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NIOSH Training Project Grant (TPG): Industrial Hygiene - University of Toledo

09/18/2015
(Revision 1: 11/18/2015)

5T01OH008605-09

07/01/2009 - 06/30/2014
(No cost extension: 07/01/2014 - 06/30/2015)

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List of Terms and Abbreviations

ABET	Accreditation Board for Engineering and Technology
ASAC	Applied Science Accreditation Commission
CDC	Center for Disease Control and Prevention
CIH	Certified Industrial Hygienist
CSP	Certified Safety Professional
DPHPM	Department of Public Health & Preventive Medicine
IH	Industrial Hygiene Program; Industrial Hygienist
MSOH	Master of Science in Occupational Health Degree
NIOSH	National Institute for Occupational Safety and Health
TPG	Training Project Grant
UT-HSC	University of Toledo Health Science Campus
URM	Underrepresented minority (Trainees)

Abstract

Title: NIOSH Training Project Grant (TPG): Industrial Hygiene - University of Toledo
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Telephone: (419) 383-4543
Award Number: 5T01OH008605-09
Start & End Dates: 07/01/2009 - 06/30/2014 (extension: 07/01/2014-06/30/2015)
Program Area: Industrial Hygiene

Final Report Abstract:
This training project grant (TPG) has been an essential financial support for training and educating occupational safety and health specialists through the Master of Science in Occupational Health Degree - Industrial Hygiene Program (MSOH-IH). MSOH-IH is offered at the Department of Public Health & Preventive Medicine (DPHPM), University of Toledo Health Science Campus (UT-HSC). The program has been a National Institute of Occupational Safety and Health (NIOSH) TPG recipient for a three cycles covering a total of 13 years; this report is for the last cycle, which includes the period 2009- 2014. NIOSH has extended this current cycle for an additional year (2014-2015) as no-cost time approval.

The primary goal of the MSOH-IH program is to provide training and education to students and members of the public for the purpose of increasing their knowledge, comprehension, skills and attitudes essential to the advancement of industrial hygiene (an occupational health and safety discipline). The program educates full-time and part-time graduate students mainly from Northwest Ohio as well as from other parts of Ohio and Michigan. In turn, graduates are employed as health and safety specialists in the region. The program also accepts students from outside the region and several alumni are employed in other locations throughout the USA. Applicants are accepted to the MSOH-IH program with no regards to their gender or ethnicity.

During the 6 years (2009-2014; & 2014-2015 no cost extension) grant activity, 25 students (4.2/yr) were graduated from the program. Twenty (20) of these graduates work as occupational health and safety professionals, 1 is being considered for IH job, 2 are between jobs and 1 attended Ph.D. in Environmental Sciences. During this period, 20 students (3.3/year; female 10, male 11) received NIOSH funding and 16 (2.7/year; 9 female, 7 male) of those graduated from the program. Of the 6 underrepresented minority (URM; African-American 13%; Oriental 6%) trainees in the program, 5 have been graduated and gained occupational health and safety jobs and one left to the medical school.

Of the16 students that received NIOSH funding and graduated from the program with MSOH-IH degree:

- All, but one, have secured health, safety and environmental positions: 4 work for Federal Government, 2 work for Ohio State Government; 1 works for a college, 8 work for private industries and 1 is in between jobs.
- Two (2) have Certification in Industrial Hygiene (CIH). 2 are Certified Safety Professional (CSP), 1 has Radiation Safety Officer (RSO) certificate, 2 are Registered Sanitarian (RS), 1 is Certified Hazardous Material Management (CHMM).

During the period 2009-2015, MSOH-IH Students (and their mentors) have had 4 peer-reviewed, scientific publications and 21 technical and scientific abstracts/presentations.

Section 1 of the Final Progress Report (2-page limit)

Significant (Key) Findings.

(a) The program of MSOH-IH trained and educated graduate-students in the industrial hygiene (occupational health and safety) field mainly from Northwest Ohio. During Summer 2009- Spring 2015 funding period, 20 (3.3/year) MSOH students were awarded NIOSH funding. Of these 16 (2.7/year) students were graduated from the program.

(b) The program's main goals were achieved as follow:

- All graduates were qualified to practice comprehensive industrial hygiene.

- Most graduates were employed and are practicing in the field of industrial hygiene or related areas of environmental and/or occupational health and safety to meet the relevant and appropriate needs of the employers and their employees in the region and beyond.

  During Summer 2009- Spring 2014, 31 students in the program, 3 work as Federal OSHA compliance officer (all NIOSH funding recipient), 2 work for Air Force and Marine Corps as industrial hygienist (1 NIOSH funding), 2 work for State of Ohio as ergonomist and sanitarian (both NIOSH funding), 4 work for the University/College as industrial hygienists and safety engineer (1 NIOSH funding), 1 works for a hospital who is being considered for IH job, 4 work for petroleum refinery as safety engineer , industrial hygienist and director of HSE (1 NIOSH funding), 10 work for industrial production facilities as industrial hygienist and health/safety specialist (8 NIOSH funding, 1 still being considered for HSE position), 1 is attending Ph.D. in Environmental sciences, 3 are in between jobs (all NIOSH funding) and 1 left to school of medicine (partially NIOSH funding).

- Most graduates pursued and/or passed applicable certification in health, safety and environmental. Of 16 students that received NIOSH funding and graduated from the program with MSOH degree: 2 have Certification in Industrial Hygiene (CIH). 2 are Certified Safety Professional (CSP), 1 has Radiation Safety Officer (RSO) certificate, 2 are Registered Sanitarian (RS), 1 is Certified Hazardous Material Management (CHMM). Some of the graduates have other certifications (e.g., OSHA courses, asbestos inspector)

(c) The tuition scholarship/stipend of the NIOSH TPG was an excellent recruitment tool and the trainees performed well and were very appreciative of the funding. There was the added benefit of the peer review and prestige associated with being a NIOSH TPG scholarship recipient.

(d) During the 6 years (2009-2014; no cost extension 2014-2015) of the NIOSH TPG funding, 20 students received NIOSH funding. Two trainees, who receive NIOSH TPG funding during this period, are still in the program and both will be graduated by the Spring 2016.

(e) Of the 6 underrepresented minority (URM; African-American 13%; Oriental 6%) trainees in the program, 5 have been graduated and gained occupational health and safety jobs and one left to the medical school.

(f) During the period 2009-2015, MSOH-IH Students (and their mentors) have had 4 peer-reviewed, scientific publications and 21 technical and scientific abstracts/presentations (see pages 11-12).

Translation of Findings. The main task of industrial hygienist (occupational health and safety specialists) is to reduce, or if possible to eliminate occupational fatalities, injuries and illnesses. Below is an estimated statistics of these heart-breaking issues: (a) Globally, each year more than 100 million workers are injured and more than 70 million new cases of occupational disease are recorded as well as 200,000 die each year in occupational accidents are attributed to hazardous exposures or workloads; (b) In the United States of America, each year approximately 3 – 5 million nonfatal workplace injuries and illnesses are reported and also 4-6 thousands workplace related fatalities are recorded; and (c). In Ohio, where the Program at UT-HSC is located, the total occupational injuries and illnesses is estimated to be more than 125,000 recordable cases and workplace related fatalities are usually more than 150 cases.

For the last 5-year funding period, the number of those in the program who were receiving NIOSH TPG decreased slightly from 9 (84 month) in 2009-2010 to 7 (48) in 2010-2011, stayed at 7 (56) in 2011-2012 and reduced slightly to 6 (44) in 2012-2013 and 4 (40; the lowest number) in 2013-2014. The program has carried over money from 2013-2014 that was used to provide scholarships through the period 2014-2015. However, the number of applicants/admissions has increased considerably in 2014 and it is anticipated that the trend will continue in the coming years.

Goal. The primary goal of the MSOH-IH program was to provide education and training to students and members of the public for the purpose of increasing their knowledge, comprehension, skills and attitudes essential to the advancement of Industrial Hygiene. The program prepared full-time and part-time graduate students mainly from Northwest Ohio as well as from other parts of Ohio and Michigan. In turn, graduates were employed as health and safety specialists in the region. In addition, the program also accepted students from outside the region and several alumni were employed in other locations throughout the USA. Applicants were accepted to the MSOH-IH program with no regards to their gender or ethnicity.

Outcomes/ Impact. This program prepared Industrial Hygienist (occupational health and safety professionals) that are employed by production, service and patient care industries as well as government agencies to protect workforce and reduce work or environmental related injuries, illnesses or fatalities. The graduates of the program are actively involved in improved practices, prevention or intervention techniques, safety communication, new and improved legislation, policy and use of technology.

Section 2 of the Final Progress Report - Scientific Report

Background for the project. This NIOSH/CDC Training Project Grant (TPG) has been used to train and educate a group of professionals called Industrial Hygienists (health and safety experts). The Master of Science in Occupational Health Degree - Industrial Hygiene Program (MSOH-IH) at the Department of Public Health & preventive medicine, University of Toledo Health Science Campus has been accredited continuously (1996-2020) by the Applied Science Accreditation Commission - Accreditation Board for Engineering and Technology (ASAC-ABET), which has increased profit of the peer review process and related distinction. Since 2001, the program has completed a three-year cycle (2001-2004) and two five-year cycles (2004-2009 and 2009- 2014) as a NIOSH TPG recipient. NIOSH has extended the last cycle for one additional year (2014-2015) as no-cost time approval. The tuition scholarships are an excellent recruitment tool and the NIOSH TPG trainees perform well and are very appreciative of the TPG funding. There is the added benefit of the peer review and prestige associated with being a NIOSH TPG scholarship recipient.

The TPG grant is awarded to the MSOH Program at the DPHPM to train and educate professional Industrial hygienist (IH) for the region. IH is an occupational health/safety expert involved in all parts of health, safety and environmental issues in the workplace. *IH's main function is to prevent exposure to harmful agents and factors*. The outcomes of excessive exposure to the harmful agents/factors can, in many instances, create variety of occupational fatalities as well as injuries and illnesses such as stress/strain related disorders, musculoskeletal diseases, respiratory diseases, hearing loss, circulatory diseases and communicable diseases and cancers. Industrial hygienist also is involved in of the worker health protection as it is involved in health promotion to improve the health/safety and work capacity of the worker.

A total of 13 participating faculty members, all except one ***(***Lampl), were from the University of Toledo. All participating faculty did team teach in courses and acted as educators or mentors to MSOH-IH students. Nine faculty members (4 MSOH-IH core and 5 supporting faculty) were from the grant recipient's Department/Program. The four core faculty members included Akbar-Khanzadeh (PI, Director of MSOH-IH program), Milz (Department Chair), Valigosky and Ames. The 5 supporting faculty from the Department included Fink, Khuder, Rega, Saltzman and Steiner. Three faculty members were participating from other colleges/departments: Kumar from College of Engineering/Civil Eng.; Pocotte from College of Nursing; Sigler from College of Natural Sciences/Microbiology).

The program also adopted the ABET definition for "Outcomes" . . . *"what* a *given curriculum will prepare graduates to know and do (competencies). Competencies must reflect an action (e.g., conduct; prepare; etc) and be measurable."* The MSOH degree -Industrial Hygiene program assured that graduates had necessary knowledge, skills, and attitudes to competently and ethically implement and practice applicable scientific, technical, and regulatory aspects of Industrial Hygiene. Graduates were prepared to anticipate, recognize, evaluate, and control exposures of workers and others to physical, chemical, biological, psychological and ergonomic factors, agents, and/or stressors that can potentially cause related illnesses and/or injuries. Upon completion of the program, graduating trainees were able to: identify agents, factors, and stressors generated by and/or associated with defined sources, unit operations, and/or processes; describe qualitative and quantitative aspects of generation of agents, factors, and stressors; understand

physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body; assess qualitative and quantitative aspects of exposure assessment, dose-response, and risk characterization based on applicable pathways and modes of entry; calculate, interpret, and apply statistical and epidemiological data; recommend and evaluate engineering, administrative, and personal protective equipment controls and/or other interventions to reduce or eliminate hazards; demonstrate the importance of appropriate ethical performance and practice; demonstrate an understanding of applicable business and managerial practices; interpret and apply applicable occupational and environmental regulations; participate in the development and implementation of applicable industrial hygiene-related programs; generate, review and interpret data, whether from original research or other published sources; prepare scientific and technical summaries and reports; understand fundamental aspects of safety and environmental health; understand the necessity of teamwork among management, industrial hygienists, safety specialists, environmental specialists, engineers, and clinicians (i.e., occupational health physicians and nurses); attain recognized professional certification.

The program utilized the volunteer services from members of its External Advisory Committee to ensure that contemporary applicable and practical content is embedded within the curriculum. For research, the program developed and continued expansion of focused sectors within the Department and the Colleges of Medicine, Engineering, Business, and Arts and Sciences to enhance intra- and interdisciplinary research projects and attraction of external grant funding. Two examples of some near past projects, among others, were exposure assessment and control of crystalline silica dust among construction workers; and, integrated aerosol monitoring (i.e. biological; chemical) and epidemiology studies in select agricultural areas.

Program faculty members and students remained involved in several research activities. Publications of the MSOH-IH faculty have been reasonable. All students completed either a scholarly project or a hypothesis-driven thesis. The program to date has accumulated an impressive selection of projects/theses covering a broad spectrum of topics involving physical, chemical or biological agents and related monitoring and/or epidemiology as part of our theme for human exposure assessment and control. The program was also involved in the Regional Medical Response System, assisting health departments, hospitals and municipalities in Northwest Ohio with emergency preparedness and related hazard recognition, incident response, and control.

The four core MSOH-IH faculty members (Drs. Milz, Akbar-Khanzadeh, Valigosky and Ames), were all ABIH Certified Industrial Hygienists (CIH) and abided by the Code of Ethics. This Code of Ethics was incorporated into courses and students were instructed how to collect reliable, valid, representative data and develop programs, which were ethical and professional. There was also a "Graduate Student Ethics Code" published in the College of Graduate Studies *Bulletin & Handbook of the Graduate Student*. In relation, professional and ethical behavior was demonstrated by faculty members and staff, and, was expected to be reciprocated and demonstrated by all students. In addition, any studies that met criteria for human subject research were reviewed and approved via the Institutional Review Board (IRB) of the University of Toledo.

Since Fall 2011, two new Faculty members were added to teach in the MSOH-IH program: Paul Rega, M.D., Assistant Professor of Public Health, to instruct occupational diseases, and Barbara Saltzman, Ph.D., MPH, Assistant Professor of Public Health, to team-teach Epidemiology. In July 2014, 2 additional full-time Assistant Professors, April Ames, Ph.D., CIH and Michael Valigosky, Ph.D., CIH, CSP were added to the

faculty team for expanding teaching and research topics in occupational and environmental health and safety, in particular Industrial Hygiene.

During the period 2009-2015, the Program Director was actively involved in the recruitment efforts to establish expanded pipelines of undergraduate students, particularly minorities, for admission, retention and graduation. A related project involved an ongoing "Environmental and Occupational Health and Safety Science and Management" program offered within the Toledo Public School system.

During the period 2009-2015, the 40 semester credit curriculum incorporated the general areas of science, technology, management, ethics, and communication within the context of the core courses, appropriate elective courses and thesis or scholarly project requirements for the MSOH-IH degree. A student could have elect to pursue a comprehensive program of study or, alternatively focus on a more specific area of study via selected and approved elective courses and research. F-T students required 12-16 months and P-T students could have required up to 30 months or more (but not exceeding 6 years) to complete the MSOH-IH program.

The applicants were evaluated for admission based on the baccalaureate major, foundation courses completed, GPA, short essay, and references. For the NIOSH TPG, the program goal was to recruit full-time students, but most applicant students preferred to be part-time since they were already employed as a health and safety experts in smaller/medium, regional manufacturing, non-manufacturing, consulting, and agriculture businesses or public health organizations. All students completed a combination of didactic courses consisting of lecture, field, and laboratory sessions, plus a research project or thesis. Students without applicable work experience also had to complete an internship. Research areas included assessment of human exposures to airborne noise, non-ionizing radiation and chemical/microbial agents in industrial/service settings as well as epidemiological evaluations and ergonomics. All the trainees and their employers benefited by the education and training completed in the program. For one example of positive impact, several public health departments and hospitals in the region employed program trainees and alumni; their expertise has been very applicable to possible expansions of those departments' focus and emphasis on air/environmental quality, and emergency preparedness.

Specific aims. The Program's specific aims were to train and educate individuals to function in the industrial hygiene discipline. The master-level program was designed to graduate competent IHs, who would clearly recognized the following principles: (a) healthy/safe workers are more productive; (b) healthy/safe workplaces are major element of sustainable development; (c) occupational health/safety can improve the employability of workers; (d) occupational health/safety practice is a main fundamental to public health and preventive medicine; (e) the IHs bridge the gap between industrial production lines and health and medical services by applying special techniques and knowledge to prevent occupational illnesses and injuries; and, (f) since the signs and symptoms of many occupational diseases are similar to those of non-occupational diseases, IHs were trained to be able to monitor and evaluate the workers exposure to harmful agents/factors and prevent incurable occupational diseases.

Methodology. The grant funding was made available to all full-time and part-time graduate-level IH students in the Program based on a set of pre-defined qualifications (e.g., undergraduate performance, GPA and so on). The IH degree program was designed and executed properly to assure that the IHs graduated from the program to have professional abilities, by choosing the right tools and means, to: (a) anticipate and

recognize the environmental and occupational harmful agents and factors and to understand their effects on man and his well-being; (b) evaluate, on the basis of experience and with the aid of qualitative measurement techniques, the magnitude of these stresses in terms of ability to impair man's health and well-being; (c) prescribe methods to eliminate, control, or reduce such stresses when necessary to alleviate their effects; (d) under the advisement of a faculty member, each IH student prepared a Plan of Study; (f) the internship of the IH students was under advisement of a faculty and supervised by a health and safety professional in the internship site; (g) Each IH student had the option of taking a scholarly project or a thesis, which was under advisement of a faculty member or a advisory committee. All students kept a GPA of B (3/4) or better while graduating from the program.

Results and Discussion. During the 5 years (2009-2015) of the TPG funding, 20 students (4.6/yr) have been graduated from the program. Of these 20, 16 students (2.7/year) received NIOSH funding. One student, who was receiving NIOSH funding, left the program and joined school of medicine. Two trainees, who received NIOSH funding were still in the program and both will be graduated by the Spring 2016. During the period 2009-2015, MSOH-IH Students (and their mentors) have had 4 peer-reviewed, scientific publications and 21 technical and scientific abstracts/presentations at national/international conferences. Most of those graduated from the Program have been employed in the region as occupational health/safety experts.

Conclusions. During the 6 years TPG funding, 20 students (3.3/yr) have been graduated from the program. Of these, 16 students (2.7/year) have received NIOSH funding. All of these 16 graduates, but one, have secured health, safety and environmental positions: 4 work for Federal Government, 2 work for Ohio State Government; 1 works for a college, 8 work for private industries and 1 is in between jobs. Two (2) have Certification in Industrial Hygiene (CIH). 2 are Certified Safety Professional (CSP), 1 has Radiation Safety Officer (RSO) certificate, 2 are Registered Sanitarian (RS), 1 is Certified Hazardous Material Management (CHMM).

The Inclusion Enrollment Table

Cumulative Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

Study Title: NIOSH Training Project Grant (TPG): Industrial Hygiene - University of Toledo

Comments:

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native										0
Asian	2									2
Native Hawaiian or Other Pacific Islander										0
Black or African American	1	2								3
White	6	7								13
More Than One Race										0
Unknown or Not Reported										0
Total	9	9	0	0	0	0	0	0	0	18

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OMB No. 0925-0001/0002 Cumulative Inclusion Enrollment Report

Publications of MSOH-IH Graduates (2009 – 2015)

MANUSCRIPTS

1. Woolley SM, **Akbar-Khanzadeh F**, Huang K: [2012] The Effect of Wearing Different Types of Respirators on Postural Stability. IJOH, 4(2):32-38
2. **Akbar-Khanzadeh F**, Windom SH, Golbabaei F: [2011].Designating Smoking Room to Control Environmental Tobacco Smoke in Nursing Homes. IJOH 3(1):1-5
3. **Akbar-Khanzadeh F**, Milz SA, Wagner CD, Bisesi MS, Ames AL, Sadik Khuder[A], Susi P, Akbar-Khanzadeh M: [2010] Effectiveness of Dust Control Methods for Crystalline Silica and Respirable Suspended Particulate Matter Exposure during Manual Concrete Surface Grinding. J Occup Environ Hyg 7(10):700-711
4. **Akbar-Khanzadeh F**, Smigielski K: [2009] Design and Set up of an Air Filter Testing Unit to Demonstrate Characteristics and Performance of Particulate Air Filters. IJOH 1(1):1-8

ABSTRACTS

1. **Akbar-Khanzadeh, F**, Smigieski, K. Efficiency of Intact and Damaged HEPA Filters and their Gaskets under Different Flowrate and Pressure Drop Conditions. American Industrial Hygiene Conference and Exposition, Salt Lake City, UT, May 30 – June 4, 2015.
2. Valigosky, M.A., Milz, S., Rohrs, S., **Akbar-Khanzadeh, F**., Ames, A. Exposure Evaluation and Control of Acetone in a Plastination Laboratory. American Industrial Hygiene Conference and Exposition, Salt Lake City, UT, May 30 – June 4, 2015.
3. Ames, A., Valigosky, M.A., Milz, S., Hagood, T., Roberts, R., **Akbar-Khanzadeh, F**. Environmental Noise Impacting a Neighborhood near a Higher Education Research Facility. American Industrial Hygiene Conference and Exposition, Salt Lake City, UT, May 30 – June 4, 2015.
4. **Akbar-Khanzadeh F**, Moreer HM, Ames AL, Milz SA, Heldt G, Doerr A, Scardina J, Bourland D, Valigosky M, Sigler V. Thermal Environment Assessment in a High School during Winter. American Industrial Hygiene Conference & Expo (AIHce), June 2-5, 2014, San Antonio, Texas.
5. Smigielski K, Akbar-Khanzadeh F. Contribution of Non- HEPA Preliminary Filters to the Efficiency and Life-span of HEPA Filters in Reducing Cadmium Contaminated Emissions and Respirable Particles. American Industrial Hygiene Conference & Expo (AIHce), June 2-5, 2014, San Antonio, Texas.
6. Milz SA, Ames AL, Klender SJ, Doerr A, Bourland D, Heldt G, Moreer H, Scardina J, Sigler V, Valigosky M, **Akbar-Khanzadeh F**. Airborne Particlulate Matter, Ambient Temperature and Relative Humidity at a High School in Northwest Ohio. American Industrial Hygiene Conference & Expo (AIHce), June 2-5, 2014, San Antonio, Texas.
7. **Akbar-Khanzadeh F**, Rowell J. Direct Reading Handheld X-Ray Fluorescence (XRF) Spectrometry Method Compared With Conventional Integrated Sampling for Determination of Airborne Cadmium" American Industrial Hygiene Conference & Expo (AIHce), May 18-23, 2013, Montreal, Canada. [SR-105-03; May 20]
8. Smigielski K, **Akbar-Khanzadeh, F**. Pressure Drop, Capture Efficiency and Dust Loading Capacity of Custom Fabricated High Efficiency Particulate Air (HEPA) Filters Before and After Being Cleaned and Reused. American Industrial Hygiene Conference & Expo (AIHce), May 18-23, 2013, Montreal, Canada. [SR-131-06 May 22]
9. Akbar-Khanzadeh F, Milz S, Ames A, Wagner C, Laughlin J. Peak Noise Exposure during Concrete Grinding in Confined Areas. Presented at the AIHCE 2012. June 16-21; Indianapolis, IN. (SR-122-7)
10. **Akbar-Khanzadeh F**, Ames A, Milz S, Czajkowski K, Carlson D, Koch T, Kabelen J. Air Contaminants Inside and Outside Rural Homes near Biosolids-Applied Agricultural Farm Fields. Presented at the AIHCE 2012. June 16-21; Indianapolis, IN. (SR-121-3)
11. Koch T, **Akbar-Khanzadeh F**, Heldt G, Li X, Ames A, Milz S, Czajkowski K. Particulate size and concentration at three agricultural fields during biosolids application and post field management. Presented at the AIHCE 2012. June 16-21; Indianapolis, IN. (PS-405)
12. **Akbar-Khanzadeh F,** Brown C, Milz S: A Comprehensive Noise Characterization in a High-school.

American Industrial Hygiene Conference & Expo (AIHce), May 14-18, 2011. Portland, Oregon. (PO #131-3)

13. Milz S, Smith E, **Akbar-Khanzadeh F**, Khuder S. Skid Loader Noise Exposure in a Confinement Dairy Barn. American Industrial Hygiene Conference & Expo (AIHce), May 14-18, 2011. Portland, Oregon. (PS #403-1)
14. Ames A, Milz S, Czajkowski K, Carlson D, Waltz A, **Akbar-Khanzadeh F**: Ammonia, Hydrogen Sulfide and Volatile Organic Compounds Indoor and Outdoor of Homes Near Sludge-Applied Farm Fields. American Industrial Hygiene Conference & Expo (AIHce), May 14-18, 2011. Portland, Oregon. (PS #405).
15. **Akbar-Khanzadeh F**, Braskie M: Noise Survey in Patient Rooms of a Hospital. American Industrial Hygiene Conference & Expo (AIHce), May 22-May 27, 2010, Denver, CO. (#124)
16. **Akbar-Khanzadeh F**, Rillo R, Milz S, Fink B: Surface Contamination with, and Management of, Antineoplastic Drugs in a Hospital. American Industrial Hygiene Conference & Expo (AIHce), May 22-May 27, 2010, Denver, CO. (3105)
17. **Akbar-Khanzadeh F**, Milz SA, Wagner CD, Bisesi MS , Ames AL, Khuder S, Susi P: Factors Influencing Silica Dust Exposure and Effectiveness of Control Methods during Manual Concrete Grinding. X2009 Sixth International Conference on Innovations in Exposure Assessment. Harvard School of Public Health Boston, MA, August 17–20, 2009.
18. **Akbar-Khanzadeh, F**, Milz S, Wagner C, Ames A, Bisesi M: Noise Exposure during Hand-held Concrete Grinding - Effects of Dust Control Methods and Grinder Size. The American Industrial Hygiene Conference & Exposition, Toronto, Canada, May 30-June 4, 2009.
19. **Akbar-Khanzadeh, F**, Weaver B, Khuder S, Dennis M. Outdoor Workers' Exposure to Ultraviolet Radiation in Northwest Ohio, U.S.A. The American Industrial Hygiene Conference & Exposition, Toronto, Canada, May 30-June 4, 2009.
20. **Akbar-Khanzadeh F**, Milz SA, Wagner CD, Ames AL, Bisesi MS , Khuder S, Susi P: Task-specific Noise Levels during Hand-held Concrete Grinding. The 15th Engineering and Work Practice Controls Work Group By NIOSH/CPWR, Orlando, FL, March 26-27, 2009.
21. **Akbar-Khanzadeh F**, Milz SA, Wagner CD, Ames AL, Bisesi MS, Khuder S, Susi P: Crystalline Silica and RSP Control Methods Effectiveness during Concrete Grinding (Progress report). The 15th Engineering and Work Practice Controls Work Group By NIOSH/CPWR, Orlando, FL, March 26-27, 2009.

The Final Financial Status Report (FSR) [5T01OH008605-09]

The FSR Ms. Julie Pinciotti will file FSR on EraCommons; her contact information is a follow: Julie Pinciotti**,** *Grants Analyst, University of Toledo, 419 530-1375, Julie.pinciotti@utoledo.edu*

Final Invention Statement and Certification

No invention is related to this grant funding.

Equipment Inventory Listing

No equipment has been purchased with this grant funding.