

WESTERN KENTUCKY UNIVERSITY

**Center for Disease Control and Prevention (CDC)/
National Institute for Occupational Safety and Health (NIOSH)**

TRAINING PROJECT GRANT (TPG)

**ANNUAL REPORT
2015-2016**

October 6, 2016

SECTION I

TPG Summary

The Environmental Health Science (EHS) degree program at Western Kentucky University (WKU) is a comprehensive program built upon education and training in basic and applied sciences. The overall educational objective is a multidisciplinary approach to providing students opportunities to develop a comprehensive understanding of the chemical, biological, physical and social factors or stressors in the occupational and natural environments that impact public health. Because of the interdisciplinary nature of the program, the core EHS faculty collaborate on research within the program and with other academic disciplines, departments and programs both within the institution and externally. Lastly, a core component of the program is engagement of faculty and students in community based participatory research and/or practice experiences, especially those with an environmental and occupational health science focus.

EHS program is both an applied science and art devoted to appeal to students with interest in the preservation and improvement of human health, quality of life, and safety of our workplaces and the natural environment. Training is provided to students in basic sciences, occupational safety and health, environmental health science, industrial hygiene, and environmental protection and compliance. Students who successfully complete the program earn a Bachelor of Science (B.S.) degree in EHS. This degree program requires no minor or additional major. However, a minor and certificate in Occupational Safety and Health are available to students. The courses offered are designed to meet the general requirements for evaluating workplace and environmental hazards by anticipating, recognizing, evaluating, and controlling stressors or factors that may affect the health, comfort or productivity of workers and the general public. This program responds to needs identified by our advisory committee members, area industries, consultants, and administrators and is consistent with the existing inventory of class room courses and laboratory courses offered at WKU. The success of graduates employed as occupational safety and health specialists, environmental health and safety specialists, industrial hygienists, environmental health scientists, and in closely related fields has established the credibility of the institution to offer this curriculum.

The National Institute for Occupational Safety and Health (NIOSH) TPG at WKU has specific objectives to enhance occupational safety and health, and related training through the EHS degree program. Primary long-term objectives are to support recruitment of students, provide training and professional development opportunities, advance the environmental and occupational health science field in Kentucky and beyond, and enhance the diversity of students in the program. A secondary objective is to support core faculty committed to the EHS program at WKU.

Specifically, the program provides stipends in the form of tuition scholarships to train six (6) students or more each project annum. Training through the EHS curriculum allows students in the TPG to graduate with an environmental and occupational health degree. A broad goal of the TPG is to attract and retain minority students. The EHS program has seen an increase in minority student enrollments, both African American and Hispanic students. However, the relative percentage of minority students in the program is low. The administrators of WKU's TPG believe that it is important to continue to be diligent and innovative in expanding opportunities for minorities to enter the EHS field. NIOSH TPG sponsorship of the WKU EHS Program is ensuring opportunities and training for creating expertise in the EHS field for the people of Kentucky to be adequately represented in local, state, and national jobs.

To meet the needs of our students and the regional community, the program must prepare students with a strong environmental health, occupational safety and health, industrial hygiene, and environmental science and compliance background. The EHS Program is committed to developing students with a sustainable scientific foundation, technical background, and applied skills necessary to take on the many challenges in the EHS field.

The EHS program features several important programmatic objectives, including

1. To provide general education and specialty courses in a baccalaureate experience intended to instill in the graduate an appreciation for learning that will continue throughout their professional career.
2. To establish a sufficient natural science and mathematics foundation that the breadth and depth of subjects necessary for IH academic training may be mastered.
3. To provide a core of academic experiences which will demonstrate the manner in which IH and the Industrial Hygienist is part of a broader field of the Environmental Sciences and Industrial Environmental Management.
4. To provide sufficient breadth and depth of specialty courses and field experiences that the graduate is prepared for entry level positions in environmental, occupational health and safety or related fields or to enroll in graduate studies.
5. To provide sufficient academic foundation that, combined with appropriate professional experience and continuing educational activities, will enable the graduate to obtain certification as an Industrial Hygienist.

Curriculum Description: When students are admitted into the major in environmental health science (Reference Number 548), they are assigned to be advised by any one of the core faculty members throughout the duration of their study. The program requires a total of 120 semester hours (a minimum of 70 semester hours of core courses and electives) for graduation leading to a B.S degree.

The training program consists of four components: Colonnade (General Education courses), Support Courses, EHS Core Courses, and Option Courses or Electives. These four components meet or exceed the requirements of the Kentucky Council on Higher Education for curricula development. The Colonnade (General Education) courses are collectively intended to produce:

- a broadened acquaintance with literature and the fine arts,
- an awareness of and respect for different philosophies, cultures, and ways of life,

- a broad general knowledge of natural science and the methods of scientific inquiry,
- an awareness of good health habits and their importance in physical development,
- the ability to think logically and to write and speak clearly and effectively,
- the ability to use quantification skills to solve problems frequently encountered in life,
- and the ability to formulate concepts, to analyze data and to make discriminating decisions.

The Support Courses are intended to provide students sufficient science background and mathematics foundation that the breadth and depth of concepts defining the field of environmental and occupational health may be approached with confidence. Sufficient laboratory experience is included to enable the student to gain a good understanding of experiments and instrumentation resulting in analysis and presentation of experimental data and results. A portion of these support courses are used to satisfy the natural science and mathematics requirements of the general education program.

The Core Courses are common to all students in the Environmental Health Science degree program. The core courses provide an introduction to a wide range of issues encountered in industrial environmental and occupational health management. These courses are designed to establish a foundation for understanding the major problem areas of air pollution, water pollution, food safety, and solid and hazardous waste management. The existence and nature of environmental law and the process by which environmental laws and regulations are developed are covered in these courses. A senior environmental seminar is included to allow discussion of emerging or contemporary and developing issues. An internship experience relevant to an area of interest is required of all students in the EHS curriculum.

The EHS Electives or optional requirements contain the group of courses considered to be necessary for a baccalaureate preparation in environmental, occupational health and safety. A number of these courses and laboratories emphasize the fundamental observational techniques and basic survey skills necessary for identifying potential health hazards associated with specific occupational or environmental settings, including the types of chemical/physical contaminants generated by these processes. In addition, significant portions of each of these course curricula are spent in discussion and demonstration of the basic principles involved in the measurement of contaminants, assessment, and interpretation of results. Similarly, the elements of basic control strategies and their applications to specific situations are discussed in the classroom. In this manner, the instructional program delivers the basic principles of recognition, evaluation, and control.

Public Health Relevance

To meet the public health needs of our regional communities the EHS program prepares students with a strong environmental health, occupational safety and health, industrial hygiene, and environmental science and compliance background. A previous survey of environmental & occupational health managers, graduates of the EHS Program, and alumni had revealed a great need for EHS professionals in this region. A recent EHS Advisory Board Meeting held in summer 2016 indicated a continued need for EHS professionals in this region. The feedback received from the advisory board is continuously used in improving the quality and content of the EHS Program courses to better suit the current Public Health needs. Students graduating

from the EHS program have become environmental and occupational health science professionals with emphases on human health protection and advancement in diverse worksites and communities across Kentucky, the region, and beyond. Graduates of the program pursue advanced degrees in public health on a regular basis. Trainees and EHS graduates are impacting public health in communities throughout Kentucky and beyond.

Key Personnel

Vijay Golla, PhD, MPH

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Dr. Vijay Golla is an Associate Professor of Environmental and Occupational Health at Western Kentucky University (WKU) Department of Public Health. He currently serves as the Associate Dean for Research for the College of Public Health at WKU. He has been teaching, conducting research, and contributing to service activities for the last 10.5 years at WKU. Dr. Golla has taught courses in Environmental and Occupational Health, Industrial Hygiene, Occupational Health and Safety, and Environmental and Occupational Epidemiology. He has been advising undergraduate students in the EHS Program and has been serving on undergraduate EHS students' honors thesis research over the years. Dr. Golla serves as the administrator/manager of the EHS Training Project Grant (TPG) as well as participate in the teaching and supervision of students in this program. Dr. Golla has been conducting research involving exposure assessment and occupational epidemiology. He has designed and directed exposure assessment studies through community based participatory research (CBPR). This included data collection on work practices, occupational hygiene, along with dust and aerosol sample collection in the field. He has also conducted laboratory experiments on various types of organic dust to study particle collection efficiencies of aerosol samplers and endotoxin analysis for organic dust. Dr. Golla has taught laboratory courses in Industrial Hygiene and facilitates students' class-room training to real-world applications in local industrial facilities. He provides direction of the TPG, oversight of TPG implementation, and assessment of the program objectives.

Ritchie D. Taylor, PhD, MS

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Dr. Ritchie D. Taylor is an Associate Professor in Environmental and Occupational Health Science in the Department of Public Health at WKU. He currently serves as the Director of both the undergraduate Environmental Health Science and graduate Environmental and Occupational Health Science programs at WKU. He has been teaching, conducting research, and contributing to service activities for the past 15 years at WKU. Dr. Taylor has taught courses in Environmental Health, Industrial Environmental Management, Environmental Toxicology, Hazardous Materials and Waste Management, Environmental Science, Water Quality and Water Resources, and Research Methods. He advises students in the undergraduate EHS program, and directs EHS internships. He serves as the faculty advisor of the Environmental Health Science Student Association (EHSSA). Dr. Taylor serves as the Co-PI of the NIOSH Training Project Grant. He has been conducting research involving water quality, hazardous materials transportation, foodborne pathogens, and fire fighter environmental exposures. Currently, he is involved in research with fire fighters in Kentucky to evaluate exposure to fire smoke and environmental

contaminants, along with particulate and aerosol sample collection in the field. He has also conducted laboratory studies on foodborne and water pathogens, evaluated water quality of surface and drinking water, and conducts watershed health assessments in the field with students to assist local communities. Dr. Taylor has taught laboratory courses in water quality and environmental sampling. He has directed several EHS Honors Thesis and EHS senior seminar courses.

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Dr. Jooyeon Hwang is an Assistant Professor in Environmental and Occupational Health in the department of Public Health at WKU. Dr. Hwang teaches and advises students in the EHS Program. She teaches courses in Industrial Hygiene, Risk Assessment, and Air Quality. Dr. Hwang has had extensive interdisciplinary training in Exposure Sciences, Occupational Health, Biostatistics, and Epidemiology. Her research focuses on reducing cancer and other adverse health effects associated with occupational hazards. Her research outcomes provide measures to protect the health of workers and their communities as well as influencing policy and practices to prevent future cancers in occupational exposures. Dr. Hwang has designed and conducted several industry-based studies, in particular, studies that require exposure assessment, data interpretation, and statistical exposure modeling. In her doctoral dissertation research, she focused on the development of exposure metrics for elongated mineral fibers (both asbestiform and non-asbestiform) for a cohort of taconite miners in Minnesota's Mesabi Iron Range. Dr. Hwang's postdoctoral fellowship at the National Institutes of Health (NIH) provided training in exposure assessment with application to occupational epidemiology. She was a co-lead of the bioaerosol exposure characterization study, a subset of a larger group endeavor, the ongoing Agricultural Health Study (AHS), which is studying farmers' exposures and related health outcomes. She also led analyses to evaluate the usefulness of publically available data sets, such as Occupational Safety and Health Administration (OSHA) measurements and data reported in the published literature to evaluate time trends in exposure data and relative exposure differences across occupations and industries to anchor exposure estimates for subjects in several studies in the National Cancer Institute. Dr. Hwang uses her training and experiences in Occupational Health and Exposure Assessment in her classes and laboratory teaching in the EHS Program.

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Ms. Jacqueline Basham is an instructor in the EHS Program in the Department of Public Health at WKU. She has a Bachelor of Science degree in Environmental Health Science and a Master of Public Health (MPH) in Environmental Health from WKU. She has taught courses in Environmental Science, Industrial Hygiene, Occupational Safety and Health, Hazardous and Solid Waste Management, and Water Quality. Mrs. Basham advises students at the undergraduate level for both the Environmental Health Science degree and the Occupational Safety and Health Certificate. She also serves as a Faculty Co-Advisor for the Environmental Health Science Student Association (EHSSA). In addition, Mrs. Basham has successfully worked on multiple collaborative research projects as a graduate and undergraduate student. A

large portion of her work has involved hazardous materials transport and water quality assessment. Within these projects, she has aided in data collection, entry and analysis, as well as assisting with generating multiple reports to explain the results from the projects.

Ms. Basham assists with recruitment for the EHS Program. She arranges all recruitment events, plans recruitment materials, and advises students.

TPG Website

WKU's EHS program is described on the Department of Public Health's website at https://wku.edu/publichealth/bs_in_ehs.php.

SECTION II

High Impact Outcomes

Over the second year of implementing the NIOSH TPG (07/01/2015 – 06/30/2016), the program has seen significant successes in meeting its programmatic goals and objectives. These highlights are summarized below:

1. In the TPG's second year of implementation seven student trainees were supported, all are American citizens, Kentucky residents, and full-time students in the EHS program. Students received stipends under the NIOSH TPG as shown in the table below.

Name	Racial Background	Sex	Amount (\$)
Jalen Tardy	African American	Female	5,000
Shaylin McGuire	White	Female	5,000
Christian Stephens	White	Female	5,000
Nicholas Kruth	White	Male	5,000
Austin Yurt	White	Male	2,500
Taylor Duncan	White	Female	5,000
Randi Hunton	White	Female	2,500

2. Each trainee and program faculty, Dr. Golla and Dr. Hwang, attended the 2015 NIOSH Pilot Research Project (PRP) Symposium organized by the University of Cincinnati's Department of Environmental Health in collaboration with the NIOSH Education and Research Center (ERC). The interdisciplinary focus of the symposium makes the PRP a unique training opportunity for students in the field of occupational safety and health education and faculty career development. Dr. Golla and Dr. Hwang also serve as steering committee members of University of Cincinnati ERC Pilot Research Training Program (PRP).
3. Two of the trainees that graduated in the spring of 2016, Nicholas Kruth and Randi Hunton, are currently enrolled in graduate studies. Each student is pursuing a Master of Science degree in Environmental and Occupational Health Science at WKU.
4. Five of the seven trainees sought and obtained internships in the EHS field with industry for the summer of 2016. One student, Ms. Shaylin McGuire, has been offered an Environmental and Occupational Health Specialist position with a prominent manufacturing company in the Bowling Green area, while serving as an intern. All trainees that have graduated from the EHS program have acquired a related professional position or pursued advanced OSH training.
5. The EHS program has increased enrollments during the period of the TPG due to the support provided for recruitment, seminars, and support of students. Enrollments have increased to a total of 36 students in the July 1, 2015 – June 30, 2016 project period. Also, a total of five minority students were in the program during this period.
6. An advanced training opportunity was provided on campus to TPG trainees and students in the EHS program. One of these opportunities was a seminar by invited speaker Dr. Tiina Reponen, a professor in the Department of Environmental Health at the University of

Cincinnati, College of Medicine, and Director of the University of Cincinnati NIOSH ERC. Information regarding her presentations is as follows:

- **Title: “Indoor mold: new insights for exposure assessment and health effects.”**
 - **Date: Wednesday, April 13, 2016**
7. A series of field trips were provided to TPG trainees and EHS students to increase interest and knowledge of the OSH field. Field trips were attended by EHS faculty and students. The field trips were the following:
 - Sumitomo, October 30, 2015, TPG awardees and EHS students with Dr. Vijay Golla, Dr. Ritchie Taylor, and Dr. Jooyeon Hwang
 - Logan Aluminum, February 19, 2016, TPG awardees and EHS students with Dr. Cecilia Watkins, Worksite Health Promotion course
 8. Recruitment events included presentations in the general education course, ENV 280 Introduction to Environmental Science, in both the fall 2015 and spring 2016 semesters. These courses primarily have freshmen and sophomore students. Dr. Hwang and Ms. Basham taught these courses and provided an opportunity in each section taught for students to hear about the EHS field, ask questions, and then arrange an advising session, if interested.
 9. Enrollment in the OSH certificate has increased during the period of performance for the TPG. Certificate enrollment is directly correlated to enrollments in the EHS program. Stipends provided by the TPG allow EHS students in the TPG to complete the OSH certificate.
 10. TPG faculty have developed 10 proposals for grant funding during the project period. This includes launching a new research agenda in the field of exposure assessment and OSH for both volunteer and career firefighters. This research is a collaboration of Dr. Hwang, Dr. Taylor, and Dr. Golla. Research components have included community based participatory components with the Green River Firefighter Association in Northwest Kentucky. The long term goal of the research is to improve the health and safety of firefighters and their families, in Kentucky and beyond, related to exposures to fire smoke contaminants.
 11. TPG faculty have published research in peer-reviewed journals. Research was also presented at local, state, and national conference. Faculty have garnered recognition at the state and regional level in the public health field working with hazardous materials emergency management, industry, the firefighting community, and in the storm water field.
 - Jonathan Suhl, **Vijay Golla**, Jessica Rinsky, and Claudia Hopenhayn. Atrazine in Kentucky Drinking Water: Inter-Method Comparison of U.S. EPA Analytical Methods 507 and 508.1. *Journal of Environmental Health*. 2016 (In Press).
 - Cecilia M. Watkins , Gretchen Macy , Grace Lartey , **Vijay Golla** , "Kentucky worksite health promotion 2014 survey results", *International Journal of Workplace Health Management*, 2016. Vol. 9 Iss: 4, pp.
 - **J. Basham, V. Golla, R. Taylor**. A Comparison of Hazardous Materials Flow in Five Kentucky Counties: Urban vs. Rural Gradient. *American Industrial Hygiene Conference and Exposition*, Baltimore, May 25, 2016.
 - **Taylor, Ritchie D.; Golla, Vijay; Brown (Basham), Jacqueline**, "Shelby County Hazardous Material Commodity Flow Study: Final Report", *Kentucky Emergency Management*, August 2015.
 12. During the project period TPG trainees and EHS graduates have sustained a greater than 90% success rate of obtaining employment in the EHS field or entering a graduate program for

advanced OSH training. Employment opportunities have included private industry, government, and non-profits. Typical job titles are occupational safety and health coordinator, environmental health and safety specialist, environmental and occupational health consultant, and environmental scientist. The TPG created opportunities for students to gain additional training and enhance their experience. Graduates are impacting public health in local communities, throughout Kentucky, and beyond. A global impact has occurred as one graduate now works in China on environmental health issues.

13. The Environmental Health Science Student Association (EHSSA) at WKU is a registered student organization and is very active in participating in community and outreach events. It currently has 20 active student membership.

- The EHSSA participated in Household Hazardous Waste Day sponsored by Warren County, Kentucky on April 26, 2016. EHS students helped with collection of data for a survey on hazardous waste disposal as well as assist with collection of hazardous waste from residents in this County.
- September 24, 2015 – Students volunteered at the Progressive Agriculture Foundation Safety Day. EHS students helped demonstrate the proper use of personal flotation devices to 4th grade students, as well as discussing safety around waterbodies.
- October 14 & 15, 2015 – Students attended Kentucky Occupational Safety and Health Program Classes offered by the Kentucky Labor Cabinet in Louisville, KY. Classes offered training in powdered industrial trucks, fire protection and egress, hazard communication and occupational noise exposures.