



# **PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTER**

## **NIOSH ANNUAL REPORT**

CDC/NIOSH Cooperative Agreement #2 U50 OH07544-07

### **FISCAL YEAR 2007**

(October 1, 2007 to September 30, 2008)

Submitted by:

Richard Fenske, PhD, MPH  
Professor and Center Director  
[rfenske@u.washington.edu](mailto:rfenske@u.washington.edu)

Pacific Northwest Agricultural Safety and Health Center  
[depts.washington.edu/pnash/](http://depts.washington.edu/pnash/)

Department of Environmental and Occupational Health Sciences  
School of Public Health and Community Medicine  
University of Washington  
Seattle, WA 98195

**DECEMBER 2008**

**Pacific Northwest Agricultural Safety and Health Center  
Annual Report to NIOSH  
CONTRACT 2 U50 OH07544-07  
Fiscal Year 2008**

**CONTENTS**

---

**I. EXECUTIVE SUMMARY**

Introduction.....	3
Accomplishments .....	3-4
Total Center Projects, Budget, Region.....	5
Total Center Products.....	6-8

**II. ADMINISTRATION, PLANNING, AND OUTREACH**

Administrative Core .....	9-13
---------------------------	------

**III. CENTER PROJECTS**

**RESEARCH CORE**

R1: Risk Factors for Cholinesterase Depression among Pesticide Handlers.....	14-16
R2: Neurobehavioral Assessment of Pesticide Exposure in Children.....	17-18
R3: Enhancements to ChE Monitoring: Oxime Reactivation and OP-ChE Adducts.....	19-21
R4: Assessment of Job-related Exposures for Diarrheal Illness in Farmworker Families ..	22-23

**PREVENTION AND INTERVENTION CORE**

P1: Interventions to Minimize Worker and Family Pesticide Exposures .....	24-25
---	-------

**EDUCATION CORE**

E1: Introducing a Cholinesterase Test Kit into Clinical Practice .....	26-28
E2: Reality Tales Storytelling to Translate Agricultural Health and Safety Research.....	29-31

**IV. SMALL/PILOT PROJECTS**

P2: Characterization of Bioaerosols in Washington Dairy Barns .....	32-33
P3: Inhibition of Cholinesterase by Pharmacological and Dietary Agents.....	34-35
P4: Point-of-view Video Analysis of the Impact of a Faller Safety Training Program .....	36-37
P5: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula .....	38-40

**V. NIOSH R01 PROJECTS AND CONTINUING PROJECT ACTIVITIES**

R01: Community Health Intervention with Yakima Agricultural Workers.....	41-42
Continuation: Fluorescent Tracer Component for Hands-on Pesticide Handler Training...	43-44
Continuation: Health and Safety Awareness for Working Teens	
- Agricultural Curriculum Evaluation.....	45-46
Continuation: P1: Skills Retention in Fishing Safety Training .....	47-48

**APPENDIX**

<b>Final Report to NIOSH: R01: Community Health Intervention with Yakima Agricultural Workers</b>	
---	--

## I. EXECUTIVE SUMMARY

The Pacific Northwest Agricultural Safety and Health (PNASH) Center, established in 1996, serves Alaska, Idaho, Oregon, and Washington with a goal of reducing occupational disease and injury among agricultural operators, workers, and their families. In recognition of the importance of all agricultural industries to the Northwest, our scope of work includes farming, fishing, and forestry industries. The PNASH Center's emphasis is on injury and illness prevention and health promotion, especially among populations not well represented in current research, including hired laborers, migrant/seasonal workers, women, and children. Our approach is to:

- Work in partnership with employers, workers, agencies and other research and service organizations
- Develop innovative research and intervention programs that focus on problem solving
- Take solutions to the workplace through training, outreach, and participatory research

In recognition that the agricultural worker and community are the foundation of a strong agricultural industry, PNASH's theme is "Safe and Sustainable Agricultural Workplaces and Communities."

The 2008 Fiscal Year (FY), the second year of our NIOSH awarded 5-year program, saw a great deal of project progress, gaining ground on the first year's delays due to review and approvals for study activities involving humans and animals. All 14 NIOSH projects had significant activity and 3 new projects were funded through our regional Small Grant Program.

This year also saw continued growth in forestry and fishing safety projects, industries that were under-represented in previous years. These projects include: Point-of-view Video Analysis of the Impact of a Faller Safety Training Program; Safety and Health of Immigrant Forest Workers on the Olympic Peninsula, and; Skills Retention in Fishing Safety Training.

Three projects have experienced challenges that will result in a full year delay in project activities. The project, Neurobehavioral Assessment of Pesticide Exposure in Children, received its Certificate of Confidentiality from the CDC in January of 2008 and was only then able to launch data collection from participants. The pilot, Assessment of Job-related Exposures for Diarrheal Illness in Farmworker Families, had slower than anticipated recruitment. Pilot 4, funded through PNASH's Small Grants Program, Point-of-view Video Analysis of the Impact of a Faller Safety Training Program, had video instrumentation difficulties that are now resolved.

The faculty, staff and students of the PNASH Center are pleased to have completed a productive 2008 FY. This assemblage of projects supports a comprehensive Center that can reduce the injuries and illnesses experienced by workers in the Northwest agricultural industries.

## CENTER ACCOMPLISHMENTS FOR 2008

### 1. Res 1: Risk Factors for Cholinesterase Depression among Pesticide Handlers

This project works in coordination with the Washington State Cholinesterase (ChE) Monitoring Program to identify the key risk factors responsible for ChE depressions, including individual genetic susceptibility. Worker exposure information is collected at health clinic visits through a literacy friendly computer-based questionnaire and compared to their ChE results. To date, we have enrolled a total of 211 agricultural pesticide handlers in this study. During the past year, 52 handlers participated in the study, with a total of 89 visits. Descriptive analyses of survey data from 154 study participants during the 2006-2007 spray seasons have been performed. Analyses of ChE inhibition in relation to self-reported exposures and PON1 status based on data collected during the 2006 and 2007 spray seasons are currently underway. By improving our understanding of the causes of ChE depression, we can help the agricultural community to reduce the burden of acute and chronic pesticide-related illnesses among handlers.

### 2. Prev 1: Interventions to Minimize Worker and Family Pesticide Exposures

This is a field-based study that tests and disseminates best agricultural pesticide practices brainstormed by

a team of industry experts that includes managers, workers, and pesticide safety educators. In FY 2008 we convened the Expert Working Group (EWG), these on-the-farm experts will ensure the relevancy and success of the project. The EWG includes eleven members of the agricultural community selected from among the key informants that participated in the Expert Interviews. Three EWG meetings were held during the year. At each meeting, pesticide safety topics and research results were presented and discussed and Washington state pesticide recertification credits were awarded. Committee members have identified and prioritized 5 areas of interest for field study in 2009.

### **3. Edu 1: Reality Tales: Storytelling to Translate Agricultural Health and Safety Research**

This 5-year education project uses Northwest workers' heat illness and ladder injury experiences to teach critical prevention strategies. The project takes 'reality tales' told by workers or those closely related who have either direct or indirectly experienced these health problems. These are then disseminated through three communication channels - facilitated community health worker educational sessions in farmworker camps, local call-in radio talk shows, and magazines favored by agricultural producers. In 2008 the project launched a novel approach to elicit worker stories - through a radio broadcast storytelling contest. This was done through Spanish public radio in the Yakima Valley, KDNA, a station that is a well known, trusted and neutral media. Sixteen contestants submitted stories and seven semifinalists were judged by a panel of health and safety experts and community representatives. Four winners were selected. The winning storytellers were invited to recount their experiences on a live radio talk show that was hosted by the radio KDNA producer and a Labor and Industries safety expert. The program was recorded and edited for evaluation. In addition to radio broadcast of these stories, excerpts from the workers stories and the educational messages they had for fellow workers, managers and owners were summarized for agricultural producers in articles in two of magazines; the Western Farmer Stockman and the Good Fruit Grower. For the English-speaking farmer, a tailored story recruitment strategy is being developed - a partnership with National Public Radio's Story Corp and with local radio stations that will broadcast the final selections.

### **4. Pilot 5: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula**

Many Northwesterners are unaware of the work of special forest product (SFP) harvesting. SFPs such as salal, cedar block, moss, mushrooms, and medicinal plants are highly significant in their cultural, economic and ecological importance. It is estimated there are 4,000 western Washington immigrants who rely on SFP harvest as their primary livelihood. PNASH's small grant program and other funding have supported this new research direction in understanding the health concerns and barriers of the SFP workforce. For cedar block harvesters the project team now includes a local coordinator and accomplishments include: 13 interviews, monthly meetings and hosting a health and safety workshop for forest workers that brought in 65 workers. This group is being carefully engaged due to the sensitive issues of their legal status and the diverse ethnicities (from Mexico and C. America, but different ethnic communities).

### **5. External competitive continuation awards for community health intervention projects:**

- **Proyecto Bienstar.** This project developed strategies to enable the community of Hispanic agricultural workers to effectively identify, characterize, and respond to the occupational and environmental health risks they and their families face. A community advisory board that includes 13 different constituencies guides the project. The University of Washington and three partners serve as catalysts, educators, and resources for the community: Northwest Communities Education Center/Radio KDNA; Heritage College; Yakima Valley Farmworkers Clinic (YVFWC)/Northwest Community Action Center. In PNASH's 2008 FY this project has been successfully continued through two funding streams to provide health education through Radio Novellas. The grants from EPA and NIH are run through the community partner, Northwest Communities Education Center/Radio KDNA.
- **Idaho Hispanic Health Project.** This partnership with the Idaho Mountain States Group is addressing health disparities among Idaho Hispanics. We are advising on community-based participatory research methodologies and occupational health research and care to help communities address safety and health interests. A continuation grant was secured through NIH to address the community health issue of concern, metabolic syndrome.

## TOTAL CENTER BUDGET

07/08 Original Budget: \$1,324,283 DC  
06/07 Unobligated Balance Carryforward: \$451,591 TC  
07/08 NIOSH Directors Award: \$18,720  
**Total 07/08 Budget: 1,794,594 TC**  
**Total 07/08 Committed Cost Sharing: 156,000 TC**

1. Actual Expenditures: \$1,303,733
2. Estimated In-kind Support Value: \$50,000
3. Outside Funding: \$395,185 (\$221,710 actual cost sharing + \$173,475 external projects)

## CENTER PROJECTS

Administrative, Planning and Outreach Core  
R1: Risk Factors for Cholinesterase Depression among Pesticide Handlers  
R2: Neurobehavioral Assessment of Pesticide Exposure in Children  
R3: Enhancements to Cholinesterase Monitoring: Oxime Reactivation & OP-ChE Adducts  
R4 Pilot: Assessment of Job-related Exposures for Diarrheal Illness in Farmworker Families  
P1: Interventions to Minimize Worker and Family Pesticide Exposures  
E1: Introducing a Cholinesterase Test Kit into Clinical Practice  
E2: Reality Tales: Storytelling to Translate Agricultural Health and Safety Research  
P2: Characterization of Bioaerosols in Washington Dairy Barns  
P3: Inhibition of Cholinesterase by Pharmacological and Dietary Agents  
P4: Point-of-view Video Analysis of the Impact of a Faller Safety Training Program  
P5: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula  
RO1: Community Health Intervention with Yakima Agricultural Workers  
Continuation: Fluorescent Tracer Component for Hands-on Pesticide Handler Training  
Continuation: Health and Safety Awareness for Working Teens - Agricultural Curriculum Evaluation  
Continuation: P1: Skills Retention in Fishing Safety Training

**Ongoing Projects: 14**

**Projects completed this fiscal year:**

Pilot: Characterization of Bioaerosols in Washington Dairy Barns  
RO1: Community Health Intervention with Yakima Agricultural Workers

**Projects dropped/discontinued in this fiscal year: None**

**New Projects: None funded by NIOSH**

**New Pilot/Feasibility Projects:**

Pilot: Inhibition of Cholinesterase by Pharmacological and Dietary Agents  
Pilot: Point-of-view Video Analysis of the Impact of a Faller Safety Training Program  
Pilot: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula

## CENTER INVESTIGATORS

Scientific Investigators	21
Program Support Staff	8

**STATES SERVED:** Washington, Idaho, Oregon, Alaska

**REGIONAL ACTIVITIES:** AK, CA, CO, ID, OR, TX, WA, and some that span USA

## CENTER PRODUCTS

### Presentations

- 10/2/2007 Interventions for Pesticide Applicators  
EPA Protecting the Pesticide Worker, Arlington, VA
- 10/2/2007 Cholinesterase Monitoring in Washington State  
EPA Protecting the Pesticide Worker, Arlington, VA
- 10/2/2007 Pesticide Curricula for Healthcare Provider Education  
EPA Protecting the Pesticide Worker, Arlington, VA
- 10/9/2007 Less Literate Populations  
Webinar, University of Iowa
- 1 /3/2008 Oral presentation at Semiahomoo Conference.  
UW-UBC Environmental and Occupational Health Conference
- 1 /5/2008 poster presentation  
La Conner
- 1 /9/2008 Chronic Pesticide Health Effects (English and Spanish)  
Pasco Trade Show
- 1 /25/2008 Pediatric Asthma  
Western Migrant Stream Forum
- 1 /27/2008 Proyecto Bienstar Community Empowerment  
Western Migrant Stream Forum
- 3 /5 /2008 Organophosphate Pesticides: Impact on Children's Health  
AgriSafe Network Web Series
- 11/1 /2008 Overview of PNASH work with Hispanic populations.  
Washington State University Tri-Cities

### Publications

Article published, professional (juried publication)

*Evaluation of a clinic-based cholinesterase test kit for the Washington State  
Cholinesterase Monitoring Program*

Hofmann-JN, Carden-A, Fenske-RA, Ruark-HE, Keifer-MC  
American Journal of Industrial Medicine

*Striving to provide opportunities for farm worker community participation in research*

Crowe-JL, Keifer-MC, Salazar-MK  
Journal of Agricultural Safety and Health 4/2008

*Meetings and magazines top ag info*

Wagner-G  
Good Fruit Grower Magazine 2007

Article published, feature (trade publication)

*Workers Tell of Ladder Injuries*

Murphy-HM  
Western Farmer-Stockman August 2008

*Tractor Safety Advice Saves Lives*

Murphy-HM  
Western Farmer-Stockman Nov 2008

*Respiratory Ailments Nothing to Sneeze At*

Murphy-HM  
Western Farmer-Stockman Dec. 2008

*Statistics Mirror Hazards of Farmwork*

Murphy-HM  
Western Farmer-Stockman April 2008

*Focus on Farm Safety When Inviting Public*

Murphy-HM  
Western Farmer-Stockman Feb 2008

*Farmers Run a Greater Risk of Skin Cancer*  
Murphy-HM  
Good Fruit Grower May 2008

*Ag Study Offers Data on Pesticides, Cancer*  
Murphy-HM  
Western Farmer-Stockman Jan. 2008

*UW Researcher Seeks Methods to Track Path of Dairy Microbes*  
Murphy-HM  
Western Farmer-Stockman July 2008

*Workers Tell of Ladder Injuries*  
Murphy-HM  
Western Farmer Stockman August 2008

*Use Animal Sense to Prevent Injuries*  
Murphy-HM  
Western Farmer-Stockman Sept 2008

*Accept Sound Advice*  
Murphy-HM  
Western Farmer-Stockman 2007

*Avoiding Ladder Injuries*  
Murphy-HM  
The Good Fruit Grower Sept 1, 2008

*Handling Language Barriers Correctly*  
Murphy-HM  
Western Farmer-Stockman June 2008

Education / Training

Thesis or dissertation

*Usability: An important Consideration for Public Health Education on the Web*  
David Shoaf  
M.P.H. Thesis. University of Washington, 6/10/2008.

*Assessment of Chlorpyrifos Exposure in Agricultural Workers During Airblast Applications*  
Jannette Kibogy  
M.S. Thesis. University of Washington, 6/10/2008

*Evaluation of the efficacy of the BioSampler Aerosol Collection device for Collection and Retention of Various Particle Sizes*  
Wischmeier-B.  
M.S. Thesis. University of Washington, 6/10/2008.

Website or webpage established

*National Tractor Safety Initiative*  
*Pacific Northwest Agricultural Safety and Health*

Newsletter

*Northwest Forest Worker Safety Review*

CD-ROM

*30 minute radio interview/talk radio show on heat related illnesses*  
*Radio Talk Show CD on Ladder Injuries*

Course manual

*Fluorescent Tracer Manual: An Educational Tool for Pesticide Safety Educators*

PowerPoint Presentation (for distribution)

*Biomarkers of sensitivity and exposure in Washington State pesticide handlers*  
*Serum cholinesterase inhibition in relation to paraoxonase status among agricultural pesticide handlers*

*Risk factors for occupational pesticide exposure  
Serum cholinesterase inhibition in relation to paraoxonase status among agricultural  
pesticide handlers*

Trainings

*Pesticide recertification classes on the acute and long term effects of pesticide exposure.*

Pasco Trade Show, Pasco, WA: 1/9/2008  
Vancouver, WA: 1/4/2008  
Tacoma, WA: 1/10/2008  
Mill Creek, WA: 1/18/2008  
Lacy, WA: 1/29/2008  
Des Moines, WA: 2/1/2008  
Bremerton, WA: 2/14/2008  
Seattle, WA: 3/6/2008  
Bellingham, WA: 3/27/2008

Conferences

9/30/2007 - 9/29/2008 Program Planning Committee  
Agricultural Safety and Health in Western Agriculture  
9/30/2007 - 9/29/2008 Program Planning Committee  
Western Migrant Stream Forum  
9/30/2007 - 9/29/2008 Program Planning Committee  
Ag Safety Day  
1/25/2008 - 1/27/2008 Western Migrant Stream Forum. Hosted Research Reception.  
Western Migrant Stream Forum  
2/20/2008 Health Fair  
Washington Governor's Ag Safety Day  
5/3/2008 Organized and facilitate health and safety workshop for forest workers.  
Forest Workers' Workshop  
5/22/2008 Seminar and discussion with Ann Backus, Hazards in the Northeast  
Fishing Fleet: Can We Reduce the Risks?  
UW DEOHS Seminar

Other Products

Annual Report  
*Pacific Northwest Agricultural Safety and Health Center Year End Report (FY06/07)*  
Report to NIOSH (year end or continuation)  
*Pacific Northwest Agricultural Center Renewal and Progress Report*



## II. ADMINISTRATION, PLANNING, AND OUTREACH

### A. PROJECT TITLE

Administrative, Planning and Outreach Core

### B. PROJECT OFFICER(S)

Richard Fenske, MPH, PhD  
Box 357234  
University of Washington  
Seattle, WA 98195  
Email: marcyw@u.washington.edu  
Tel: (206) 616-1958  
Fax: (206) 616-2687

### HOST ORGANIZATION

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

### C. PROJECT DESCRIPTION

The Administrative and Planning and Outreach Core provides the administrative infrastructure for the entire Center program and assists in the implementation of individual project objectives. It ensures that project activities are well coordinated within the Center and are of high scientific quality and responsive to stakeholder needs. The components of this core include:

- Management.
- Pilot Project Program.
- Internal and External Advisory Committees.
- NIOSH Agricultural Center Collaboration.
- Agricultural Community Outreach and Education Program.

### D. PROJECT START AND END

Start: 9/30/2006      End: 9/29/2011

### E. PROJECT BUDGET

1. Actual Project Expenditures: 249,189 TC
2. Estimated In-kind Support Value: \$18,000
3. Outside Funding: \$195,611 actual cost sharing

### F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

**1 Ongoing Management.** The Administrative and Planning Core provides the organization, internal communications, and facilities for the conduct of research, education, translation, and intervention activities. Highlights of the 2007 FY include:

- **Cultural Competency Training and Retreat** for staff, faculty and students.
- **Permanent hire of Pablo Palmandez, Research Coordinator.** Mr. Palmandez is based in the Center's Yakima Valley Field Office supporting both Richard Fenske and Matthew Keifer's projects.
- **Move of Yakima Valley Field Office** to a central location with additional space and dry lab facilities.
- **New External Research Awards:**

1) PI: Matthew Keifer, NIH R01 flowed through Idaho Mountain States Group, Idaho Partnership for Hispanic Health, \$60,000.

- 2) PI: Richard Fenske, Washington State Dept of Health Research Contract, Air Concentrations of Organophosphate Pesticides in Washington State Agriculture, \$150,000.
- 3) PI: Matthew Keifer, Washington State Medical Aid and Accident Fund project grant, Occupational Health and Safety of Cedar Block Cutters on the Olympic Peninsula, \$25,055.
- 4) PI: Matthew Keifer, NIOSH ERC project grant, Occupational Health and Safety of Cedar Block Cutters in the Olympic Peninsula, \$21,222.
- 5) PI: Richard Fenske, Washington State Medical Aid and Accident Fund project grant, Development and Dissemination of a Fluorescent Tracer Demonstration Kit, \$30,000.
- 6) NIOSH conference grant, Health and Safety in Western Agriculture, New Paths, \$46,800.
- 7) PI: Richard Fenske, NIH R01 flowed through Oregon Health and Sciences University, Biomarkers of Organophosphorus Pesticide-Induced Neurotoxicity, \$245,052.
- 8) PI: Matthew Keifer, NIH R03 flowed through Northwest Communities Educational Center, Well-being and Health of Migrant Agricultural Workers and their Families through a Spanish Language Radio Drama, \$156,000.
- 9) PI: Matthew Keifer, EPA Care Grant flowed through Northwest Communities Educational Center, Proyecto Bienstar or Well Being project. A continuation of the CBPR project with Yakima, Wa agricultural workers, \$8,064.

**2 Ongoing** Pilot Project Program. In the 2008 FY, PNASH's small grants program RFA resulted in 7 pre-proposals, 6 final proposals and 3 funded projects. The program was administered by PNASH with the goal of stimulating and supporting new and expanded research, prevention/intervention, and education/translation activities in the area of occupational safety and health in Northwest farming, forestry and fishing. The funded projects include:

- P3: Inhibition of Cholinesterase by Pharmacological and Dietary Agents
- P4: Point-of-view Video Analysis of the Impact of a Faller Safety Training Program
- P5: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula

**3 Ongoing** Internal and External Advisory Committees. The Internal Advisory Committee (IAC) meets monthly, assisting the Principal Investigator and project investigators in making scientific and administrative decisions in the operation of the Center. The External Advisory Committee (EAC) provides the Center with overall guidance on program direction and relevance of activities to the region and the nation. In the 2008 FY, the EAC convened by phone in November 2007 and March 2008. An in-person advisory meeting on fishing safety took place with ad-hoc advisor, Jerry Duzgen, Director of AMSEA on April, 10 2008.

**4 Ongoing** NIOSH Agricultural Center Collaboration. PNASH continues to serve as the Coordinating Center for the NIOSH Ag Centers and was an active participant in the Agricultural Centers Evaluation Program and the National Agricultural Tractor Safety Initiative.

**5 Ongoing** Agricultural Community Outreach and Education Program (ACOEP). The ACOEP is the Center's foundation for building relationships and sharing information with producers, farmworkers, health care providers, extension specialists, government workers, and other researchers and educators. The Center's ACOEP continued with its strategic plan and regular commitments:

- Co-hosting the Washington Governor's Ag Safety Day and coordinating the health fair
- Planning the Western Migrant Stream Forum and hosting the Research Reception
- Participating and providing educational resources to the Washington State Community Health Worker Network.
- Editing and publishing the Northwest Forest Worker Update newsletter.
- Regular educational column, "Nurse Murf," in the *Western Farmer Stockman* and *Good Fruit Growers* Magazines, and "Enferma Elena" in *El Mundo* a Spanish language daily newspaper.
- Regional education presentations. (See below.)

## G. PROJECT PRODUCTS

### Presentations

- 10/2 /2007 Interventions for Pesticide Applicators  
EPA Protecting the Pesticide Worker, Arlington, VA
- 10/2 /2007 Cholinesterase Monitoring in Washington State  
EPA Protecting the Pesticide Worker, Arlington, VA
- 10/2 /2007 Pesticide Curricula for Healthcare Provider Education  
EPA Protecting the Pesticide Worker, Arlington, VA
- 10/9 /2007 Less Literate Populations  
Webinar, University of Iowa
- 1 /9 /2008 Chronic Pesticide Health Effects (English and Spanish)  
Pasco Trade Show
- 1 /25/2008 Pediatric Asthma  
Western Migrant Stream Forum
- 1 /27/2008 Proyecto Bienstar Community Empowerment  
Western Migrant Stream Forum
- 3 /5 /2008 Organophosphate Pesticides: Impact on Children's Health  
AgriSafe Network Web Series
- 11/1 /2008 Overview of PNAS work with Hispanic populations.  
Washington State University Tri-Cities

### Publications

- Article published, professional (juried publication)  
*Meetings and magazines top ag info*  
Wagner-G  
Good Fruit Grower Magazine 2007
- Article published, feature (trade publication)  
*Accept Sound Advice*  
Helen Murphy  
Western Farmer-Stockman 2007
- Use Animal Sense to Prevent Injuries*  
Helen Murphy  
Western Farmer-Stockman Sept 2008
- Workers Tell of Ladder Injuries*  
Helen Murphy  
Western Farmer-Stockman August 2008
- UW Researcher Seeks Methods to Track Path of Dairy Microbes*  
Helen Murphy  
Western Farmer-Stockman July 2008
- Handling Language Barriers Correctly*  
Western Farmer-Stockman June 2008
- Farmers Run a Greater Risk of Skin Cancer*  
Helen Murphy  
Good Fruit Grower May 2008
- Focus on Farm Safety When Inviting Public*  
Western Farmer-Stockman Feb 2008
- Statistics Mirror Hazards of Farmwork*  
Western Farmer-Stockman April 2008
- Respiratory Ailments Nothing to Sneeze At*  
Helen Murphy  
Western Farmer-Stockman Dec. 2008

*Tractor Safety Advice Saves Lives*

Helen Murphy  
Western Farmer-Stockman Nov 2008

*Ag Study Offers Data on Pesticides, Cancer*

Helen Murphy  
Western Farmer-Stockman Jan. 2008

Education / Training /

Thesis or dissertation

*Usability: An important Consideration for Public Health Education on the Web*  
*Assessment of Chlorpyrifos Exposure in Agricultural Workers During Airblast Applications*

Website or webpage established

*National Tractor Safety Initiative*  
*Pacific Northwest Agricultural Safety and Health*

Newsletter

*Northwest Forest Worker Safety Review*  
*PNASH Bi-Monthly E-News*

Trainings

Pesticide recertification classes on the acute and long term effects of pesticide exposure.

Pasco Trade Show, Pasco, WA: 1/9/2008

Vancouver, WA: 1/4/2008

Tacoma, WA: 1/10/2008

Mill Creek, WA: 1/18/2008

Lacy, WA: 1/29/2008

Des Moines, WA: 2/1/2008

Bremerton, WA: 2/14/2008

Seattle, WA: 3/6/2008

Bellingham, WA: 3/27/2008

Conferences

9/30/2007 - 9/29/2008 Program Planning Committee  
Agricultural Safety and Health in Western Agriculture

9/30/2007 - 9/29/2008 Program Planning Committee  
Western Migrant Stream Forum

9/30/2007 - 9/29/2008 Program Planning Committee  
Ag Safety Day

1 25/2008 - 1/27/2008 Western Migrant Stream Forum. Hosted Research Reception and  
Western Migrant Stream Forum

2/20/2008 - Health Fair

Washington Governor's Ag Safety Day

5/22/2008 - Seminar and discussion with Ann Backus, Hazards in the Northeast  
Fishing Fleet: Can We Reduce the Risks?  
UW DEOHS Seminar

Other Products

Annual Report

*Pacific Northwest Agricultural Safety and Health Center Year End Report (FY06/07)*

Report to NIOSH (year end or continuation)

*Pacific Northwest Agricultural Center Renewal and Progress Report*

**H. STATES PROJECT WAS ACTIVE IN**

AK, CA, CO, ID, OR, TX, WA, and some that span USA

**I. COLLABORATION**

Alaska Marine Safety Education Assn. (AMSEA)  
Central Washington Occupational Medicine  
Harborview Occupational Medicine Clinic  
Heritage University  
Idaho Mountain States Group  
National Institute for Occupational Safety and Health (NIOSH)  
NIOSH Agricultural Centers  
Northwest Communities Education Center/Radio KDNA  
Oregon growers and shippers organizations  
Oregon Health & Sciences University  
Oregon State University Agricultural Extension  
Pesticide Incident Reporting and Tracking Panel (WA DOH PIRT)  
Pesticide Laboratory, Centers for Disease Control and Prevention  
US Environmental Protection Agency  
Washington State University  
Washington State University Cooperative Extension  
Washington State Labor and Industries  
Washington State Department of Agriculture  
Washington State Department of Health  
Washington State Department of labor and Industries  
UW Center for Ecogenetics and Environmental Health  
UW Department of Environmental and Occupational Health Laboratory  
UW Northwest Center for Occupational Safety and Health  
UW Pediatric Environmental Health Specialty Unit  
Yakima Valley Farm Workers Clinic

**External Advisory Committee members:**

Jim Blackman, Assistant Dean, Idaho WWAMI  
Deborah Carter, Northwest Horticultural Council  
Jim Doornick, Doornink Fruit Ranch  
Leda Garside, Tuality Healthcare's ¡Salud! Services  
Barbara Lee, Director, National Children's Center for Rural and Agricultural Health and Safety  
Karen Lewis, Extension Educator, Washington State University  
Carol McCormick, Outreach Coordinator, Columbia Valley Community Health  
Sara Quandt, Professor, Wake Forest University  
Steven Witte, Northwest Region United Farmworkers Union

### III. CENTER PROJECTS

#### A. PROJECT TITLE

Res: Risk Factors for Cholinesterase Depression among Pesticide Handlers

#### B. PROJECT OFFICERS(s)

Matthew Keifer, MD, MPH  
PNASH Center  
Box 357234  
Seattle, WA 98195-7234  
Email: mkeifer@u.washington.edu  
Tel: (206) 616-1452  
Fax: (206) 616-2687

#### HOST ORGANIZATION

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

#### C. PROJECT DESCRIPTION

In 2004, the Washington State Department of Labor and Industries (L&I), under mandate from the Washington State Supreme Court, initiated a new cholinesterase (ChE) monitoring program for agricultural workers who handle toxicity class I or II organophosphate (OP) or N-methyl-carbamate (CB) pesticides. The ChE enzyme, which plays an essential role in the regulation of neural signaling, is inhibited by OP and CB pesticides. Washington is only the second state in the Union to establish a ChE monitoring program; California has required ChE monitoring since 1974. In contrast to the California monitoring program, the Washington program benefits from a single laboratory provider, a central data repository (L&I), provision of the vast majority (>80%) of ChE tests by three main clinics, and an inspection team that reviews work practices and conditions at workplaces where ChE depressions occur. Although these investigations have revealed several potential risk factors, none of these factors have been confirmed through a comparison against work practices and conditions among a reference group of handlers who did not have depressed ChE activity. These characteristics of the newly established ChE monitoring program offer researchers an unprecedented opportunity to investigate determinants of overexposure to OP and CB pesticides. In the proposed study, we will seek to identify and characterize risk factors for ChE depression among handlers participating in the Washington State ChE monitoring program. Approximately 1,200 handlers will be recruited over a 5-year period in collaboration with the three main occupational medicine clinics in agricultural regions of Washington State. A participant's risk of ChE depression will be evaluated with respect to workplace, behavioral, and genetic characteristics (paraoxonase or PON1 status). Exposure information will be obtained using a computer-based survey instrument with audio-recorded questions and icon-based responses that are displayed on the touch screen Tablet PC. We will collect exposure data before ChE activity status is determined. Reported exposures will be validated through worksite visits for a subset of study participants. Blood specimens will be collected and analyzed for determination of PON1 status for each study participant. Epidemiologic studies are needed to verify animal-based findings that PON1 status correlates with susceptibility to certain OPs. The results of this study will improve our understanding of potential routes and mechanisms of pesticide overexposure, and will help to prevent such exposures among pesticide handlers. The effectiveness of educational materials developed in response to identify risk factors will be evaluated in terms of their impact on the prevalence of ChE depression and the prevalence of reported risk factors among participating handlers.

#### D. PROJECT START AND END

Start: 1/10/2006      End: 9/29/2011

#### E. PROJECT BUDGET

1. Actual Project Expenditures: \$193,295
2. Estimated In-kind Support Value: None
3. Outside Funding: \$4,680 Cost Sharing

#### F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

##### PROJECT AIMS

- 1 Enroll 50% of Washington State pesticide handlers who undergo repeat ChE testing in an ongoing cross-sectional study. **Ongoing**

To date, a total of 211 agricultural pesticide handlers have been enrolled in this study. During the past year, 52 handlers participated in the study, with a total of 89 visits (i.e., occasions when participating handlers completed the survey and/or provided a blood sample for PON1 testing). Enrollment has been somewhat lower than expected due to an overall decrease in the number of workers participating in the ChE monitoring program, possibly due to work reorganization or reduced use of organophosphate and carbamate insecticides.

- 2 Collect information about likely key risk factors for pesticide over-exposure from participating handlers. **Ongoing**

Self-reported information about potential sources of pesticide exposure was collected for a total of 85 participant visits during the 2008 spray season. Descriptive analyses of survey data from 154 study participants during the 2006-2007 spray seasons have been performed.

- 3 Characterize PON1 status in blood specimens from each participant. **Ongoing**

PON1 status is hypothesized to be a biological marker of susceptibility to some organophosphate pesticides including chlorpyrifos. A total of 58 blood specimens for PON1 testing were collected from participating handlers during the 2008 spray season. These blood specimens have been analyzed by Dr. Clement Furlong and colleagues to determine PON1 status based on the two-substrate assay, as well as plasma PON1 activity levels. Genotyping assays for the C-108T polymorphism in the PON1 promoter region and the Q192R polymorphism in the PON1 coding region will also be performed. Blood specimens from 163 participants during the 2006-2007 spray seasons have been tested for PON1 status and genotype.

- 4 Determine which risk factors are associated with ChE inhibition, including workplace conditions, behavioral factors, and PON1 status. **Ongoing**

Analyses of ChE inhibition in relation to self-reported exposures and PON1 status based on data collected during the 2006 and 2007 spray seasons are currently underway.

- 5 Evaluate the impact of educating workers and growers about risk factors for ChE depression. **Future**

This aim will be addressed in subsequent years of the project when data about work practices and workplace conditions are available over an extended time period.

## **G. PROJECT PRODUCTS**

Presentations

Publications

Education / Training /

PowerPoint Presentations (for distribution)

- *Risk factors for occupational pesticide exposure*
- *Biomarkers of sensitivity and exposure in Washington State pesticide handlers*
- *Serum cholinesterase inhibition in relation to paraoxonase status among agricultural pesticide handlers*

Conferences

Other Products

## **H. STATES PROJECT WAS ACTIVE IN**

Washington

## **I. COLLABORATION**

Central Washington Occupational Medicine

Department of Entomology and Environmental Toxicology, Washington State University

Farmworker Education Program, Washington State Department of Agriculture

Pesticide Incident Reporting and Tracking Panel, Washington State Department of Health

Scientific Advisory Committee, Washington State Cholinesterase Monitoring Program

WorkCare, PLLC

Yakima Worker Care



## A. PROJECT TITLE

Res: Neurobehavioral Assessment of Pesticide Exposure in Children

## B. PROJECT OFFICERS(s)

Diane Rohlman,  
3181 SW Sam Jackson Park Road, L606  
Portland, OR 97301-3098  
Email: rholmand@ohsu.edu  
Tel: (503) 494-2513  
Fax: (503) 494-4278

## HOST ORGANIZATION

Oregon Health & Science University  
CROET  
3181 SW Sam Jackson Park Road  
Portland, OR 97239

## C. PROJECT DESCRIPTION

The goal of the proposed study is to extend our previous work to identify possible health effects from chronic exposure to organophosphate pesticides in school-age children (5-12 years) and determine if performance is correlated with current home pesticide exposure or an estimate of lifetime measure of exposure.

We propose a 5-year plan of research that will: (1) establish an optimal exposure measurement protocol; (2) recruit a cohort of 150 exposed and 150 non-exposed control children; (3) compare neurobehavioral performance of children of applicators to children of controls in a cross-sectional study, and relate neurobehavioral performance of all children to estimates of (potential) home dust exposure and estimates of lifetime exposure; (4) repeat the same measurements in a second year to obtain longitudinal data that will characterize developmental progress and relate that progress to exposure estimates; (5) develop one-page English/Spanish brochures for the various communities to describe research outcomes and their implications for school, work, home and clinical diagnosis.

## D. PROJECT START AND END

Start: 1/10/2006      End: 9/29/2011

## E. PROJECT BUDGET

1. Actual Project Expenditures: \$ 107,376
2. Estimated In-kind Support Value: None
3. Outside Funding: None

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 Establish a sampling protocol to characterize Organophosphate (OP) exposures in urine metabolites in children over a spraying season. Obtain self-reports of pesticide use by applicators and family members using an icon-based interview approach to develop an estimate of lifetime pesticide exposures in the children tested. **Met**
- 2 Recruit a cohort of 150 school-age children whose parents are active OP pesticide mixer-loader-applicators, and an age- and gender-matched control group (N=150); and implement

procedures for maintaining contact with the sample over two application seasons. **Ongoing**

The Certificate of Confidentiality from the CDC was received in January of 2008. At this time we were able to begin collecting data from participants. During the Spring of 2008 seventeen families participated in a study to pilot the questionnaires and neurobehavioral test battery. These families were recruited from agricultural and non-agricultural communities different from the study community. Analysis of this data is currently in progress. A Research Assistant was hired from the study community and began recruiting families for the Sampling Study. Urine samples were collected from seventeen children during the 2008 pesticide application season (May through September). Samples were collected from 6 time periods, 2 pre-spray periods (approximately 2 weeks and one week before applications of Organophosphate pesticides), 2 application periods (at the middle of the application period and at the end of the application period), and 2 post-spray periods (approximately 1 week and 2 weeks after the application period). We contracted with the Oregon State University Agricultural Extension Office for lab and freezer space and hired two Research Assistants to assist with collection and processing of the urine samples. The families were also interviewed during this time and completed the questionnaires and Life History Calendar. Dr. Dana Barr from the CDC has agreed to analyze the urine samples and preparations are being made to ship them to her laboratory.

- 3 Conduct a cross-sectional study of neurobehavioral performance in 5-12 year old children of pesticide mixer-loader-applicators, compared to same-age control children, and relate performance of all children to home dust exposures. **Ongoing**

During September we began recruiting families for the Neurobehavioral Study. We are working with local grower organizations and health care clinics and schools to recruit families. At this point we have 90 families enrolled in the study (our goal is 100 families this year). We have begun conducting interviews with the families. Because of the late start of data collection we have hired another Research Assistant to assist with the Neurobehavioral Study.

- 4 Examine neurobehavioral performance of the same 300 children in the following (second) year to determine if home pesticide exposures affect neurodevelopment. **Ongoing**
- 5 Develop a series of communications to the orchard worker, orchard owner, school and medical communities in Hood River that describe the research outcomes and targeted implications. **Ongoing**

## **G. PROJECT PRODUCTS**

- Presentations
- Publications
- Education / Training
  - Newsletter
- Conferences
- Other Products

## **H. STATES PROJECT WAS ACTIVE IN: OR, WA**

## **I. COLLABORATION**

- Members from the Oregon growers and shippers organizations
- Members of the Oregon State University Agriculture Extension Office
- Hood River community members

## A. PROJECT TITLE

Res: Enhancements to Cholinesterase Monitoring: Oxime Reactivation & OP-ChE Adducts

## B. PROJECT OFFICERS(s)

Chris Simpson, PhD  
Box 357234  
Seattle, WA 98195-7234  
Email: simpson1@u.washington.edu  
Tel: (206) 543-3222  
Fax: (206) 616-2687

## HOST ORGANIZATION

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

## C. PROJECT DESCRIPTION

The overall goal of this proposal is to improve the specificity, sensitivity and reliability of cholinesterase monitoring, thereby providing a tool to detect and reduce overexposure of agricultural workers to cholinesterase (ChE)-inhibiting pesticides.

## D. PROJECT START AND END

Start: 1/10/2006      End: 9/29/2011

## E. PROJECT BUDGET

1. Actual Project Expenditures: 207,728 TC
2. Estimated In-kind Support Value: None
3. Outside Funding: \$5,661 Cost Sharing

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

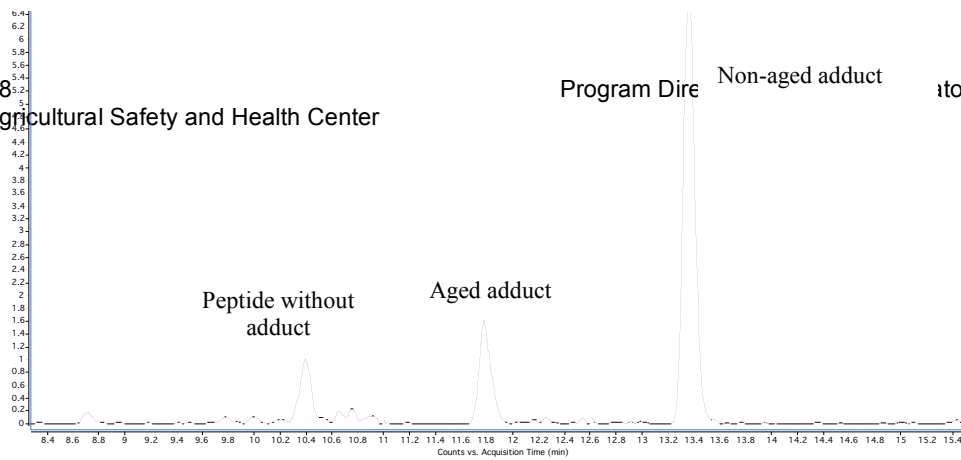
### PROJECT AIMS

- 1a Develop/validate a sensitive, accurate and robust analytical procedure based on HPLC/MS/MS for the measurement of OP-adducts to plasma ChE (butyryl ChE, BuChE).

#### Met

A sample preparation procedure was acquired from collaborators at CDC and successfully reproduced in our lab. Procainamide sepharose gel is used to isolate cholinesterase from plasma samples, providing an effective means of sample cleanup.

In vitro samples were prepared with human plasma and chlorpyrifos oxon. Selected samples were allowed to age for up to 1 day at room temperature before analysis. Using LC/MS/MS, we separated and identified the peptide of interest with and without the OP adduct. We also identified the aged adduct in which one of the ethyl groups had been cleaved from the OP moiety. The figure below shows a chromatogram from a sample containing these three analytes. The chromatogram is relatively free of interfering peaks and the signal to noise ratio is between 10 and 100 for these peaks.



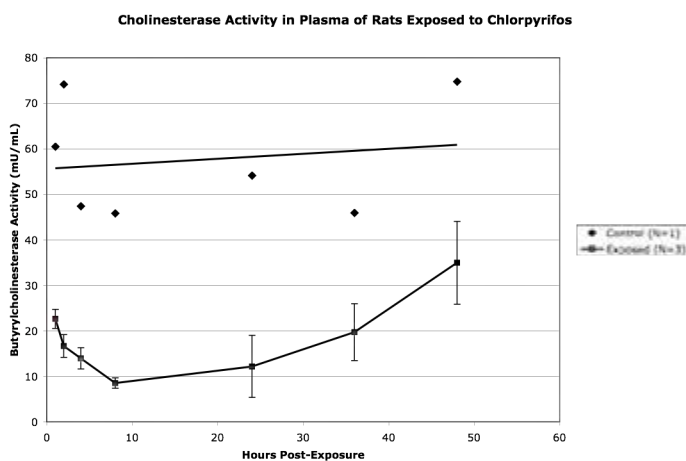
A  $^{13}\text{C}$ -labeled internal standard of the active site nonapeptide was ordered from a commercial laboratory that specializes in peptide synthesis. This standard will be added to samples during preparation to improve quantitative aspects of the assay.

1b Evaluate the potential of oxime reactivation followed by measurement of ChE activity for confirmation of depressed ChE activity. **Met**

In year 1, we developed a cholinesterase activity assay for human plasma using a 96-well microplate reader. During the present year, we developed a related assay for measurement of rat plasma butyrylcholinesterase. This assay was used to measure cholinesterase inhibition in rats exposed to chlorpyrifos (described below in Aim 2).

2 Evaluate the relationships between OP-adduct levels, reactivatability of ChE, and ChE activity in vitro, in vivo in rats, and in humans exposed to OP pesticides. **Ongoing**

A pilot study was conducted where rats were exposed to chlorpyrifos. The pesticide was dissolved in corn oil and given by oral gavage. Four rats were dosed at 10 mg/kg while two served as unexposed controls. Blood was drawn 1, 2, 4, 8, 24, 36, and 48 hours after dosing. The figure below summarizes the cholinesterase activity data. One of the dosed rats and one control rat failed to complete the test due to technical problems. The timecourse for cholinesterase activity in the rats is illustrated in the attached figure. Cholinesterase inhibition took ~10 hours to reach the maximum level and then recovered considerably during the remainder of the test. Future tests for these samples will include oxime reactivation and adduct measurement by LC/MS/MS.



3 Research to practice: Incorporate the assays developed in Aim 1 with the practice of OP pesticide exposure monitoring in Washington state. **Future**

**G. PROJECT PRODUCTS**

Presentations  
Publications  
Education / Training /  
Conferences  
Other Products

**H. STATES PROJECT WAS ACTIVE IN**

Washington

**I. COLLABORATION**

CDC Laboratory

## **A. PROJECT TITLE**

Res Pilot: Assessment of Job-related Exposures for Diarrheal Illness in Farmworker Families

## **B. PROJECT OFFICERS(s)**

John Scott Meschke, JD, PhD, MS  
Box 357234  
Seattle, WA 98195-7234  
Email: jmeschke@u.washington.edu  
Tel: (206) 221-5470  
Fax: (206) 616-2687

## **HOST ORGANIZATION**

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

## **C. PROJECT DESCRIPTION**

It is hypothesized that occupational and environmental exposure pathways from livestock operations (in particular cattle operations) pose a significant risk of exposure to zoonotic bacterial contamination (e.g. *Campylobacter* spp., *Salmonella* spp., *E.coli* O157:H7) for farmworkers and their families. In addition to on the job workplace exposures to livestock handlers, livestock handling farmworkers may unwittingly expose themselves and their families through transportation of job-related bacterial contamination to the household. Additionally, farmworkers may reside in close proximity to livestock operations which result in environmental contamination of their homes by a variety of pathways (e.g. through bioaerosol or well water contamination). The primary objective of the proposed project is to assess job-related exposures for farmworkers and their families to three common zoonotic bacterial pathogens (*Salmonella* spp., *Campylobacter* spp., and *E.coli* O157:H7). The specific aims of the proposed project are: 1) Adaptation, development, and/or validation of methods for sampling of bacteria on surfaces (e.g. vehicle and household carpets, worker apparel, and other workplace, vehicle and household surfaces); 2) Assessment of fomite surfaces, bioaerosol, and water as workplace exposure pathways; 3) Assessment of the paraoccupational (or take-home) exposure pathway for three zoonotic pathogens (*Salmonella* spp., *Campylobacter* spp., and *E.coli* O157:H7); and 4) Assessment of residential proximity to job-related livestock operations as an exposure pathway. This study will specifically address NIOSH priorities for a special occupation at risk (farmworkers) as identified in the National Occupational Research Agenda (NORA). Additionally this study will develop or adapt novel methods for occupational-related sampling for pathogenic microorganisms.

## **D. PROJECT START AND END**

Start: 1/10/2006      End: 9/29/2009

## **E. PROJECT BUDGET**

1. Actual Project Expenditures: \$104,248 TC
2. Estimated In-kind Support Value:
3. Outside Funding: \$6,398 Cost Sharing

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 Adaptation, development, and/or validation of methods for sampling of bacteria on surfaces (e.g. vehicle and household carpets, worker apparel, and other workplace, vehicle and household surfaces). **Partially Met**

Subject recruitment has been slower than anticipated, requiring increased promotion effort and time that has delayed this pilot and necessitated a 1-year no cost extension.

- 2 Assessment of fomite surfaces, bioaerosol, and water as workplace exposure pathways.

**Partially Met**

- 3 Assessment of the para-occupational (or take-home) exposure pathway for three zoonotic pathogens (*Salmonella* spp., *Campylobacter* spp., and *E. coli* O157:H7). **Ongoing**

- 4 Assessment of residential proximity to job-related livestock operations as an exposure. **Future**

### G. PROJECT PRODUCTS

Presentations  
Publications  
Education / Training  
Conferences  
Other Products

### H. STATES PROJECT WAS ACTIVE IN

Washington

### I. COLLABORATION

Microbial-Vac Systems, Inc.  
Environmental Sciences Program, Heritage University

## A. PROJECT TITLE

Edu: Interventions to Minimize Worker and Family Pesticide Exposures

## B. PROJECT OFFICERS(s)

Richard Fenske, PhD, MPH  
PNASH Center  
Box 357234  
Seattle, WA 98195-7234  
Email: rfenske@u.washington.edu  
Tel: 206-543-0916  
Fax: 206-616-2687

## HOST ORGANIZATION

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

## C. PROJECT DESCRIPTION

The overall objective of this five-year project is to identify and test practical interventions that reduce pesticide exposures of agricultural workers and their families, and to disseminate these “best practices” into agricultural workplaces and workers’ homes in the Northwest and around the nation. We define interventions very broadly, including changes in product use and innovations in application equipment, as well as changes in specific work practices. We will work closely with producers, workers, and our regional land-grant institutions to develop cost-effective interventions that are acceptable to both employers and employees. Specific aims are as follows:

- 1 Convene an Expert Working Group to define intervention strategies appropriate to the Northwest tree fruit industry **Partially Met**
- 2 Conduct worksite intervention studies of pesticide applicator exposure **Ongoing**
- 3 Implement and evaluate a novel pesticide applicator safety training program **Ongoing**
- 4 Translate Best Practices into a document for a national audience **Ongoing**

## D. PROJECT START AND END

Start: 1/10/2006      End: 9/29/20011

## E. PROJECT BUDGET

1. Actual Project Expenditures: 246,652 TC
2. Estimated In-kind Support Value:
3. Outside Funding: \$4,680

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 Convene an Expert Working Group to define intervention strategies appropriate to the Northwest tree fruit industry. **Ongoing**

The eight members of the agricultural community were selected for the Expert Working Group. Members were selected from among the key informants that participated in the Expert Interviews. Three EWG meetings were held during the year. At each meeting, topics relevant to pesticide safety



were presented and discussed. Committee members identified and prioritized 5 areas of interest for intervention study.

Three additional members for the expert working group were selected after they participated in the Key Informant Interviews. Analysis of the Key Informant Interviews is ongoing.

A review of the current peer literature on interventions to minimize has been conducted. The second phase of the review is now ongoing.

2 Conduct worksite intervention studies of pesticide applicator exposure. **Ongoing**

Study options have been reviewed and presented to the expert working group. Intervention study activities begin in Winter 2009

3 Implement and evaluate a novel pesticide applicator safety training program. **Ongoing**

4 Translate Best Practices into a document for a national audience. **Ongoing**

Planning for a regional/national workshop is underway with partner meetings taking place. The workshop is planned for July 2010 and funding will be applied for to NIOSH and EPA in Summer 2009.

## G. PROJECT PRODUCTS

Presentations

Publications

Education / Training

3 Expert Working Group Meetings (each provided professional education and Washington state pesticide recertification credits)

Graduate Student Jen Krenze was supported on this grant as a research assistant for summer2008.

She will be continuing with the project for her masters thesis.

Conferences

Other Products

3 Expert Working Group Meetings

## H. STATES PROJECT WAS ACTIVE IN

Washington

## I. COLLABORATION

7 agricultural applicators, supervisors, producers and educators who form the Expert Working Group.

NIOSH

US EPA

## **A. PROJECT TITLE**

Edu: Introducing a Cholinesterase Test Kit into Clinical Practice

## **B. PROJECT OFFICERS(s)**

Matthew Keifer, MD, MPH  
PNASH Center  
Box 357234  
Seattle, WA 98195-7234  
Email: mkeifer@u.washington.edu  
Tel: (206) 616-1452  
Fax: (206) 616-2687

## **HOST ORGANIZATION**

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

## **C. PROJECT DESCRIPTION**

This project will work to enhance and simplify worker monitoring for pesticide overexposure by introducing a portable testing kit, the Test-mate ChE test system into an existing, state-wide cholinesterase monitoring program. Washington State OSHA (known as WISHA) mandates the monitoring of cholinesterase for certain agricultural workers. Over 2200 baseline and 900 follow-up tests were done last year. The measurement of cholinesterase by clinics in Washington presently depends on sending samples across the state to a central lab. This Test-mate system employs the Ellman methodology (same as the laboratory) and a battery powered, portable, light emitting diode based photoanalyzer which measures the activity of both plasma and erythrocyte cholinesterase using only 10 microliters of blood. The blood sample can be obtained from a finger stick sample or venipuncture. The kit has been used in countries around the globe and has been reported upon in many studies in the published literature. It has shown good performance when compared to laboratory based systems. Easy to apply in a clinician's office, the Test-mate to clinics and work with large and small programs to facilitate the introduction by developing several "use models" based on the way the clinic conducts testing. Once developed, these use models will be used to disseminate the technology to other clinics in the area. Data gathering throughout the study period will assess the usability of the kit, the effectiveness of training, as well as the accuracy of the Test-mate against the gold standard laboratory. The use of the Test-mate will also permit evaluation of new cholinesterase depression verification techniques developed by the Agricultural Center (Simpson Project). Monitoring workers for overexposure to pesticides is a labor and resource intensive process. This translation project will take a proven methodology, reconfirm its value and introduce it into the cholinesterase testing process aiming at reducing the work, cost and improving the quality of information and response time of the cholinesterase monitoring process.

## **D. PROJECT START AND END**

Start: 1/10/2006      End: 9/29/2011

## **E. PROJECT BUDGET**

1. Actual Project Expenditures: 58,729 TC
2. Estimated In-kind Support Value: None
3. Outside Funding: None

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 To work with a single clinic in Washington state to design a "use model" for onsite ChE testing using the Test-mate ChE system. **Met**

We have continued to work with Central Washington Occupational Clinic this year. As we develop questions and procedures, we continue our dialogue to ensure that the project is responsive to their needs and that they are still eager to work with us.

- 2 To identify clinic-specific issues that interfere with use of the Test-mate system and adapt the "use model" to resolve these issues. **Ongoing**

Through discussion among the UW research team, several possible clinic-specific issues have been identified, including;

- Clinical Laboratory Improvement Amendments (CLIA) certification: We have researched the requirements and will work with the clinic to ensure that they are CLIA certified. The laboratory director must be qualified to manage and direct the laboratory personnel and the performance of moderate complexity tests and must be eligible to be an operator of a laboratory
- Costs vs. benefits – how many tests must a clinic perform to make the Test-mate cost efficient?
- Space, environmental and time requirements: To date, we have worked on lab experiments to test the validity of the test kit as temperature and time change. In the coming future, we will expand upon this testing.
- Developing a more formal training for new users and a refresher for following years – as Randy Treadwell, graduate research assistant continues to work with the test kit, he is developing a protocol for future users.
- Simultaneous use of multiple test kits in order to increase sample output.

The research team will further investigate these and additional issues as they arise. Conversational interviews with clinic staff will make this an iterative process.

- 3 To expand participation to three to five clinics with smaller ChE monitoring programs and adapt the use model for dissemination to other clinical providers. **Ongoing**

We have not yet expanded this project to work with additional clinics.

- 4 To determine the potential for the Test-mate to augment or replace laboratory-based cholinesterase testing based on the performance of the Test-mate in the clinic setting and the cost of incorporating the Test-mate into the monitoring system. **Future**

We have not yet reached this point in the research project.

- 5 To introduce to clinics two new methods for ChE inhibition verification. **Future**

We have not yet reached this point in the research project.

## G. PROJECT PRODUCTS

Presentations

Publications

Article published, professional (juried publication)

*Evaluation of a clinic-based cholinesterase test kit for the Washington State Cholinesterase Monitoring Program*

Hofmann-JN, Carden-A, Fenske-RA, Ruark-HE, Keifer-MC  
American Journal of Industrial Medicine

Education / Training

Graduate Student Randy Treadwell was supported on this grant as a research assistant for the spring quarter 2008. He was trained in the use of the ChE test mate kit and as a graduate student in environmental and occupational health.

Conferences

Other Products

**H. STATES PROJECT WAS ACTIVE IN**

Washington

**I. COLLABORATION**

Central Washington Occupational Medicine (CWOM)

## **A. PROJECT TITLE**

Edu: Reality Tales: Storytelling to Translate Agricultural Health and Safety Research

## **B. PROJECT OFFICERS(s)**

Helen Murphy, MS, FNP  
Box 357234  
University of Washington  
Seattle, WA 98195-7234  
Email: hmurf@u.washington.edu  
Tel: (206) 616-5906  
Fax: (206) 616-2687

### **HOST ORGANIZATION**

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

## **C. PROJECT DESCRIPTION**

The goal of this project is to use the ancient oral tradition of storytelling to translate health and safety research and education for agriculture producers and workers on two critical issues: ladder injuries and heat stress. Through this novel educational communication strategy, the ultimate objective is to reduce the incidence of ladder injuries and heat stress. The project will develop and reproduce 'reality tales' told by workers or those closely related who have either direct or indirectly experienced these health problems. These then will be placed within three communication channels - facilitated community health worker educational sessions in farmworker camps, local call-in radio talk shows, and a magazine favored by agricultural producers. The educational rationale is that storytelling as opposed to instructions or data is more relevant, memorable, and persuasive thus better engaging the audience members to effect personal behavior change. Year 1 will define the take home educational messages and issues to be communicated (behavioral, technical and social) through the storytelling methodology by a review of current research findings and prevailing educational interventions for ladder injuries and heat stress. Also in Year 1 the project will determine which communication channels are the most influential and best means to connect with the stakeholder agricultural producers and workers. Year 2 the project will gather agriculture workers who have directly or indirectly experienced heat related illnesses, ladder injuries or near miss ladder accidents to form 'story groups'. The project will engage these groups to recount, discuss, document, and evaluate their stories for model educational narratives. Year 3 will develop pilot storytelling narratives and field test them in three cycles with members of the target audiences. Year 4 will place the storytelling narratives in three communication channels; i) face to face community health worker-lead educational sessions in farmworker camps; ii) local call-in radio talk shows and; iii) as articles in a grower magazine. Year 5 the project will evaluate the use of narratives in these three channels as well as document the project through a user's manual, presentations and publications. We will also produce and disseminate storytelling narratives for others to use locally and nationally.

## **D. PROJECT START AND END**

Start: 1/10/2006                      End: 9/29/2011

## **E. PROJECT BUDGET**

1. Actual Project Expenditures: 59,181 TC
2. Estimated In-kind Support Value: 10,000
3. Outside Funding: \$4,680 Cost Sharing

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 Define the key take-home educational messages to be communicated (behavioral, technical and social) through the storytelling methodology by a review of current research findings and prevailing educational materials aimed at preventing ladder injuries and heat stress. **Met**
- 2 Determine the most effective means to reach agricultural producers and workers by identifying their preferred communication channels. **Met**
- 3 Gather agriculture workers who have directly or indirectly experienced heat related illnesses, ladder injuries or near-miss ladder accidents to form "story groups." **Met (revised)**

Based partially on the advice of our external advisory committee, we decided to spend this year developing the methodology for the project - selecting one topic (ladder injuries) with one educational target group audience (Spanish speaking farmworkers).

Through piloting we found that workers were reluctant to come together in story telling groups. A better method was suggested by our Hispanic partner organization radio KDNA. They propose to elicit worker stories through a radio broadcast storytelling contest. They felt this method will yield the best stories from a larger pool. Also KDNA radio is a well known, trusted and neutral media.

The contest and rules were announced over the KDNA radio, through fliers distributed at various Hispanic local events, through a press release in the local newspaper and as an e-invitation to local organizations. The contest was launched in November 2007 with registration of 16 contestants over the month of the contest period. Each story was screened for validity and educational value by the study team yielding seven semifinalists stories. Their stories were subsequently recorded for final judging by our panel of 12 health and safety experts and community representatives who selected four winners.

- 4 Engage these worker story groups to recount, discuss, document, and evaluate their stories for model educational narratives. **Met**

The winning storytellers were invited to recount their experiences on a live radio talk show that was hosted on March 20th 2008 by the radio KDNA producer and a Labor and Industries safety expert. The program was recorded and edited for evaluation.

- 5 Develop pilot storytelling narratives and field-test them in three cycles with members of the target audiences. **Met (Revised)**

The development and field testing was conducted in three cycles but slightly different than proposed. The technical review was conducted by our 12 member technical panel who selected the finalists. Stage two testing was conducted during a ladder safety training program with 20 community health workers. Then after editing based on their feedback the final version was tested with 13 volunteers from the Radio KDNA listening audience.

- 6 Place the storytelling narratives in three communication channels; 1) face-to- face Community Health Worker (CHW) -led educational sessions in farmworker camps, 2) local radio call-in talk shows, and 3) a popular growers' magazine. **Ongoing**

Excerpts from the workers stories and the educational messages they had for fellow workers, managers and owners were summarized for agricultural producers in articles in two of magazines;

the Western Farmer Stockman and the Good Fruit Grower.

7 Evaluate the use of the storytelling narratives in all three communication channels. **Future**

8 Document the project through a user's manual, presentations and publications; produce and disseminate storytelling narratives. **Future**

## **G. PROJECT PRODUCTS**

Presentations

Publications

Article published, feature (trade publication)

*Workers Tell of Ladder Injuries*

Murphy-HM

Western Farmer Stockman August 2008

*Avoiding Ladder Injuries*

Murphy-HM

The Good Fruit Grower Sept 1, 2008

Education / Training

CD-ROM

*30 minute radio interview/talk radio show on heat related illnesses*

*Radio Talk Show CD on Ladder Injuries*

Conferences

Other Products

## **H. STATES PROJECT WAS ACTIVE IN**

Washington

## **I. COLLABORATION**

Radio KDNA

Washington State University Cooperative Extension

Washington State Labor and Industries

One regional grower who is also a PNASH External Advisory Committee member

Columbia Valley Community Clinic

## IV. SMALL/PILOT PROJECTS

### A. PROJECT TITLE

Pilot 2: Characterization of Bioaerosols in Washington Dairy Barns

### B. PROJECT OFFICERS(s)

John Scott Meschke, JD, PhD, MS  
Box 357234  
Seattle, WA 98195-7234  
Email: [jmeschke@u.washington.edu](mailto:jmeschke@u.washington.edu)  
Tel: (206) 221-5470  
Fax: (206) 616-2687

### HOST ORGANIZATION

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

### C. PROJECT DESCRIPTION

One of the focus areas of the Northwest farming agenda is 'respiratory diseases' affecting farm workers. A significant proportion of all work-related illness in agriculture is respiratory in nature and potentially related to workers' exposure to bioaerosols. However, most of the exposure studies in concentrated animal feeding operations (CAFO) have focused on confined swine and poultry operations. Past studies have indicated significant dose-response relationships in workers exposed to total dust, respirable dust, endotoxin and ammonia, and decline in pulmonary function in both swine confinement and poultry operations (Schenker et al., 2005; Zjeda et al., 1993; Zuskin et al., 1992). Other recent studies have demonstrated significant exposures to aerosolized bacteria and fungi in swine barns (Rule et al., 2005; Sapkota et al., 2006). The goal of this research project is to characterize and quantify the bioaerosols in a typical dairy CAFO in the Pacific Northwest. In assessing the bioaerosol exposures that may lead to respiratory illness in dairy CAFO workers, this proposed project explicitly addresses the NW farming research agenda. Data from this project is expected to provide an initial assessment of CAFO workers' bioaerosol exposures and to support application for continued research funding from USDA or NIOSH. Future studies would aim to identify specific sources and work practices and develop strategies to reduce bioaerosol exposures, resulting in improved worker health in dairy CAFOs. This project will be conducted collaboratively between University of Washington and Washington State University on a 4,300 head dairy CAFO in Central Washington. This research project will be conducted in parallel with an EPA study which focuses on quantification of ammonia, hydrogen sulfide, volatile organic compounds, and particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>). Instrumentation already in place for the EPA study will be utilized by the proposed study, thus reducing the required budget.

### D. PROJECT START AND END

Start: 1/1/2007                      End: 9/29/2008

### E. PROJECT BUDGET

1. Actual Project Expenditures: \$4,967 TC
2. Estimated In-kind Support Value: \$5,000
3. Outside Funding: None



## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 Characterize and quantify fungi, bacteria, actinomycetes, and endotoxins in bioaerosols from a typical dairy open freestall barns. **Met**
- 2 Evaluate the levels and types of bioaerosol contaminants in relation to concurrently collected environmental data (under a concurrent EPA funded study) and activities occurring in the barn. **Partially Met**

### G. PROJECT PRODUCTS

Presentations

Publications

Education / Training

Thesis or Dissertation

*Evaluation of the efficacy of the BioSampler Aerosol Collection device for Collection and Retention of Various Particle Sizes*

Wischmeier-B.

M.S. Thesis. University of Washington, 6/10/2008.

Conferences

Other Products

### H. STATES PROJECT WAS ACTIVE IN

Washington

### I. COLLABORATION

Pius Ndegwa, Assistant Professor, Biological Systems Engineering, Washington State University, PO Box 646120, Pullman, WA 99164-6120

## A. PROJECT TITLE

Pilot 3: Inhibition of Cholinesterase by Pharmacological and Dietary Agents

## B. PROJECT OFFICERS(s)

Chris Simpson, PhD  
Box 357234  
Seattle, WA 98195-7234  
Email: simpson1@u.washington.edu  
Tel: (206) 543-3222  
Fax: (206) 616-2687

## HOST ORGANIZATION

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

## C. PROJECT DESCRIPTION

Overall goal: To evaluate the possible interference of dietary and pharmacological agents with the cholinesterase test for organophosphate pesticide exposure.

Specific aim: To determine whether quinine and acetaminophen, when consumed at realistic therapeutic concentrations, cause significant depression of cholinesterase activities.

## D. PROJECT START AND END

Start: 9/30/2007      End: 9/29/2009

## E. PROJECT BUDGET

1. Actual Project Expenditures: 22,794 TC
2. Estimated In-kind Support Value: None
3. Outside Funding: None

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 Monitoring cholinesterase levels in the blood of 15 healthy adults while they ingest 3g of acetaminophen per day for 6 days (75% of the maximum dose). **Met**

This section of the study was completed successfully during July and August 2008. A prescreening test of liver enzyme levels in the blood of 21 volunteers lead to the elimination of 5 people due to high liver enzymes. This precaution was designed to prevent liver damage by acetaminophen administered in our study. One individual chose to withdraw for personal reasons following the prescreening blood draw. Our targeted enrollment of 15 healthy adults (ages 23-51) ingested acetaminophen at 75% of the maximum daily dose for 6 consecutive days. High liver enzymes were detected in the blood of one participant after which their acetaminophen dose was stopped but blood draws continued through day 6 and liver enzyme levels returned to normal. Daily blood samples (serum and whole blood) of all participants were stored at -80°C for later cholinesterase analyses. Analysis of cholinesterase levels in blood is currently underway in our laboratory and will be presented in future reports.

- 2 Monitoring cholinesterase levels in the blood of 10 healthy adults after ingestion of quinine-laden tonic water alone, vodka alone, and the two combined. **Future**

3 In vitro testing of cholinesterase depression in blood after addition of quinine or acetaminophen.  
**Future**

**G. PROJECT PRODUCTS**

Presentations  
Publications  
Education / Training  
Conferences  
Other Products

**H. STATES PROJECT WAS ACTIVE IN**

Washington

**I. COLLABORATION**

None

## A. PROJECT TITLE

Pilot 4: Point-of-view Video Analysis of the Impact of a Faller Safety Training Program

## B. PROJECT OFFICERS(s)

Gary Rischitelli, MD, JD, MPH  
3181 SW Sam Jackson Park Road, L606  
Portland, OR 97239  
Email: [rischite@ohsu.edu](mailto:rischite@ohsu.edu)  
Tel: (503) 494-4398  
Fax: (503) 494-4278

## HOST ORGANIZATION

Oregon Health & Science University  
Center for Research on Occupational and Env. Tox.  
3181 SW Sam Jackson Park Rd, Mailcode L606  
Portland, OR 97219

## C. PROJECT DESCRIPTION

We will conduct a video observation study of loggers at work, concentrating on fallers, using video equipment attached to a hardhat for a first person point of view. The study will test the feasibility of using new video technology in an innovative approach to observe fallers at work in a remote work environment. Observation of actual work practices is the most reliable method to determine training effectiveness. Point-of-view video observation provide a way to gain access to the remote work situation in the woods in the most unobtrusive manner. The study will (a) develop specific procedures to obtain and manage video data of worker behavior in logging, (b) develop an analytical framework to evaluate a five-step faller safety checklist, and code observable behaviors in the database of video files, (c) perform appropriate statistical analyses to detect changes in relevant behavior before and after a safety training intervention, and (d) document points of interest for researchers related to equipment needs, subject participation and burden, resulting image quality, ability to assess safety behaviors with point-of-view video analysis software, and the time required for each phase of the project. The study will assemble appropriate equipment to record and analyze video data, and implement a human subjects research protocol that is sensitive to the privacy of subjects and consistent with human-subjects research protection requirements. The project addresses the PNASH research agenda for Northwest forestlands by developing methods to identify and measure positive safety behaviors, and also develops an innovative strategy for obtaining data on work behaviors of lone workers and remote locations. A successful pilot project will provide a basis for evaluating the effectiveness of safety training for loggers, and may be used to provide feedback to loggers to promote safe behaviors.

## D. PROJECT START AND END

Start: 9/30/2007      End: 9/29/2009

## E. PROJECT BUDGET

1. Actual Project Expenditures: \$11,051
2. Estimated In-kind Support Value: \$5,000
3. Outside Funding: None

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

- 1 Develop specific procedures to obtain and manage video data of worker behavior in logging. **Met**

The project selected a Viosport POV.1 camera, Transana software, and a high-capacity storage drive to create, analyze, and archive video data. Two cameras were purchased and permanently mounted

on a standard hardhat, with a belt pack to hold the recorder unit (connected by a 5-foot cable). One camera failed in the first two sessions. Although trial recording in the office worked well, longer recording sessions in the field produced a file that could not be downloaded from the recorder unit. Warranty repair replaced hardware to fix the file compression. Also, a new SD card with a faster write speed was purchased for the camera. Both cameras now function properly. Two beginning student fallers were observed in a first phase of data collection in May and July 2008. Plans to observe two advanced student fallers was not carried out, because they were not available, but two advanced student participants were identified to bring into the study at a later date. Observation of two professional fallers are also planned for a later date.

- 2 Develop an analytical framework to implement the five-step faller safety plan, and code observable behaviors in the database of video files. **Ongoing**

Video files from the two beginning student fallers were observed and coded to distinguish different aspects of behavior. Selected segments of activity were coded according to direction of view (ahead, up, left, right, down) to determine the feasibility of obtaining reportable results. The video files were then carefully coded for each "tree event," distinguishing the five critical steps in safe falling activity: assess the area, assess the tree, establish a safe work area, fall the tree, and get in the clear. The video files were then observed by a logging safety consultant to confirm and correct the coding of five work behaviors. The coding produced a database of behaviors associated with each tree event, including time sequences and cumulative time spent in each behavior.

- 3 Perform appropriate statistical analyses to detect changes in relevant behavior between Time 1 (prior to training with the safety booklet) and Time 2 (following training with the safety booklet), and determine the sample size needed to obtain statistical power. **Future**

Analysis of differences between student, advanced, and professional fallers, and between the first and second phase of data collection will be possible following further participant observation.

- 4 Document points of interest for researchers, related to equipment needs, subject participation and burden, resulting image quality, ability to assess job performance with video analysis software, and the time required for each phase of the project. **Ongoing**

The resulting video is clear, and worker behavior is plainly observed. Watching and coding the video involved several iterations to develop a workable coding system and appropriate focus on relevant behavior. The point-of-view coding, at the fastest pace, required 6 hours for each 1 hour of video. Coding of the five steps in falling was somewhat faster, due to longer intervals for each coded behavior. Participant burden is yet to be evaluated.

## **G. PROJECT PRODUCTS**

- Presentations
- Publications
- Education / Training
- Conferences
- Other Products

## **H. STATES PROJECT WAS ACTIVE IN**

- Oregon

## **I. COLLABORATION**

Student fallers were recruited from the Student Logging Training Program at Oregon State University with the consent of the OSU Forest Engineering Department.

## **A. PROJECT TITLE**

Pilot 5: Safety and Health of Immigrant Forest Workers on the Olympic Peninsula

## **B. PROJECT OFFICERS(s)**

Matthew Keifer, MD, MPH  
PNASH Center  
Box 357234  
Seattle, WA 98195-7234  
Email: mkeifer@u.washington.edu  
Tel: (206) 616-1452  
Fax: (206) 616-2687

## **HOST ORGANIZATION**

University of Washington  
DEOHS  
Box 357234  
Seattle, WA 98195

## **C. PROJECT DESCRIPTION**

Latino immigrant workers are an increasing percentage of the manual forest laborers on both private and public lands in the Pacific Northwest. They perform labor intensive seasonal jobs such as reforestation planting, tree thinning, salvage cedar block cutting, forest fire fighting and non-timber forest products harvesting (Mosley 2006). The health of the forest and the economy of many rural towns depend heavily upon this population. However, these workers rarely benefit from conventional employee benefits while frequently working in dangerous conditions. This study will provide a baseline understanding of the health and safety hazards faced by salvage cedar block cutters and the barriers that they face in addressing these hazards. It will be the key first step in prioritizing and addressing health issues among this nearly invisible population and will lay the informational foundation for further work with this population. This project will directly work towards PNASH's goal of reducing occupational disease and injury among agricultural workers in the Pacific Northwest by collaborating with community members and researchers in varied disciplines. Furthermore, it will address several of the priority research areas identified in the Occupational Research Agenda for Northwest Forestlands by starting to document disease and injury, environmental hazards and hazardous operations within salvage cedar block cutting. Through participatory processes, this project will identify areas where health and safety can be improved and compile a list of worker suggested interventions that will be used in future research to develop education, outreach and evaluation programs to improve workplace safety. It will also identify potential data sources to permit tracking future changes in injuries and illnesses. This project will help to further develop and strengthen the "Working Group on Immigrant Forest Workers" (WGIFW), a collaboration of non-profits and academic partners pursuing similar ends, in which Matthew Keifer and Lesley Hoare participate.

## **D. PROJECT START AND END**

Start: 9/30/2007      End: 9/29/2008

## **E. PROJECT BUDGET**

1. Actual Project Expenditures: 37,973 TC
2. Estimated In-kind Support Value: \$2,000
3. Outside Funding: An additional \$25,055 was funded for this project through the Department of Environmental and Occupational Health Sciences - Medical Aid and Accident Fund.

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 Meet with and establish a rapport with workers in the block cutting community on the Olympic Peninsula. **Ongoing**

Conducted monthly meetings with cedar block cutters on the Olympic Peninsula to talk about occupational work issues. Continue to stay in contact with workers.

- 2 Develop a preliminary job/task risk profile based on interviews with key informants (KI) such as block cutters, L&I safety personnel and other sources if found. **Met**

Campe and Hoare have conducted 13 key informant interviews have been conducted with block cutters and key community members. These have been analyzed using the qualitative scientific software program Atlas.ti 5.2. A job/task risk profile has been developed based on these interviews.

- 3 Conduct interviews and focus groups (FG) with block cutters and their family members in order to identify issues that they consider to be key regarding health and safety in the workplace. **Partially Met**

Focus groups and additional interviews (outside of the preliminary 13 key informant interviews) have not yet been conducted. The increased presence of immigration agents on the Olympic Peninsula (starting summer 2008) has modified and slowed the project. Originally, focus groups were planned in order to clarify risks and concerns (identified in the key informant interviews) and prioritize these risks. However, with the increased fear and financial burden (fees associated with going through the immigration system), there is little safe space or extra time for people to meet and conduct additional interviews. As a result, money from additional funding will be used to do five follow-up interviews in the coming 2-3 more months, as conditions permit.

- 4 Identify data sources that document injury and illness information about block cutters in Washington State. **Ongoing**

Some additional data has been explored through Washington State Labor and Industries. However, there is limited data since these workers are considered to be independent contractors and only receive workers compensation in limited circumstances. The project team is also exploring the possibility of looking at local hospital records, although this may also provided limited opportunities because occupation is not recorded.

- 5 Obtain baseline data for future studies with the block cutting community. This data will serve to assemble training/intervention plans to address the health and safety needs of the block cutter workforce. **Met**

Work on this aim is ongoing. We have obtained some data from initial interviews and conversation, but hope to continue to learn more through future work.

## G. PROJECT PRODUCTS

### Presentations

- 1 /3 /2008 Oral presentation at Semiahomoo Conference.  
UW-UBC Environmental and Occupational Health Conference
- 1 /5 /2008 poster presentation  
La Conner

Publications

Education / Training

Conferences

5 /3 /2008 - 5 /3 /2008 Organized and facilitate health and safety workshop for forest workers.  
Forest Workers' Workshop

Other Products

**H. STATES PROJECT WAS ACTIVE IN**

Washington

**I. COLLABORATION**

Staff at the Labor Education and Research Center at the Evergreen State College collaborated on this project with PNASH staff. Early on in the project, additional collaboration came from The Jefferson Center for Education and Research, a small non-profit based out of Portland, OR. Local project collaboration has come from staff at the Forks Community Hospital.



## V. NIOSH R01 PROJECTS AND CONTINUING PROJECT ACTIVITIES

### A. PROJECT TITLE

RO1: Community Health Intervention with Yakima Agricultural Workers

### B. PROJECT OFFICERS(s)

Matthew Keifer, MD, MPH  
PNASH Center  
Box 357234  
Seattle, WA 98195-7234  
Email: mkeifer@u.washington.edu  
Tel: (206) 616-1452  
Fax: (206) 616-2687

### HOST ORGANIZATION

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

### C. PROJECT DESCRIPTION

The primary purpose of this project is to develop a permanent partnership that will empower the Hispanic agricultural worker community in the Yakima Valley, Washington State, to effectively identify, characterize and respond to the many occupational and environmental risks they face. The target population is the seasonal and migrant agricultural workers in the middle Yakima Valley. The Northwest Communities Education Center/Radio KDNA, the Yakima Valley Farm Workers Clinic, the University of Washington and Heritage University will partner in this multi-disciplinary project. This project will organize and sustain a community advisory board (CAB) comprised of unions, church groups, community members and other representative community groups. Through the guidance from the CAB, a community process will develop a prioritized research and action agenda. The activities of the project will use a participatory action research (PAR) approach as a means to obtain new perspectives and an ecological framework to identify and prioritize occupational and environmental health stressors. The plan will include frequent community communication and education, an interactive evaluation process, curriculum development for Heritage University students and ConneX summer trainees and further data collection by students and community members. Technical expertise will be tapped from the University of Washington Schools Nursing and Public Health and Heritage University. Preliminary data collection will support the development of new research proposals. The products of this process will be a sustainable community-academic-clinical partnership, an empowered cadre of young people from the community and improved occupational and environmental health for Hispanic agricultural workers.

### D. PROJECT START AND END

Start: 9/1/2003                      End: 8/31/2008

### E. PROJECT BUDGET

1. Actual Project Expenditures: \$66,894TC
2. Estimated In-kind Support Value: None
3. Outside Funding: Additional funds for this project included \$12,581 from a grant from the U.S. EPA.

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

### PROJECT AIMS

- 1 Develop structures and processes to facilitate the Hispanic community's involvement in the identification and prioritization of occupational and environmental stressors among farmworkers in Yakima Valley. **Met**
- 2 Create opportunities and mechanisms for this community to understand and actively participate in decision-making related to their occupational and environmental health. **Met**
- 3 Develop an issues driven action plan that focuses on the needs articulated by Hispanic agricultural workers. **Met**
- 4 Cultivate a cadre of new investigators with preliminary training related to the investigation and remediation of occupational and environmental health threats. **Met**
- 5 Develop a sustainable partnership among the following entities: the Hispanic community in Yakima Valley, community organizations: Northwest communities Education Center/KDNA and Heritage college, health care providers from the Yakima Valley Farmworkers Clinic (YVFWC), and scientists from the University of Washington. **Met**

### G. PROJECT PRODUCTS

Presentations

Publications

Article published, professional (juried publication)

*Striving to provide opportunities for farm worker community participation in research*

Crowe-JL, Keifer-MC, Salazar-MK

Journal of Agricultural Safety and Health 4/2008

Education / Training

Conferences

Other Products

Project flyer for distribution and outreach. In English and Spanish.

### H. STATES PROJECT WAS ACTIVE IN

Washington

### I. COLLABORATION

Northwest Communities Education Center/Radio KDNA

Yakima Valley Farm Workers Clinic

Heritage University.

## **A. PROJECT TITLE**

Continuation: Fluorescent Tracer Component for Hands-on Pesticide Handler Training

## **B. PROJECT OFFICERS(s)**

Kit Galvin, MS, CIH  
Box 357234  
University of Washington  
Seattle, WA 98195-7234  
Email: kgalvin@u.washington.edu  
Tel: (206) 616-5850  
Fax: (206) 616-2687

## **HOST ORGANIZATION**

University of Washington  
Environmental and Occupational Health Sciences  
Box 357234  
Seattle, WA 98195

## **C. PROJECT DESCRIPTION**

The goal of this project is to improve pesticide handler education by developing and evaluating a model Fluorescent Tracer module for hands-on pesticide handler training provided by pesticide safety educators and trainers. Pesticide handlers will have an immediate illustration of potential pesticide contamination by viewing the results from proper and improper handling techniques performed during hands-on training. This will provide handlers with the skills and knowledge to minimize their exposure to pesticides and protect their health. We will develop this module in collaboration with pesticide safety educators from the Washington State Department of Agriculture and Agricultural Extension Service. The year one aims are, to determine key pesticide safety messages to be communicated with the FT module; develop the prototype FT module for the Washington State hands-on pesticides safety training and evaluate and monitor the prototype FT module as used in the hands-on training. During year two, the aims are to finalize the FT module based on use in the WA State hands on pesticide training program for pesticide handlers; and prepare a model FT training module available for use by pesticide safety educators and extension agents nationally. Based on a focus group with pesticide volunteer handler educators; the expertise of collaborating pesticide safety educators, and our technical knowledge of fluorescent tracers, we will pick four key pesticide safety messages to incorporate into a model FT training module. The FT module will be evaluated for ease of use by pesticide safety educators and trainers in hands-on safety training; usefulness in pesticide safety training; and effectiveness in communicating the pesticide safety messages to pesticide handlers. Trainer evaluations will take place during post training focus groups. Pesticide applicators and handlers will be given pre and post training evaluations using audiotape questionnaires. The project will conclude with production of print and web based model FT training module for pesticide safety educators and handlers to use nationally.

## **D. PROJECT START AND END**

Start: 9/30/2004                      End: 3/31/2007

## **E. PROJECT BUDGET**

1. Actual Project Expenditures: No NIOSH funding at this time.
2. Estimated In-kind Support Value:
3. Outside Funding: \$30,000 from the Dept of Environmental Health's Medical Aid and Accident Fund

## F. PROJECT ACTIVITIES / ACCOMPLISHMENTS

- 1 Develop a FT training component as part of a hands-on training recertification course for licensed handlers. **Met**
- 2 Evaluate the FT training component for licensed handlers and finalize this component based on the evaluation. **Met**
- 3 Adapt the FT training component for use with unlicensed handlers. **Met**
- 4 Evaluate the FT training component for unlicensed handlers and finalize this component based on the evaluation. **Met**
- 5 Produce, disseminate, and monitor the FT component for hands-on pesticide handler training manual for pesticide safety educators in Spanish and English, by making these materials available in print and web-based formats. **Ongoing**

In 2008 we launched a continuation project through a Washington state funding source to develop a kit and video to aid pesticide educators, including employers, in using fluorescent tracer demonstrations in their safety training programs. This project runs July 2008 – June 2010.

## G. PROJECT PRODUCTS

Presentations

Publications

Education / Training /

Course manual

*Fluorescent Tracer Manual: An Educational Tool for Pesticide Safety Educators*

Conferences

Other Products

## H. STATES PROJECT WAS ACTIVE IN

Washington

## I. COLLABORATION

## **A. PROJECT TITLE**

Continuation: Health and Safety Awareness for Working Teens - Agricultural Curriculum Evaluation Project

## **B. PROJECT OFFICERS(s)**

Darren Linker,  
Environmental & Occupational Health Sciences  
4225 Roosevelt Way NE, Suite 100  
Seattle, WA 98195  
Email: [dlinker@u.washington.edu](mailto:dlinker@u.washington.edu)  
Tel: (206) 616-7566  
Fax: (206) 685-4696

## **HOST ORGANIZATION**

University of Washington  
Environmental & Occupational Health Sciences  
4225 Roosevelt Way NE, Suite 100  
Seattle, WA 98105

## **C. PROJECT DESCRIPTION**

The primary goal of this project is to determine if a student's exposure to the "Health and Safety Awareness for Working Teens in Agriculture" curriculum will increase their level of knowledge and influence their attitudes about agricultural workplace health and safety. The project will work with high school students enrolled in agriculture education classes in Washington State. The specific aims of the project are that students will:

- Increase their ability to identify and locate hazards in the workplace.
- Understand child labor regulations that govern agricultural employment of teens.
- Develop solutions and strategies to reduce or eliminate hazards in the workplace.
- Understand the importance of communicating with supervisors to resolve health and safety issues at work.
- Develop strategies to prevent and deal with sexual harassment in the workplace.

The secondary aim of this project is to determine if the curriculum met the needs of agriculture teachers, including; perceived effectiveness of the curriculum with students, use of individual curriculum components, and suggestions for future curriculum modifications, and adoption of the curriculum.

The evaluation will recruit teachers (and their respective students) from four different geographic regions of the state, each representing different types of agricultural production common to that region. The goal is to recruit and train at least four teachers from each region. Each teacher will receive training and curriculum materials. Student data will be collected using pre and post-tests. The teacher portion of the evaluation will use a reflection survey.

## **D. PROJECT START AND END**

Start: 9/30/2005      End: 9/29/2008

## **E. PROJECT BUDGET**

1. Actual Project Expenditures: No NIOSH funding at this time.
2. Estimated In-kind Support Value: None
3. Outside Funding: \$5,000 from the Dept of Environmental Health's Medical Aid and Accident Fund

## **F. PROJECT ACTIVITIES / ACCOMPLISHMENTS**

### **PROJECT AIMS**

- 1 Increase student's ability to identify and locate hazards in the workplace. **Ongoing**
- 2 Students will understand child labor regulations that govern agricultural employment of teens. **Ongoing**
- 3 Students will develop solutions and strategies to reduce or eliminate hazards in the **Ongoing**
- 4 Students will understand the importance of communicating with supervisors to resolve health and safety issues at work. **Ongoing**
- 5 Students will develop strategies to prevent and deal with sexual harassment in the workplace. **Ongoing**

Both a student pre-test and student post-test were developed to test student learning related to the five different content areas of the curriculum. Included within the pre and post-tests were attitude questions related to each content area of the curriculum. In addition a grading and scoring rubric was developed to evaluate the student responses.

All of the content related questions developed as part of this evaluation were also incorporated into the final printed curriculum document in the form of pre and post-tests. This will allow any teacher who uses the curriculum to use the pre and post-tests at any time throughout the life of the curriculum.

The evaluation has not yet been conducted, but it will be carried out during the 2008-2009 academic year. When completed, the findings from this evaluation can be used to demonstrate if the curriculum is an effective tool for educating high school agriculture education students about agricultural workplace hazards. If proven effective, the curriculum could be modified for use agriculture education programs in other states.

### **G. PROJECT PRODUCTS**

- Presentations
- Publications
- Education / Training /
- Conferences
- Other Products

### **H. STATES PROJECT WAS ACTIVE IN**

Washington

### **I. COLLABORATION**

- Washington State Department of Labor and Industries
- Washington State Department of Education

## **A. PROJECT TITLE**

Continuation Pilot 2: Skills Retention in Fishing Safety Training

## **B. PROJECT OFFICERS(s)**

Jerry Duzgan,  
2924 Halibut point Rd  
Sitka, AK 99835  
Email: [director@amsea.org](mailto:director@amsea.org)  
Tel: (907) 747-3287  
Fax:

## **HOST ORGANIZATION**

AMSEA  
2924 Halibut Point Rd  
Sitka, AK 99835

## **C. PROJECT DESCRIPTION**

Commercial fishing continues to have one of the highest rates of occupational fatalities in the US. This occupation is often a family operation. One basic question will be asked: what is the skills decay over an 18-24month time period of the four survival skills originally taught as part of the Drill Conductor (DC) course? This will help determine the regulatory interval for DC refresher training that the Coast Guard is currently considering and requesting input. From Phase One of this project in 2007, we obtained data on skills decay in one and three month intervals. This helped determine intervals for emergency drills that are conducted by DCs. In this second proposed phase, the skills decay of the DCs themselves who are actually conducting the drills after being initially certified to do so, will be measured to ascertain the appropriate time interval for refresher training of the DCs.

## **D. PROJECT START AND END**

Start: 1/1/2007                      End: 9/29/2009

## **E. PROJECT BUDGET**

1. Actual Project Expenditures: No NIOSH funding at this time.
2. Estimated In-kind Support Value: \$5,000
3. Outside Funding: None

## **F. PROJECT ACTIVITIES / ACCOMPLISHMENTS**

### **PROJECT AIMS**

- 1 Measure the need for refresher training for drill conductors due to skills decay and if so what is the most reasonable interval for refresher training?

**Ongoing**

- 2 Inform Coast Guard regulation interval for drill conductor refresher training.

**Ongoing**

PNASH continued this project in the coming year, funded through the Small Grants Program. Continuation activities will include a 1-year follow-up evaluation on emergency drill training retention.

## **G. PROJECT PRODUCTS**

Presentations  
Publications  
Education / Training  
Conference

Other Products

Chair and Member of U.S. Coast Guard Safety Committee

**H. STATES PROJECT WAS ACTIVE IN**

Alaska

**I. COLLABORATION**

Alaska commercial fisherman

US Coast Guard

NIOSH AK Station