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FINAL PERFORMANCE REPORT

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SCHOOL OF PUBLIC HEALTH
SAN JUAN, PUERTO RICO 00936-5067

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Abstract

The occupational health MS Program at the University of Puerto Rico is geared to train industrial hygienists for the growing need of these professionals on the Island. Students are required to complete a 2-year curriculum comprised of an industrial hygiene core, supplemented by public health and environmental health courses. Thirty-three students completed the requirements for degrees during this project period with an average of 6.6 graduates per year. Important program objectives such as grant support to students, and improvement of laboratory and literature resources were achieved during this period. In this respect, NIOSH training grant program has had a significant impact in the quality of training on the program at the University of Puerto Rico.

Significant Findings (Summary)

The major accomplishments for the program during the time covered by this reporting period include:

1. A curriculum revision conducted during this period lead to the development of a new training program. The new program grants the degree of MS in IH rather than a MS in Environmental Health with concentration in Occupational Health. Significant training deficiencies were corrected with this strategy. These improvements respond to NIOSH recommendations over the past few years, and to an internal evaluation.
2. Thirty-three students completed the training program during this period. NIOSH support has been crucial in the training of these students. Near half of these graduates work for industry; and the rest are with government agencies, public corporations or consultants.
3. The major progress in the faculty area has been the contribution done by two adjunct faculty members. Significant improvements have been achieved in teaching areas such as ergonomics, safety and OH management. However, the addition of one or two regular faculty members at this time is a crucial aspect for the program.
4. Modest progress was done during this period in the area of laboratory equipment. Funding for this purpose was limited to add a limited number of basic IH laboratory pieces of equipment. A strategy developed during this period to get support from the University in a regular basis has begun to give some positive results.

Body of report with conclusions

Purpose and Program Characteristics

During the last decades many industries have established operation in Puerto Rico. These include among others, pharmaceutical, electronic, and refinery plants. Puerto Rico has one of the highest (if not the highest) density of pharmaceutical plants per land in the world. The 850,000 workforce is distributed through 40,000 workplaces. The Department of Labor (BLS) estimates that one out of every eleven Puerto Rican workers will suffer an injury or illness every year. This represents approximately 70,000 new cases every year. The need for training and research in industrial hygiene (and other occupational and safety areas) is demonstrated by this high injury and illness incidence rate among Puerto Rican workers. The IH Program at UPR is the only industrial hygiene training program on the Island.

Training Objectives and Goals

The industrial hygiene program at the University of Puerto Rico is geared to train industrial hygienists to supply the demand for this professional, particularly in Puerto Rico. It is expected that this professional will contribute to mitigate the high incidence rate of occupational injuries and illnesses among the Puerto Rican people.

Key objectives and goals for the program during this period focused on the following:

1. A curriculum revision to incorporate new areas of knowledge and actualize existent ones. The most important aspects of this revision were: (a) change to a new degree of Master in Science in Industrial Hygiene instead of Master in Sciences in Environmental Health with Concentration in Occupational Health in the present program; (b) removal of environmental health course not relevant to industrial hygiene (e.g. parasitology, food hygiene) and the addition of new courses in industrial hygiene; and (c) the substitution of the master thesis by an internship in industry.
2. To recruit sufficient number of students of the highest quality and provide to this trainees with an adequate financial support.
3. To improve laboratory and library resources to provide trainees with adequate methodological skills for industrial hygiene practice.
4. To maintain faculty participation at the highest level to be able to provide students with an adequate counseling and advising support.
5. To stimulate faculty research within the program through encouraging faculty to seek external funding for research.

Program Accomplishment and Progress

Curriculum. During this period the graduate training program evolved from an area of concentration in environmental health to MS in industrial hygiene. A new program was approved by the University authorities and will be initiated during next academic year. Recruitment of a new faculty member is necessary to fulfill the new program purpose and goals. Every effort is being made in order to identify funding to recruit this person. The new program is described below.

The training program is a graduate program and the trainees will be granted the degree of Master of Science in Industrial Hygiene. The MS curriculum contains nineteen (19) credit-hours in public health; eleven (11) credit-hours in environmental health, twenty-eight (28) credit-hours in industrial hygiene courses and related areas, and ten (10) credit-hours in electives courses. The training program has a duration of two academic years. Training is conducted by means of lectures, seminars, laboratory practices and field practices.

The following table presents the program curriculum:

COURSE		Trimester hours
PUBLIC HEALTH COURSES		
MEDU 6500	Core Course in Public Health	6
BIOE 6525	Statistical Analysis	5
EPID 6523	Methods in Epidemiology	4
SALP 6584	Administrative Aspects of Environmental Health Programs	4
ENVIRONMENTAL HEALTH COURSES		
SAAM 6528	Principles in Environmental Health	3
SAAM 6535	Environmental Toxicology	4
SAAM 6541	Environmental Health Law	3
SAAM 6529	Seminar in Environmental Health	1
INDUSTRIAL HYGIENE COURSES		
SAAM 6524	Principles in Occupational Health	3
SAAM 6543	Industrial Hygiene	4
SAAM 6548	Industrial Hygiene Laboratory	4
SAAM 6565	Occupational Health Hazards Control	3
SAAM 6529	Seminar in Environmental Health	1
EPID 6547	Occupational Epidemiology	2
SAAM ____	Industrial Hygiene Internship	6
SAAM ____	In-Plants Studies	2
SAAM 6547	Principles in Occupational Safety	4
ELECTIVES		10
TOTAL		68

Trainees. The following table presents the distribution of program graduates during the last five years (Project period).

<u>Year</u>	<u>Program Graduates</u>
1989-90	3
1990-91	7
1991-92	5
1992-93	10
1993-94	8
Total	33

The program has graduated thirty-three students during this period, with an average of 6.6 graduates per year. The vast majority of these graduates have remained in Puerto Rico; being industry the main employer for these professionals (see Appendix A).

Faculty. Program faculty has remained about the same throughout this period. This has been one of the major difficulties faced by the program. As it was mentioned before, every effort is being made to recruit at least one person at this time. The recruitment of this person is one of the top priorities at the School level. However, outside lectures have had an important role in teaching activities for specific IH topics. In addition, other faculty members from the Department of Environmental Health and from other departments of the School of Public Health contribute to the Program through teaching courses, supervising research projects and advising students.

The program faculty and adjunct faculty are as follow:

Jesus Gonzalez, Ph.D., Director of the Industrial Hygiene Academic Program and the NIOSH Training Grant Project is an industrial hygienist (Ph.D.) with background in analytical chemistry (B.S.) and environmental health (M.S). He provides leadership and supervision to the overall program activities. His research interest includes air sampling and analysis of the workplace, and health effects of environmental and occupational hazards. He joined the program in 1985 after he graduated from the University of Michigan. He is responsible for the Environmental Toxicology (SAAM 6535) and Industrial Hygiene (SAAM 6543) courses. He also has co-responsibility for the

Laboratory (SAAM 6548) and the Control of Occupational Health Hazards (SAAM 6565) courses. He plays an active role in almost all student research projects.

Porfirio A. Toledo, M.S. is an industrial hygienist with background in health physics (M.S.), noise and industrial ventilation. His research interest is in the area of physical hazards. He joined the program 1979. His major responsibilities are with the Laboratory in Industrial Hygiene (SAAM 6548) and the Control of Occupational Health Hazards (SAAM 6565) courses.

Carlos Villafaña, MD., is a board certified occupational physician that contributes 50% of his time to the program. Previous to joining the program he was at SKB Pharmaceuticals in Puerto Rico. His major research interest is in the area of health effects of occupational hazards. He is responsible for the Basic Principles of Occupational Health (SAAM 6524) course. He also advises students on their research projects, particularly those related to the health effect of occupational health hazards, and provides leadership in the area of occupational health for other School programs. Dr. Villafaña plays a critical role the continuing education effort in occupational health for physicians and nurses.

Norka Saldaña, Ph.D. is an ergonomics Engineer with background in industrial engineering. She is an adjunct instructor for the Safety Course (SAAM 6547) and lecturer for the ergonomics area in the Industrial Hygiene (SAAM 6543) and Control of Occupational Health Hazards (SAAM 6565) courses. At present she directs the Ergonomics Program at ETHICON (a Division of Johnson and Johnson Professional Co. in Puerto Rico).

Aileen Ocasio, Ph.D. is an industrial hygienist with background in chemistry. She is the second adjunct faculty, she lectures in the Industrial Hygiene (SAAM 6543) course. Currently, Dr. Ocasio is Manager for Health, Safety and Environmental Affairs for Eli Lilly Industries in Puerto Rico.

Equipment. Although the need for IH equipment still exists, some important pieces of equipment were added during this period. The acquisition of this equipment had an important impact on the IH laboratory course. The objective in this area was to acquire basic sampling and analytical equipment (personal sampling pumps, sound level meters, octave band analyzers, air flow calibrators).

The NIOSH training grant has played a critical role in the accomplishment of important program objectives. In this sense, NIOSH mandate of "...provide an adequate supply of qualified personnel to carry out the purpose of this (OSH) Act ..." is fulfilled. The training grant made possible financial support to a significant number of trainees. Other Important aspects of the training program were improved with grant funds: (1) computer and literature resources were enhanced during this period; (2) it was feasible for one member of the faculty to attend annually to AIHC during this period; (3) NIOSH support during this period made possible an appropriate participation of key adjunct faculty.

APPENDIX A Training Program Graduates During the reporting Period

<u>NAME</u>	<u>LAST KNOWN EMPLOYER</u>
Domingo Velázquez	Westinghouse, Atlanta
Iván Torres	Abbott Laboratories
María V. Cruz	P. R. Economic Development Administration.
Edna Saurí	Up-John Pharmaceuticals
Carlos Matos	Department of Natural Resources
Ana Olga González	Department of Education
Freddie De León	Environmental Quality Laboratories
Ilza Román	Department of Labor, Puerto Rico
Rafael Pérez	Department of Labor, Puerto Rico
Jeannette De Arce	Department of Labor, Puerto Rico
Iván Marrero	Wyeth-Ayerst
Ileana Martínez	Department of Labor, Puerto Rico
Ivelisse Avilés	Abbott Laboratories, Puerto Rico
Edgardo Aulet	Abbott Laboratories, Puerto Rico
Pedro J. Morales	Department of Health. Puerto Rico
Jessica Zayas	Medical Sciences Campus, UPR
Luis Santini	Motorola of Puerto Rico
Elizabeth Morales	Department of Labor, Puerto Rico
Janette Barbosa	Abbott Laboratories, Puerto Rico
Rosa E. Otero	Environmental Quality Board, Puerto Rico
Madeline Sepulveda	Environmental Quality Board, Puerto Rico
Jose J. Burrezo	Department of Health. Puerto Rico
Rafael Medina	Metropolitan University
Ada Y. Gomez	Unknown
Ana R. Rivera	Environmental Quality Board, Puerto Rico
Lilliam Colón	Schering Pharmaceuticals
Clariza Rodríguez	Abbot Laboratory
Zahira L. Vélez	Lederle Pharmaceuticals, Inc.
Zulma Toro	Oley Company
Brenda Huertas	Department of Labor (OSHO)
Wanda Torres	University of Puerto Rico
Miguel de Jesús	Allied Group. Inc.
Jesus M. Peña	Ochoa Environmental Services

