of the report need to be developed in detail. The general evaluation model is shown in Table 3. These plans include the collection and analysis of information to determine the progress, effectiveness, sustainability, and impact of the interventions presented in this report. Progress needs to be monitored against schedules indicated in the report. Effectiveness needs to be evaluated for the production of expected effects resulting from this report. Sustainability needs to be evaluated to determine whether resources have been captured to sustain efforts following the issuance of the report including this evaluation effort. Finally, impact needs to be evaluated to assess the reduction in tractor-related injuries. Methods used in the evaluation are monitoring, operations research (i.e., decision analysis), case studies, surveys, and time series analysis as also shown in Table 3. [Veney JE, Kaluzny AD. *Evaluation and decision making for health services*. 3rd ed. Ann Arbor, Michigan: Health Administration Press. 1998]

TABLE 3. Components for Evaluating the TRAC Policy Process

Time Line	Needs assessment →	Implementation →	Results assessment		
Type	relevance, adequacy	progress	effectiveness	sustainability	impact
Method	available data, expert opinion	monitoring, operations research	case studies, surveys, time series analysis		
Policy Model	report →		interventions →		reduced injuries