

FINAL PROGRESS REPORT

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OCCUPATIONAL SAFETY AND HEALTH TRAINING

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List of Abbreviations

ABET - Accreditation Board for Engineering and Technology

HBCU - Historically Black College or University

JFAP - Joint Faculty Appointments Program

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.

The Industrial Hygiene program is comprehensive and includes core courses from various public health disciplines. 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. Many 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 support trainees pursuing degrees in industrial hygiene. The training project grant played a significant role in increasing the number of minority and disadvantaged students in the field of industrial hygiene. 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 main objective of the program is to educate and to train individuals for careers in industrial hygiene, with special emphasis on recruiting and retaining students from Historically Black Colleges and Universities (HBCUs).

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 2006. The training program has been beneficial in recruiting graduate students into the industrial hygiene program. As stated earlier in other progress reports, the original goal of supporting three to five students with partial tuition support per academic school year was modified mid way through the grant cycle. The modification included less tuition support and more funding for a modest stipend. Although this modification resulted in a smaller number of trainees for the program, we felt that it was more beneficial to have students assist with projects on campus rather than seeking outside employment which had little to do with public health or industrial hygiene. The trainees were able to participate in more meaningful assignments to obtain on-the-job training for careers as occupational health professionals. Providing stipend support to students has continued since the first modification.

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 days and job fairs as well research seminars. The Tulane/Xavier dual (BS/MSPH) degree program, between the Department of Environmental Health Sciences, Tulane Health Sciences Center and the College of Arts and Sciences at Xavier University, has been instrumental in recruiting students to the program.

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. The BS/MSPH program is a combined degree program that allows Xavier University undergraduate biology/premed 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 approximately 5 years, which is less time than it would take to complete each degree separately. During the senior year, undergraduate science majors take 10 credits of graduate level courses at the Tulane University School of Public Health and Tropical Medicine (TUSPHTM). These credits are taken as electives in their undergraduate course of study and are applied toward both the BS and MSPH degrees.

In addition, Dr. Grimsley has developed a good relationship with Xavier through the Tulane/Xavier joint faculty appointments program (JFAP). The JFAP program was sponsored by the National Science Foundation (NSF) and the Louisiana Board of Regents. The mission of the program was to foster inter-university collaboration between Tulane University as a majority institution (MI) and Xavier University as an historically black college or university (HBCU). Faculty members appointed through this program have dual appointments at both universities. Dr. Grimsley held a joint faculty appointment until she resigned from Xavier in June 2005.

This program and established relationships have 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 over the last 8 years.

Currently, there are a total of 7 students enrolled in the on-campus industrial hygiene program (See Table 1 or 2 for a list of current students). One student decided not to matriculate into the program this fall, and another dropped out of the program. Three of the students are graduates from Xavier University of New Orleans. There are four doctoral students enrolled in the program.

During the past three years, there were a total of 13 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. Of the six students, four were minorities with all four being graduates of Xavier University of Louisiana, an HBCU.

The following four minority students completed the MSPH course and research requirements under the direction of Drs. Grimsley and Rando and are currently pursuing careers as occupational health professionals. Graduates are: 1) Harold Sias, Herman Hospital, Houston, TX; 2) Erica Harris, Veterans Administration Hospital, Dayton, OH; 3) Ashton Grant, Motiva, Convent, LA; 4) Enjoli DeGrasse, Teamsters, Washington, DC.

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 accredited through 2011.

Faculty Achievements

Dr. Grimsley has successfully completed the promotion and tenure goals and requirements outlined by the Department of Environmental Health Sciences. She is currently Associate Professor of Environmental Health Sciences (with tenure).

In addition to teaching responsibilities, Dr. Grimsley has been actively seeking extramural funding to support her research interests. She has submitted several grant applications as principal investigator, as well as collaborating with other researchers within and outside of the department. Dr. Grimsley's research interests include: indoor air quality, exposure assessment, and bioaerosols. After Hurricane Katrina, she participated in several projects related to mold exposures.

In particular, she served as the Co-Principal Investigator of the project, "Sampling of Biological Contaminants from Surfaces in Flooded Homes of New Orleans: Development, Evaluation and Implementation of a New Cost-Effective Protocol," which was designed to investigate mold exposures in New Orleans post-Hurricane Katrina. The goal of the project was to develop and evaluate a low cost method to assess biological contaminants, such as mold and other indoor allergens. The objective of this project was to field test a newly developed protocol designed to identify and assess major biological contaminants associated with excess moisture in housing in the New Orleans area, such as: mold, endotoxin, and dust mite allergens. This was a collaborative research effort with the University of Cincinnati. The project was funded by HUD.

Dr. Grimsley is also involved in the “Head -off Environmental Asthma in Louisiana (HEAL)” project. She is the lead person for the exposure assessment component of the project. The project was approved for funding by the NIEHS in October 2006. The primary objectives of the project are: to investigate effective intervention measures and to determine exposures to asthma triggers, such as mold, dust mites, cockroach and mouse antigens, in the homes of asthmatic children in the New Orleans area. Another objective of the project is to collect and bank biospecimens to support future genetic studies of asthma and gene-environment interaction studies of the clinical response of asthma to AC (asthma counselor) intervention, and allergen and mold reduction.

In March 2007, Dr. Grimsley was awarded a Tulane Research Enhancement Phase II grant to support the research project “Fungal Allergens: An Investigation of Biomarkers of Mold Exposure.” The purpose of this project is to conduct immunologic marker assays in a population of subjects exposed to fungal allergens. The specific aims of the project are: to establish a baseline for each subject and to document changes in specific mold antibody loads and their associations with environmental mold exposures.

Dr. Grimsley has also participated in other small preliminary data gathering pilot projects post-Hurricane Katrina. These included the following projects: 1) Fungal Fragments in Flood-damaged Buildings in New Orleans and 2) Methodology for Fungal Fragments - A New Exposure Assessment Tool for Gene: Mold Interactions Studies. The first pilot study was conducted in collaboration with the University of Cincinnati. The objective of the project was to field test a new sampling instrument and methodology for assessing fungal fragments. The data will be used for the preparation of a larger R01 grant application on the prevalence and health effects of fungal fragments in moldy buildings. Data from the second project are also being used to develop exposure assessment protocol to investigate asthma gene and mold interaction effects.

Dr. Grimsley continues to make contributions to the field of industrial hygiene through invitations to serve on advisory boards, peer review panels, and community outreach programs. The following represent journals and agencies that have requested her to serve: Journal of the International Society for Respiratory Protection, Atmospheric Environment, Environmental Research, Environmental Monitoring and Research, American Industrial Hygiene Association (AIHA), American Board of Industrial Hygiene (ABIH), National Institute for Occupational Safety and Health (NIOSH), American Association for the Advancement of Science (AAAS), American Conference of Governmental Industrial Hygienist (ACGIH), Academy of Industrial Hygiene (AIH), National Institute of Environmental Health Sciences (NIEHS), and the Louisiana Office of Public Health. Dr. Grimsley also actively participates in professional societies. Invitations to speak at conferences and to serve as an expert witness offer opportunities for scholarly activities and professional practice outside the university as well.

Other accomplishments have included:

EHS Academy for Institutions, Workshop co-coordination with University of Texas ERC and University of Alabama-Birmingham Deep South Center, May 21-23, 2008

First Recipient AL-AIHA H. Kenneth Dillon Memorial Lecture Award, 2007

National Toxicology Program (NTP) Mold Information Work Group, RTP, NC, March 2007

CDC 2009 NIOSH NORA Peer Review Panel Member, Epidemiology, Exposure Assessment & Lab Methods, Baltimore, MD, May 2008

Member Permanent Conference Committee, American Conference of Governmental Industrial Hygienists, 2008 - Present

Director, American Board of Industrial Hygiene (ABIH), 2003 -2007

Member, Deep South Center for Environmental Justice (DSCEJ) Advisory Board, Dillard University, New Orleans, LA, 2006 – Present

Louisiana Office of Public Health (OPH), Occupational Health Surveillance Work Group, Metairie, LA, 2007 - Present

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.

Translation of Findings

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 from HBCUs. Overall, the goals and objectives of the training program are being accomplished. Resource funding from the NIOSH training program grant has been used to support 1- 3 students per year. Our graduates are gainfully employed in the field of occupational health and safety.

Outcomes/Relevance/Impact

The training grant continues to be a popular scholarship for our industrial hygiene students. The training grant, now in its fourth year, is designed to provide fellowship support for up to three minority students in the industrial hygiene master's program each year. The scholarships have provided much needed funding for graduate students in the industrial hygiene program. As with all universities, the tuition at Tulane University continues to escalate, and it is becoming more difficult to attract and retain bright individuals. Without the NIOSH funding, it would be very difficult to attract and retain high quality students that are interested in occupational health and safety careers. The program continues to work with HBCU's in the area that are very good sources of applicants for the program. During this reporting period, of the six students who graduated, four were minority -4 were graduates of Xavier University of Louisiana.

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 Motiva, Albemarle, and Viola, Inc.

This training program grant has 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 enhanced linkages between the Tulane and Xavier University, established multidisciplinary research collaborations, created research opportunities for undergraduate students, and provided viable career options for science majors.

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 distance delivery of the IH program via video teleconferencing began in Spring 1995 in response to a need by the Department of Energy Hanford Site in Richland, Washington. In 1993, Tulane SPHTM (Center for Applied Environmental Public Health) was named the major university partner by the US Department of Energy's National Hazardous Material Management and Emergency Response (HAMMER) Education and Training Center. Tulane was requested to provide the MSPH program in industrial hygiene as a component of Hammer. Twenty students obtained MSPH degrees in IH through this program. In 2001, the distance learning IH program began utilizing the interactive virtual classroom via the internet. The system uses a virtual electronic classroom with audio streaming where students attend live-real-time lectures once a week for the entire semester.

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 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.

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

Specific Aims

The purpose of the program is to provide minority and disadvantaged students with training and education in occupational health. Specifically, the program is intended to:

1. 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.
2. Provide scholarship funds to minority and disadvantaged students admitted into the Tulane University industrial hygiene program.
3. Increase the knowledge and skills of minority and disadvantaged students in the field of industrial hygiene.
4. Increase awareness of under-represented students about the field of occupational safety and health, biostatistics, and epidemiology as career options.

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

Methods/Approach

-Recruit and retain minority and disadvantaged individuals for the Tulane Industrial Hygiene on-campus program. Several approaches were used for recruitment of students into the industrial hygiene program. These consisted of targeted mailings and phone calls, selective advertising, and receptions and/or booths at conferences, such as those held by the AIHA, 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 presented a seminar to introduce IH to minority students at the Louisiana State University (LSU- Baton Rouge) in September 2008.

-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.

-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. Courses include: epidemiology, biostatistics, toxicology, radiation health, industrial ventilation, physical agents, air sampling and analysis, occupational health, principles of industrial hygiene, 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, risk assessment, and principles of safety.

-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.

-Increase the number of African Americans and other under-represented minority populations with advanced degrees in occupational safety and health. Tulane's Department of Environmental Health Sciences specifically targets recruitment and retention of students from HBCU's. 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 in the past 8 years. As a 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. This affiliation has increased the visibility of industrial hygiene as a field of study among the undergraduates and helps to channel new candidates into our program.

Results

Currently, there are a total of 7 students enrolled in the on-campus industrial hygiene program. See Table 1 for list of current students. Four of the students are graduates from Xavier University of New Orleans. There are three doctoral students enrolled in the program.

In the last 3 years, formal applications for the MSPH and doctorate program have been received from 21 students, 17 were offered admission and 16 enrolled. One student dropped out of the program. Six students graduated from the program during this time period. (See Table 1 for students who graduated from the program for the last 3 years. Table 1 also list current employment for graduates of the program). Eighty seven percent of the program's graduates are now employed in the field of occupational safety and health. In the last 3 years, the program has not appointed postdoctoral fellows or provided continuing education courses.

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 Motiva Enterprises, Albemarle, and Viola, Inc.

The last industrial hygiene advisory board meeting was held on October 24, 2004. The board reviewed the curriculum and courses and made recommendations for changes. Members of the advisory board include: Dr. Wynn White, President, Wynn White Consulting, Baton Rouge, Louisiana, Dr. Monty Herr, Los Alamos Laboratory, California, Mr. Ezekiel Haslam, MSPH, CIH, Occupational Health and Safety Manager, Duke Energy, Charlotte, North Carolina, and Dr. Steven Levine, University Michigan (retired). A board meeting was not convened in 2005 due to Hurricane Katrina. We are in the process of planning another meeting/teleconference for review of the program. In addition to these members, we are seeking a representative from labor to serve as well.

Additional changes to the program include course instructors for two of the required courses. Dr. Ronald Goans now teaches the radiological health course. We now have Dr. He Wang, a new faculty member in the discipline area of occupational health/toxicology who teaches the Occupational Health course. With the small number of students in each class, the department of Environmental Health Sciences recently reviewed curriculum requirements for all degrees, including industrial hygiene, and recommendations to combine courses or offer courses every other year were approved (See Tables 3 and 4 for model curriculum and core faculty). With the addition of the new Council on Education in Public Health (CEPH), the program now requires more hours to fulfill requirements for graduation. Overall, the program content has remained the same. In addition, both of our IH programs (on-campus and distance learning) underwent review and were re-accredited by ABET through 2011.

The program has benefited from the Tulane/Xavier Joint Faculty Appointments Program (JFAP) and has been instrumental in breathing new life in the dual (BS/MSPH) degree program between the Department of Environmental Health Sciences, Tulane Health Sciences Center and the College of Arts and Sciences at Xavier University. This BS/MSPH program is a combined degree program that allows Xavier University undergraduate biology/premed majors 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 approximately 5 years, which is less time than it would take to complete each degree separately. During the senior year, undergraduate science majors take 10 credits of graduate level courses at the Tulane University School of Public Health and Tropical Medicine (TUSPHTM). These credits are taken as electives in their undergraduate course of study and are applied toward both the BS and MSPH degrees.

The recruitment and retention of minority students into the field of 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.

As a direct result of this relationship and proven track record for recruiting minority students, the Tulane industrial hygiene program was awarded the ABET Presidential Award in Fall 2005. In addition, in the accreditation report from the Accreditation Board for Engineering and Technology, Inc. (ABET), the Xavier/Tulane dual degree was commended as a "best practice" for effectively recruiting and graduating minority students in the field of industrial hygiene. In the past 8 years, 11 of the 31 graduates of the IH program were African-American.

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. Limited funding for minorities and disadvantaged students is currently available through Tulane's Financial Aid department; however, this small amount of funding is distributed to eligible students throughout most of Tulane's undergraduate and graduate programs. Many deserving, otherwise eligible students are thus unable to benefit from this funding source; therefore, the NIOSH funding that is allotted to our Industrial Hygiene students is instrumental in allowing them to further their educations.

The efficacy of the industrial hygiene masters degree program is evidenced by the successful placement of eighty seven 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.

The collaboration between Tulane and Xavier Universities has been a mutually-beneficial partnership, and it has led to numerous students matriculating into the BS/MSPH combined degree program throughout the years. This relationship, as well as the associations with Dillard University and Louisiana State University, has allowed the Tulane Industrial Hygiene program to prosper, despite the hardships and uncertainty that are presently faced by our society. The councils, such as the industrial hygiene advisory board, the environmental health sciences department faculty and CEPH, and the dedication of Drs. Grimsley and Rando are integral to providing the guidance and oversight that are vital in maintaining the department's high standards.

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 quickly becoming well known both nationally and internationally. Currently, there are 30 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 education 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: enhanced linkages between Tulane and Xavier University; established multidisciplinary research collaborations; created research opportunities for undergraduate students; and provided viable career options for science majors.

Students were recruited from Historically Black Colleges and Universities (HBCUs) in the New Orleans area for the most part. Because of our well-established joint degree program and Joint Faculty Appointment Program with Xavier University of New Orleans, as expected, most of the students matriculated from their biology and chemistry departments. This relationship was instrumental in increasing Tulane's industrial hygiene program enrollment.

One of the biggest hurdles for recruiting qualified students from undergraduate programs is their general lack of knowledge about industrial hygiene as a career path. Much of the recruiting target efforts and NIOSH scholarship funding have helped with increasing awareness of IH at the undergraduate level and in recruitment.

Publications and Presentations- None Supported by This Award

(NOTE: Trainee authors are highlighted in red)

Seo, S., Reponen, T., **Grimsley, F.**, Lee, T., Crawford, C., Iossifova, Y., Rao, C., Schmechel, D., and Grinshpun, S., "Laboratory and Field Evaluation of a New Method for the Sampling and Analysis of Fungal Fragments," American Industrial Hygiene Conference and Exposition Philadelphia, PA, June 6, 2007.

Bates, T., **Grimsley, L.**, Edgar, J., Relle, L., "Comparison of Fungal Spore Collection Efficiencies of Two Filter Collection and Two Spore Trap Collection Devices," American Industrial Hygiene Conference and Exposition, Philadelphia, PA, June 6, 2007.

Edgar, J., **Grimsley, L.**, Bates, T., Relle, L., "Evaluation of Fungal Spore Deposition on a Mixed Cellulose Ester Filter," American Industrial Hygiene Conference and Exposition, Philadelphia, PA, June 6, 2007.

Edgar, J., **Grimsley, L.**, Bates, T., Relle, L., "Relative Capture Efficiencies of Spore Traps and Filter Cassettes are Compared in HVAC Systems," American Industrial Hygiene Conference and Exposition, Philadelphia, PA, June 6, 2007.

Reponen, T., Seo, S.H., **Grimsley, F.**, Lee, T., Crawford, C., and Grinshpun, S.A., "Laboratory and Field Characterization of (1-3)- β -D-glucan in Aerosolized Fungal Fragments," The European Aerosol Conference, Salzburg, Austria, September 9-14, 2007.

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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).

Appendix - A

Table 1- Graduates of Program Last Three Years

Student Name	Date Entered	Date Graduated	Degree	
Erica Harris	Spring 2007	Fall 2008	MSPH/IH	
Enjoli DeGrasse	Fall 2006	Fall 2005	MSPH/IH	
Tanya Bates	Fall 2005	Sum 2007	MSPH/IH	
Ashton Grant	Fall 2004	Spr 2006	MSPH/IH	
Harold Sias	Fall 2004	Sum 2006	MSPH/IH	
Chirapa Hongsawat	Fall 2004	Fall 2006	MSPH/IH	

Table 2 – Current Students

Student Name	Date Entered Program	Status
Sheena Goodridge	Fall 09	Current
Danielle Majors	Sum 09	Current
Sasithorn Srimeechai	Spr 08	Current
Jocelyn Lewis	Fall 06	Current
John Edgar	Fall 06	Current
Janita Griffin	Fall 02	Current
Cheol-Woong Kwon	Fall 01	Current

Table 3 --

**INDUSTRIAL HYGIENE PROGRAM
MODEL CURRICULUM**

Course	Title	Credits
Year 1 - Fall		
*BIOS 603	Introductory Biostatistics	3
*SPHL 601	Biological Basis of Disease	3
ENHS 660	Principles of Toxicology	3
ENHS 662	Physical Agents as Occupational Health Hazards	3
ENHS 672	Principles of Industrial Hygiene	3
Total		15
Year 1 - Spring		
*EPID 603	Principles of Epidemiology	3
ENHS 659	Air Pollution	2
ENHS 714	IH Aspects of Plant and Process Operations	2
ENHS 750	Air Sampling and Analysis	3
ENHS 711	Industrial Ventilation and Hazard Control	3
ENHS 603	Survey of Environmental Health	3
Total		16
Year 1 - Summer		
ENHS 799	Practicum	0
Total		0
Year 2 - Fall		
*HSMG 603	Principles of Health Systems Administration and Management	3
*SPHL 603	Social & Behavioral Aspects of Global Health	3
ENHS 639	Radiological Health	2
ENHS 654	Occupational Health	3
ENHS 779	Seminar	1
	Electives	2
Total		14
Grand total		45

*Public Health Core Requirement

Suggested electives include:

- ENHS 650 "Toxic and Hazardous Waste Management"
- ENHS 657 "Institutional Environmental Health and Safety"
- ENHS 667 "Hazardous Site Assessment/Operations"
- ENHS 670 "Principles of Safety"
- ENHS 661 "Toxicology of Environmental Agents"
- ENHS 668 "Risk Communication"
- ENHS 762 "Health Risk Assessment"
- HEDC 620 "Worksite Health Promotion"

Table 4 – Environmental Health Sciences Core Faculty

ENHS Core Faculty	Area/Discipline
Roy Rando, Sc.D., CIH	Industrial Hygiene
Faye Grimsley, Ph.D., CIH	Industrial Hygiene
LuAnn White, Ph.D., DABT	Toxicology
Maureen Lichtveld, MD	Environmental Health
Assaf Abdelghani, Sc.D.	Environmental Health
Elizabeth James, Ph.D.	Management
A.J. Englande, Jr., Ph.D., P.E.	Environmental Engineering/Water Quality Management
Jeff Wickcliff, Ph.D.	Toxicology/Risk Assessment
Robert Reimers, Ph.D.	Environmental Chemistry/ Hazardous Waste Management
He Wang, Ph.D.	Toxicology/Occupational Health
James Balsamo, MPH, MHA, CIH, CSP	Safety