FINAL PROGRESS REPORT

L. Faye Grimsley, Ph.D., CIH
Department of Global Environmental Health Sciences
Master of Science in Public Health-Industrial Hygiene Program
Tulane University
New Orleans, Louisiana 70112
Email: Grimsley@Tulane.edu

OCCUPATIONAL SAFETY AND HEALTH TRAINING

July 1, 2009 -June 30, 2012
NIOSH Grant Number: 2T03OH008629-08

March 2013

Table of Contents

List of Abbreviations

ABET - Accreditation Board for Engineering and Technology

HBCU - Historically Black College or University

TUSPHTM - Tulane University School of Public Health and Tropical Medicine

Abstract

The industrial hygiene program at Tulane University, School of Public Health and Tropical Medicine (SPHTM) offers masters and doctorate degrees. The program was established in 1980 and accredited by the Accreditation Board for Engineering and Technology (ABET) in 1998 and is accredited until 2017. The Industrial Hygiene program is comprehensive and includes core courses from various public health disciplines. The industrial hygiene program was awarded a Training Project Grant (TPG) by the National Institute for Occupational Safety and Health (NIOSH) in 2003 and renewed in 2012. The purpose of the Industrial Hygiene program at Tulane University is to provide industrial hygiene training for candidates, enabling them to seek employment in government, labor, the private sector, and in academia. After completion of the program, the industrial hygiene students have the knowledge and skills to seek careers as occupational health professionals. The on-campus and distance learning programs have had great success and are filling regional and national needs to provide graduate study to individuals pursuing careers as occupational health and safety professionals throughout the country. Most of our graduates are now employed in industry, government, consulting, and academia. The program has a sound reputation for producing quality graduates. Through the support of the NIOSH training project grant program, we were able to target and recruit trainees from Historically Black Colleges and Universities (HBCUs) to enroll in Tulane's industrial hygiene degree program. The training project grant played a significant role in increasing the number of under-represented minority and disadvantaged students in the field of industrial hygiene, providing support for our industrial hygiene faculty scholarly activities, and increasing awareness and importance of worker health and safety. The project was administered through Tulane University's on-campus industrial hygiene program.

Highlights/Significant Results

The following narrative highlights the accomplishments for the Tulane University Industrial Hygiene Training Program. The program has a special interest in educating and training individuals for careers in industrial hygiene, with special emphasis on recruiting and retaining students from Historically Black Colleges and Universities (HBCUs). The goal of the training proposal is to increase the number of under-represented individuals in occupational health and safety in industrial hygiene and to expand the availability of graduate programs to mid-career professionals. Specific objectives to accomplish these goals will be to: 1) recruit and retain minority and disadvantaged individuals; 2) provide scholarships to minority students; 3) train and educate minority and mid-career students in the field of industrial hygiene.

The Tulane Industrial Hygiene program was awarded a training grant by the National Institute for Occupational Safety and Health (NIOSH) in 2003 and renewed in 2012. The training program has been successful in recruiting graduate students to the industrial hygiene program. The recruitment efforts for the program targeted minority institutions in the state of Louisiana. There were several opportunities to meet and recruit minority students through career day and job fairs as well research seminars. The Tulane/Xavier dual (BS/MSPH) degree program, between the Department of Global Environmental Health Sciences, Tulane School of Public Health and Tropical Medicine and the College of Arts and Sciences at Xavier University, and word of mouth has been instrumental in recruiting students to the program.

The Xavier BS/MSPH program has facilitated introducing more students to occupational health and safety as a career option. This affiliation has increased the visibility of industrial hygiene as a field of study among the undergraduates and helped to channel new candidates into our program. This program and other recruitment efforts have resulted in increased enrollment of minority students into the program.

Currently, there are a total of 5 students enrolled in the on-campus industrial hygiene program (See Tables 1 and 2 for a list of graduates and current students). One student decided not to matriculate into the program fall (2012) due to lack of available financial aid, and another dropped out of the program. During the past three years, there were a total of 14 students pursuing graduate degrees in the on-campus industrial hygiene program. All students, with the exception of 1 part-time student, were enrolled in the program full-time. Six of the students fulfilled the requirements for graduation and are currently employed or seeking employment. Of the six students, four were minority/disadvantaged with two being graduates of Xavier University of Louisiana, an HBCU. One minority student (graduate of Xavier University) changed her focus of concentration to risk assessment/toxicology and is currently pursuing a doctorate in our department.

The program continues to fill the need for employers seeking to hire students for internships and full-time employment. All students seeking internships during this reporting period were successfully placed with companies in private industry or government agencies. Specific examples include the following: completed internships with Chevron, CSX Railways, Inc., NASA, Exxon, and Gulfstream/Beechcraft.

Our efforts to recruit minority students have not gone unnoticed, and our efforts are recognized by our peers in the field of industrial hygiene. In 2005, our program was commended by the Accreditation Board for Engineering and Technology, Inc. (ABET), for effectively recruiting and graduating minority students in the field of industrial hygiene. Our IH programs (on-campus and distance learning) are ABET accredited through 2017.

Faculty Teaching and Accomplishments

Dr. Grimsley was promoted to Associate Professor of Environmental Health Sciences with tenure in 2009. Dr. Grimsley teaches two courses each year (one per semester) and Dr. Rando teaches two courses each year (one course each semester). Drs. Rando and Grimsley review and monitor the progress of each student in the IH program. In addition, the Air Sampling and Analysis course is team taught by Drs. Rando and Grimsley. With the recent hiring of Drs. Jeffery Wickliffe (Risk Assessment), Erik Svendsen (Air Pollution) and He Wang (Occupational Health), this has enhanced the ability of the program to provide and teach required industrial hygiene and elective courses. Some courses are also offered in alternating years to account for the small number of students registering for the courses.

Dr. Grimsley continues to emerge into a leadership role in the field of industrial and environmental hygiene at the national level. For example, at the request of the National Institute of Environmental Health Sciences (NIEHS) she is currently serving on the Deep-water Horizon Oil Spill GuLF Study Exposure Assessment Work Group (WG) and the Deep-water Horizon Oil Spill GuLF Scientific Advisory Board, Dr. Grimsley was selected to serve as a member of the NIOSH study section review panel in June 2011. She recently completed serving as lead investigator for the environmental exposure assessment component in the "Head -off Environmental Asthma in Louisiana (HEAL)" project. Several manuscripts were published from this research investigation.

In addition, Dr. Grimsley recently completed serving as Yerby Visiting Faculty Scholar, Harvard School of Public Health, Department of Environmental Health where she participated in teaching, research, and service activities January 1 – May 31, 2012. In April 2012 Dr. Grimsley was asked to serve as expert witness before Congress for the National Toxicology Program's rule making process and carcinogen classification for styrene and formaldehyde as reported in the Report on Carcinogens (RoCs 13th Edition).

Witness, U.S. House of Representatives, Committee on Science, Space, and Technology Subcommittee on Investigations & Oversight and Committee on Small Business Subcommittee on Healthcare and Technology Hearing, *"How the Report on Carcinogens Uses Science to Meet its Statutory Obligations, and its Impact on Small Business Jobs"* Congressional Testimony*,* Wednesday, April 25, 2012, Washington, DC

Dr. Rando also continues to be active in research and teaching in the IH program. Current research grants include:

Current Research Grants

Novel Therapies for Chlorine-Induced Lung Injury
Goal: To investigate how G-protein mediated signaling pathways regulate injury and inflammation induced by exposure to chlorine gas using endothelial and epithelial cell culture and mouse models. The information gleaned will then be used to develop new therapeutic agents, including cell-soluble Gq inhibitory peptides and Gq SiRNA, for the treatment of chlorine induced lung injury.

Respiratory Effects in Workers From Post-Katrina Related Airborne Exposures
Goal: To conduct a longitudinal epidemiologic assessment of respiratory health and particulate/bioaerosol exposure among remediation/restoration workers in the gulf coast.

Validation of Appropriate Wood Dust Sampling and Analysis Procedures
Goal: To provide analytical and field support for a NIOSH intramural research project evaluating various commercially available inhalable dust samplers for collection of wood dust, and to provide FTIR analysis of collected samples.

Homing and Differentiation of Adult Stem Cells to Lung
Goal: The overall aim of this program project grant is to determine the potential usefulness of adult stem cells to treat pulmonary diseases.

Molecular Mechanisms of Lung Cancer Induced by Cigarette Smoke And Asbestos.
The goal of this project is to establish mechanisms of inflammation, BASC proliferation and tumorigenesis in wild-type and p53R172H knock-in mice initiated by inhalation exposures to asbestos and cigarette smoke.

Since the last project award project, the program has made strides to promote industrial hygiene as a career option/path for students in the science field. The program provides occupational safety and health education, research, and field experience opportunities for those who are accepted to the program.

Outcomes/Relevance/Impact

The program continues to fill the need for employers seeking to hire students for internships and full-time employment. All students seeking internships or employment were successfully placed with companies in private industry, consulting, or governmental agencies. For example, students participated in internships with Chevron, CSX Railroads, NASA, Exxon, and Gulfstream/Beechcraft .

According to NIOSH, since the American workforce is becoming more diverse in age, gender, race and nationality, these changes require a more comprehensive, multidisciplinary training and alternative training programs. Studies have shown that NIOSH training programs have had a major impact on improving public health. In a 1995 report by the Inspector General of the Department of Health and Human Services, it was noted that approximately 80% of the graduates from NIOSH funded programs pursue careers in occupational safety and health (NIOSH, 2001).

The industrial hygiene programs at Tulane have experienced rapid growth in the last 5 years because of the distance learning offerings to mid-career professionals and efforts to recruit minority students. Tulane recognized the need for distance learning delivery and is now considered a flagship program for distance learning. Tulane also recognized the need for more minorities in the field of occupational safety and health (OSH).

The lack of minority OSH professionals has been documented in several reports by various agencies and organizations such as the American Industrial Hygiene Association (AIHA), Institute of Medicine (IOM), and National Institute for Occupational Safety and Health (NIOSH). To address this need, Tulane University Health Sciences Center has dedicated resources and time for the recruitment of minorities.

Our recruitment efforts continue to attract students to the IH program. Four of the full-time students in the program are minority/disadvantaged. Overall, the goals and objectives of the training program are being accomplished. Resource funding from the NIOSH training project grant has been used to support 1- 3 students per year. Our graduates are gainfully employed in the field of occupational health and safety.

This training project grant has led to increased numbers of minority students entering into graduate school and the field of occupational safety and health, specifically industrial hygiene, four of last graduates were minority/disadvantaged. Added accomplishments through the support of the grant have led to increased student enrollments in Tulane's on-campus industrial hygiene program.

Overall the Tulane Industrial Hygiene Program Educational and the Training Project Grant Objectives were successfully met. The program provided graduates of the MSPH program in Industrial Hygiene with: 1) the knowledge and skills to anticipate, recognize, evaluate, and manage workplace exposure to chemical, biological, and physical stressors; 2) qualifications necessary to attain positions as industrial hygienists or to obtain advancement in their current jobs and professions; and 3) to prepare graduates to sit for and successfully complete the certification examination administered by the American Board of Industrial Hygiene (ABIH).

Technical Report

Background

Tulane SPHTM developed the IH program in 1980 with the hiring of an industrial hygienist and a toxicologist; an additional IH faculty member was hired in 1984. Currently, the primary faculty in industrial hygiene are Professors Roy Rando and L. Faye Grimsley. Dr. Rando joined the faculty as academic director of industrial hygiene in 1994. Dr. Grimsley joined the program in 2001. The program has graduated over 100 students since its inception. The IH program is accredited by the Accreditation Board for Engineering and Technology (ABET). All tracks of the department are operated in a coordinated manner to take advantage of expertise, resources and interdisciplinary synergy. The occupational tracks function as a cohesive unit with Roy Rando, Sc.D., CIH directing the IH program and LuAnn E. White, Ph.D., DABT taking the lead for the distance learning programs related to occupational health and safety. Dr. Faye Grimsley serves as the lead person for the NIOSH Training Project Grant.

The on-campus and distance learning IH programs are equivalent, requiring that all students admitted into the programs meet certain admission and programmatic requirements and graduation requirements. The Industrial Hygiene program is comprehensive and includes core courses from various public health disciplines. Courses include epidemiology, biostatistics, toxicology, radiological health, industrial ventilation, physical agents, air sampling and analysis, occupational health, principles of industrial hygiene, risk assessment, and air pollution. In addition, all full-time students participate in a weekly departmental seminar. Students also select electives from the other disciplines within the department such as hazardous waste management, principles of safety and industrial hygiene aspects of plant operations. Doctoral students, with the aid of their advisor's and other committee members, select additional courses beyond those required for the Masters of Science in Public Health (MSPH) degree that are consistent with their research interests.

The Industrial Hygiene program admissions requirements include acceptable GRE scores, letters of recommendations, career statement, and adhere to additional requirements listed below to meet ABET criteria:

- A baccalaureate degree based on a minimum of 120 semester hours or the equivalent and includes 60 or more semester-hours credits in undergraduate or graduate level courses in science, mathematics, engineering and technology, at least 15 of which are at the upper (junior, senior, graduate) level.

- A minimum of 21 semester hour credits or equivalent, in communications, humanities, and social sciences.

- In addition, applicants for the distance learning program must demonstrate 3 or more years of experience in industrial hygiene or closely related field. Those without experience may only be admitted to the on-campus program. Distance learning students must also have computer skills including the ability to use the internet to manipulate and organize computer-based files and email, to use MS Office applications (intermediate proficiency preferred), and to implement technical instructions and guidance for the appropriate computer hardware and software.

  The primary purpose of this training project grant is to support the on-campus industrial hygiene program, and the following program plan focuses on the on-campus program only.

Specific Objectives

Tulane Industrial Hygiene Program Educational Objectives:

1. Use basic scientific and engineering principles to anticipate and identify potential hazards in the workplace.
2. Apply the methods and techniques of analytical chemistry and other measurement sciences to quantify the degree of hazard of identified occupational health stressors.
3. Interpret toxicology literature and health data and incorporate these into the management of occupational health hazards.
4. Apply principles of engineering in the design of appropriate controls for workplace hazards, with emphasis on general and local exhaust ventilation.
5. Select, evaluate, and manage the use of appropriate types of personal protective equipment for control of worker exposures.
6. Utilize critical thinking in the development, management, and evaluation of industrial hygiene programs.
7. Communicate to labor, management, and the community, both verbally and in writing, the nature, risks, and remediation of workplace and environmental hazards.
8. Interpret and assure compliance with applicable government regulations and standards pertaining to occupational safety and health.
9. Qualify for and attain professional certifications and registrations related to industrial hygiene, especially the Certified Industrial Hygienist certification administered by the American Board of Industrial Hygiene.

Training Project Grant (TPG) Program Objectives

A primary purpose of the Tulane on-campus industrial hygiene program with support from funding through the National Institute for Occupational Safety and Health (NIOSH) Training Project Grant (TPG) program is to provide training and education in occupational health to students recruited from Historically Black Colleges and Universities (HBCUs) and to students who are disadvantaged. Specifically, the program is intended to:

- Recruit and retain minority and disadvantaged individuals (e.g., persons who are in an under represented group, or those who have been deprived of education opportunities) for the Tulane industrial hygiene on-campus program.

- Provide scholarship funds to minority and disadvantaged students admitted into the Tulane University industrial hygiene program.

- Increase the knowledge and skills of minority and disadvantaged students in the field of industrial hygiene.

- Increase awareness of under-represented students about the field of occupational safety and health, biostatistics, and epidemiology as career options.

- Increase the number of African Americans and other under-represented minority populations with advanced degrees in occupational safety and health.

Results

-Recruit and retain minority and disadvantaged individuals for the Tulane Industrial Hygiene on-campus program. Several approaches were used in the past and have been successful for recruitment of students into the industrial hygiene program. These consisted of receptions and/or booths at conferences, such as those held by the AIHA/ACGIH, ASSE, and APHA. Specific recruiting plans to identify minority and disadvantaged students included attending recruitment school fairs that targeted local historically black colleges and universities (Xavier University, and Dillard University) to inform students of the opportunities in IH and the availability of the scholarships. A unique aspect of our recruitment plan was the collaboration with Xavier University, a historically black college, nationally recognized for producing high-quality undergraduate students in pre-medicine and the sciences. The combined BS/MSPH degree is designed to promote industrial hygiene as an academic career path for minority students. This provides a bridge to transition minority students into the masters program. Dr. Grimsley also served as a panelist for Xavier's Biology Club's career planning options seminar in 2010 and 2011.

-Provide scholarships to underrepresented and disadvantaged minorities admitted to the program. Once admitted into the program, Drs. Rando and Grimsley took the lead for allocating scholarship money to the most qualified minority applicants based on designated criteria. During this project period we provided stipend and tuition assistance to 4 students.

-Increase the knowledge and skills of minority and disadvantaged students in the field of industrial hygiene. Students admitted in the program are required to take courses outlined in the industrial hygiene program curriculum, which is comprehensive and includes core courses from various public health disciplines (See Appendix A for Model Course Schedule). Courses include: epidemiology, biostatistics, toxicology, radiation health, industrial ventilation, physical agents, air sampling and analysis, occupational health, principles of industrial hygiene, risk assessment, and air pollution. In addition, all full-time students participate in a weekly departmental seminar. Students also select electives from the other disciplines within the department such as hazardous waste management, industrial hygiene aspects of plant

operations, and principles of safety. Students are required to complete an internship/practicum and culminating experience. Four of the last six graduates were minority/disadvantaged.

-Increase awareness of underrepresented students about the field of occupational safety and health, biostatistics, and epidemiology as career options. Tulane School of Public Health and Tropical Medicine Administration and Faculty attend graduate school fairs at undergraduate institutions and provide information on the public health program and degree requirements to college counselors. The number and percent of minority students at SPHTM as reported by the Tulane Registrar over the last 3 years has ranged from 29% to 32% which includes: 15-16% African-Americans, 6-9% Asians, 4-5% Hispanics and 3% Native Americans.

-Increase the number of African Americans and other under-represented minority populations with advanced degrees in occupational safety and health. Tulane's Department of Global Environmental Health Sciences specifically targets recruitment and retention of under-represented students. The SPHTM participates in Xavier's GRADSTAR program, an on-campus graduate school fair. This has been a primary recruitment tool for Xavier students in the past and was instrumental in recruiting most of the minority students. As a previous participant in the Tulane/Xavier joint faculty appointments program (JFAP), Dr. Grimsley has developed a good relationship with Xavier. This relationship has facilitated introducing more students to occupational health and safety as a career option.

Currently, there are a total of 5 students enrolled in the on-campus industrial hygiene program. See Table 2 for list of current students. In the last 3 years, 14 students were enrolled in the program. Six students graduated from the IH program during this time period, one student graduated with a concentration in Global Environmental Health Sciences. (See Table 1 for students who graduated from the program for the last 3 years. Eighty three percent of the program's graduates are now employed in the field of occupational safety and health.

The following four minority/disadvantaged students completed the MSPH or PhD course and research requirements under the direction of Drs. Grimsley and Rando and are currently pursuing careers as occupational health professionals. Graduates are: 1) Emmanuel Enweasor, seeking employment, 2) Sheena Goodridge, Chevron, Richmond, CA, 3) Jocelyn Lewis, LA Dept. Health and Hospitals, New Orleans, LA, 4) Nicole Orgeron, Exxon, Baton Rouge, LA. Other students completing the program included Lauren Geddes, Beechcraft/Gulfstream and Cheol Kwon, Post-Doctorate Tulane, Department of Global Environmental Health Sciences.

Students Completed Research/Internships Related to the Following:

- Hurricane Katrina New Orleans Mold Exposures and Biomarkers of Exposures
- Assessment of Exposures and Adequate Ventilation in Railroad Tunnels
- Noise Assessments and Controls
- Aerospace Health and Safety Compliance
- Wood Dust Exposures and Analytical Methods Development

Discussion

The results from the past three years of the program were as expected. As many IH programs across the country have seen a decreased number of students, this trend is also consistent within our on-campus program. Various recruitment efforts and the ability to provide scholarship

funding to currently enrolled students have helped Tulane's Industrial Hygiene program to remain competitive in the field and attractive to potential enrollees. The methods employed to recruit students have also led to relatively high retention rates for the masters and doctorate Industrial Hygiene program.

The program has benefited from offering dual degree programs such as the Tulane/Xavier (BS/MSPH) degree program between the Department of Global Environmental Health Sciences, Tulane Health Sciences Center and the College of Arts and Sciences at Xavier University; dual degree with Southeastern Louisiana University and Tulane's undergraduate BSPH program. This BS/MSPH program is a combined degree program that allows Xavier University, Southeastern Louisiana University, and Tulane undergraduate biology/premed/public health majors to obtain a Master of Science in Public Health (MSPH) in Environmental Health Sciences in conjunction with earning a Bachelor of Science (BS) degree. The program allows students to earn both undergraduate and master degrees in less time than it would take to complete each degree separately.

The recruitment and retention of minority and other students into the field of Global Environmental Health Sciences and Industrial Hygiene has benefited from this relationship. This relationship provides a bridge to transition minority students into graduate school and provides research opportunities.

The efficacy of the industrial hygiene master's degree program is evidenced by the successful placement of eighty three percent of the recent graduates in careers related to occupational health and safety. Both the public and private sectors have employed our students for internships or for full-time careers. The Tulane Industrial Hygiene Program strives to increase the number of students, particularly those who are minorities and disadvantaged, who successfully enter and complete the program; this, in turn, will allow them to gain valuable environmental health experience and enter the workforce as confident and well-rounded professionals.

In addition to our on-campus program, our distance learning program continues to be successful and has attracted many students from across the country and is well known both nationally and internationally. Currently, there are 28 part-time students enrolled in the program. These students are able to continue to support themselves and/or their families with full-time positions, while further advancing their educations and skill set. The rigorous curriculums for both the on-campus and distance learning programs accommodate the various lifestyles of all students, yet both permit them to foster the educational enrichment which they are seeking.

Conclusions

Overall, the goals and specific aims for this training program grant were accomplished and have led to increased numbers of minority students entering into graduate school and the field of occupational safety and health, specifically industrial hygiene. Added accomplishments have led to: research opportunities for our students and provided viable career options for science majors.

Students were recruited from Historically Black Colleges and Universities (HBCUs) in the New Orleans area, Georgia State University and Loyola University of New Orleans. Our dual degree programs have played a major role in increasing knowledge and awareness about industrial

hygiene as a career path. Available NIOSH scholarship funding has been instrumental with increasing awareness of IH at the undergraduate level and in recruitment.

Publications and Presentations- None Supported by This Award

Bloom, E, **Grimsley, LF**, Pehrson, C, **Lewis, J,** Larsson, L., "Molds and Mycotoxins in Dust from Water-Damaged Homes in New Orleans after Hurricane Katrina," (Indoor Air 2009; 19:153-158).

Adhikari A, Jung J, Reponen T, **Lewis JS, Degrasse EJ**, **Grimsley LF,** Chew GL, Grinshpun SA, Aerosolization of fungi, (1-3)-B-D glucan, and endotoxin from flood-affected materials collected in New Orleans homes. Environmental Research, 109:215-224 (2009).

Adhikari A, **Lewis JS**, Reponen T, **DeGrasse EJ**, **Grimsley LF**, Chew GL, Iossifova Y, Grinshpun SA., "Exposure matrices of endotoxin, (1→3)-β-D-glucan, fungi, and dust mite allergens in flood-affected homes of New Orleans," Sci Total Environ, 408 (2010): 5489-5498.

Chulada PC, Kennedy S, Mvula M, Jaffee K, Wildfire J, Thornton E, Cohn R, ***Grimsley LF***, Mitchell H, El-Dahr JM, Sterling Y, Martin W, White L, Stephens K, Lichtveld M, "The Head-off Environmental Asthma in Louisiana (HEAL) Study - Design, Methods, and Population." Environ Health Perspect 120:1592–1599 (2012).

Grimsley LF, Chulada PC, Kennedy S, White L, Wildfire J, Cohn R, Mitchell H, Thornton E, El-Dahr JM, Mvula M, Sterling Y, Martin W, Stephens K, Lichtveld M, "Indoor Environmental Exposures for Children with Asthma in Post-Katrina New Orleans." Environ Health Perspect 120:1600–1606 (2012).

Mitchell H, Cohn R, Wildfire J, Thornton E, Kennedy S, El-Dahr JM, Chulada PC, Mvula M, ***Grimsley LF***, Lichtveld M, White L, Sterling Y, Stephens K, Martin W, "Implementation of Evidence–based Asthma Interventions in Post-Katrina New Orleans: The HEAL Study (Head-off Environmental Asthma in Louisiana)." Environ Health Perspect 120:1607–1612 (2012).

Grimsley LF, Wildfire J, Lichtveld M, Kennedy S, El-Dahr JM, Chulada PC, Cohn R, Mitchell H, Thornton E, Mvula M, Sterling Y, Martin W, Stephens K, White L, " Few associations found between mold and other allergen concentrations in the home versus skin sensitivity from children with asthma after Hurricane Katrina in the Head-off Environmental Asthma in Louisiana (HEAL) Study." Accepted October 19, 2012, International Journal of Pediatrics.

***Rando RJ*,** Lefante JJ, Freyder LM, Jones RN: Respiratory Health and Flood Restoration Work in the Post Katrina Environment. In Bioaerosols - 6th International Scientific Conference on Bioaerosols, Fungi, Bacteria, Mycotoxins in Indoor and Outdoor Environments and Human Health. Johanning E., Morey PR, Auger P; Eds. Albany, NY: Fungal Research Group Foundation, Inc., 2012. ISBN: 978-0-9709915-0-8

Weiyuan Chang, Jing Chen, Connie F Schlueter, ***R J Rando***, Yashwant V Pathak, Gary W. Hoyle: Inhibition of Chlorine-Induced Lung Injury by the Type 4 Phosphodiesterase Inhibitor Rolipram. Tox. Appl. Pharm. 263: 251-258, 2012.

***Rando RJ*,** Lefante JJ, Freyder LM, Jones RN: Respiratory Health Associated with Restoration Work in Post Hurricane Katrina New Orleans. J. Environ. Publ. Health. Vol. 2012*. 8 pp. d*oi:10.1155/2012/462478.

Books

Grimsley L.F**.**, **Harris, E.,** "Iron and Cobalt " in Patty's Toxicology, Edited by Bingham, E., et al, 6th edition, Vol. 3, 2012.

Dissertation/Thesis

Lewis JS: [2011] Assessment of Pre-and-Post Hurricane Katrina New Orleans Mold Exposures and Biomarkers of Exposures, Ph.D., Dissertation, Tulane University.

Sheena Goodridge (MSPH-IH December 2011), Interned with Chevron Oil and Gas, Midland TX, Summer 2011 and assisted industrial hygienists at NASA Michoud facility Spring 2011 to receive hands on experience.

Danielle Major – (MSPH Environmental Health August 2011) Current Ph.D. under the direction of Dr. Wang in Risk Assessment/Toxicology. Proposed research topic related to Gulf of Mexico Oil Spill exposures and toxic effects of dispersants. IH internship with Michoud NASA Spring 2011.

Nicole Orgeron – (MSPH-IH December 2011), Interned with CSX Railroad, Jackson, FL, Summer 2011.

Lauren Geddes – (MSPH May 2012), Interned with Gulfstream Aerospace Corp. Savannah River, SC, Summer 2011.

Emmanuel Enweasor – (MSPH-IH May 2012), Interned Tulane University Office of Environmental Health and Safety, New Orleans, LA, Spring 2012.

Cheol-Woong Kwon, "Wood Solid Analysis in Industrial Dust by Diffuse Reflectance Infrared Fourier Transform Spectroscopy" (PhD 2010). Current Post-Doctoral Fellowship sponsored by NIOSH with Dr. Rando.

Note: Trainees supported by NIOSH TPG are bolded and underlined—none of the publications included NIOSH TPG acknowledgement.

Appendix - A

Table 1- Graduates of Program Last Three Years

Student Name	Date Entered	Date Graduated	Degree	
Danielle Majors*	Sum 2009	Sum 2011	MSPH	
Sheena Goodrich	Fall 2009	Fall 2011	MSPH/IH	
Nicole Orgeron	Spring 2010	Fall 2011	MSPH/IH	
Emmanuel Enweasor	Fall 2010	Spr 2012	MSPH/IH	
Lauren Geddes	Fall 2010	Spr 2012	MSPH/IH	
Cheol Kwon	Fall 2001	Fall 2010	PhD	
Jocelyn Lewis	Fall 03	Fall 2011	PhD	

*Danielle Majors changed to full-time status as Risk Assessment/Toxicology doctoral student in department with Dr. Wang Fall 2011.

Table 2 – Current Students

Student Name	Date Entered Program	Status
Sasithorn Srimeechai	Spr 08	Current
Rory Elmore	Sum 12	Current
Wahab Adebisi	Fall 12	Current
Olarewaju Fafowora	Spr 13	Current
Bayarmagnai Munkhjargal	Spr 13	Current

Table 3 –
Model Course Schedule MSPH – Industrial Hygiene

Fall entry

Year 1 semester 1	**12 credits**
BIOS 6030: Introductory Biostatistics	3 credits
GEHS 6600: Principles of Toxicology	3 credits
GEHS 6620: Physical Agents & Ergonomic Hazards in the Workplace	3 credits
GEHS 6720: Principles of Industrial Hygiene	3 credits
Year 1 semester 2	**12 credits**
EPID 6030: Epidemiologic Methods I	3 credits
GEHS 6540: Occupational Health	3 credits
GEHS 6030: Survey of Environmental Health	3 credits
GEHS 7500: Air Sampling & Analysis	3 credits
Year 1 semester 3 (summer)	**3 credits**
GEHS 6700: Principles of Safety	3 credits
Year 2 semester 1	**12 credits**
TRMD 6010: Biological Basis of Disease	3 credits
GCHB 6030: Social & Behavioral Aspects of Global Health	3 credits
GEHS 7110: Industrial Ventilation & Chemical Hazard Control	3 credits
GHSD 6030: Principles of Health Systems Administration and Management	3 credits
Year 2 semester 2	**6 credits**
GEHS 6390: Radiological Health	2 credits
GEHS 7620: Environmental Health Risk Assessment	3 credits
GEHS 7000: Environmental Health Seminar	1 credit
Practicum & Thesis	0 credit

Table 4-
Model Course Schedule MSPH – Industrial Hygiene

Spring Entry

Year 1 semester 2	**12 credits**
BIOS 6030: Introductory Biostatistics	3 credits
GEHS 6540: Occupational Health	3 credits
GEHS 6030: Survey of Environmental Health	3 credits
TRMD 6010: Biological Basis of Disease	3 credits
Year 1 semester 3 (summer)	**3 credits**
GEHS 6700: Principles of Safety	3 credits
Year 2 semester 1	**12 credits**
EPID 6030: Epidemiologic Methods I	3 credits
GEHS 6600: Principles of Toxicology	3 credits
GEHS 6620: Physical Agents & Ergonomic Hazards in the Workplace	3 credits
GEHS 6720: Principles of Industrial Hygiene	3 credits
Year 2 semester 2	**11 credits**
GEHS 6390: Radiological Health	2 credits
GEHS 7620: Environmental Health Risk Assessment	3 credits
GEHS 7500: Air Sampling & Analysis	3 credits
GHSD 6030: Principles of Health Systems Administration and Management	3 credits
Year 3 semester 1	**7 credits**
GCHB 6030: Social & Behavioral Aspects of Global Health	3 credits
GEHS 7110: Industrial Ventilation & Chemical Hazard Control	3 credits
GEHS 7000: Environmental Health Seminar	1 credit
Practicum & Thesis	0 credit