FINAL PROGRESS REPORT

Grants for Education Programs in Occupational Safety and Health: Long-term Training Project Grants (TPGs)

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Abstract

The industrial hygiene (IH) program at the University of North Alabama (UNA) was created in the mid-seventies in response to the passage of the Occupational Safety and Health Act of 1970. It is one of the first undergraduate programs of IH established in the nation and the only one of this type in the State of Alabama. The program offers the degree of a Bachelor of Science (or Bachelor of Arts) with a major in IH.

The IH curriculum is designed to prepare professionals for the comprehensive practice of IH. It is broad in scope and includes complementary education in the allied sciences of safety and environmental health. It also contains a very important component of chemistry courses, and offers, without the need of any extra coursework, the option of a double major in industrial hygiene and general chemistry.

The NIOSH Training Project Grant (TPG) awarded to the UNA IH program three years ago has brought positive developments and desirable results. By supporting academic scholarships and funding students' extramural activities, it has helped us in our recruitment effort. Enrollment of the IH program has increased by 65.6% in the last three years. The grant was also instrumental securing funding for the process initiated in the year 2002 for accreditation. It addition, it supported release time the program director used in the evaluation process for accreditation, and added value to our application as a NIOSH supported program. The IH program was accredited by the Applied Science Accreditation Commission of the American Board of Engineering Technology on August 15, 2003.

Since the academic year 1998-1999, a total of twenty five students have graduated with a double major in industrial hygiene and general chemistry and one with a major solely in industrial hygiene. Nineteen of these graduates currently hold positions in the field of environmental health and safety. From these, thirteen have been employed by local industry in the North Alabama region. Seven of the UNA graduates (since 1998-99) have applied and been accepted at graduate school programs.

Significant Findings

The main objectives of the initial NIOSH-TPG were twofold, increase the enrollment of the IH program and improve the quality of the academic offering. During the first three-year cycle of the grant, important advances have been made in these two fronts. The enrollment of the IH program has reverted from a negative to a positive, steadily increasing, trend. The increase has been important considering that in the last three years, the enrollment is up by 65.6% with respect to the fall of 2001, when the grant was awarded. An important recruitment incentive has been the NIOSH scholarship program. Currently, fourteen students are receiving a $1,000.00 a year scholarship that pays partially for their tuition costs. Scholarship recipients are IH majors, maintaining a GPA equal or greater than 2.7, and attending a chemistry or IH course every semester.

The recruitment effort is not complete without communicating the profession and educational opportunities available at the local and national levels. The NIOSH grant has provided funding for reaching out to local high school students through an annual program that has had the participation of more than 350 students in the first two years of its offering.

Assessment and evaluation of academic quality has been exhaustive during this triennial period. After the initial review of the NIOSH-designated Special Emphasis Panel, the program was thoroughly evaluated for academic accreditation, and then for renewal of the NIOSH-TPG. We have succeeded in each of these endeavors, with usually positive remarks about the quality of curriculum. A milestone was achieved when the IH program received ABET accreditation on August 15, 2003, becoming one of only five accredited programs at the bachelor level in the U.S. The process of evaluation was very successful, considering that the program was accredited for the maximum extension possible (6 years), without intermediate reporting requirements. Our commitment to maintaining the accredited status assures a recurrent process of evaluation and the timely correction of deficiencies if they are detected.

The external review process has fostered the creation of an outstanding advisory committee and the implementation of quality assessment tools that include questionnaires and surveys of the main program constituencies (alumni, employers, and students enrolled in graduate programs). In general, the results given by these assessment methods are very positive (see main body of the report).

Background

With the passage of the Occupational Safety and Health Act of 1970, the country saw an increase in the demand of safety and health professionals. In the early seventies, employment opportunities in Industrial Hygiene (IH) were plentiful and varied, and often encompassed all levels of professional responsibility, from technical support to managerial positions. During this period, the prominent source of IH education was at the graduate level, with programs usually offered in schools of public health or engineering. Graduate education however, was not always the best response to satisfy the varied demands of professional practice. A small number of undergraduate colleges and universities anticipated opportunities of intermediate responsibility and responded by establishing baccalaureate programs in IH. The University of North Alabama (UNA) was one of these institutions. It created its undergraduate program during the mid-seventies, and graduated the first students during the 1979-80 academic year (1). The original curriculum was developed under a collaborative effort between faculty members of the UNA Department of Chemistry and professional hygienists of the Tennessee Valley Authority (TVA). Since then, the program has undergone substantial review and change to reflect the trends of the profession and the expectations of prospective employers.

The University of North Alabama (UNA) is a regional university (enrollment of 5,970 students during the fall semester of 2004) located in the Northwest corner of the State of Alabama. UNA is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award bachelor's, master's and education specialist degrees. The IH program at UNA provides undergraduate education in the traditional and emerging disciplines of the field of industrial hygiene. The curriculum is broad in scope and includes complementary education in allied sciences such as safety and environmental science. The UNA industrial hygiene major is unique in the way it allows, without any additional coursework, the double major option in IH and general chemistry.

I. Industrial Hygiene Academic Program

a. Program Management

The industrial hygiene program is housed in the Department of Chemistry and Industrial Hygiene in the College of Arts and Sciences of the University of North Alabama. The Department of Chemistry and Industrial Hygiene offers majors leading to the Bachelor of Science or Bachelor of Arts degree in professional chemistry, general chemistry, environmental chemistry, and industrial hygiene. This department is one of the only seven in the State of Alabama that offers a degree certified by the American Chemical Society. Dr. Michael B. Moeller is the chairperson of the department and Dr. Crescente E. Figueroa is the director of the industrial hygiene program.

The Department of Chemistry and Industrial Hygiene has six full-time faculty members, two of them having direct responsibilities in IH education. The two faculty members with IH responsibilities both hold certification in the comprehensive practice of

industrial hygiene (CIHs). In addition to full-time faculty, adjunct faculty and lecturers are brought in to teach specific topics on environmental, occupational health and safety issues.

Funding for the academic departments at the University of North Alabama is derived from the institutional budget through the Vice President for Academic Affairs and Provost and the appropriate deans. Institutional funds are primarily obtained from state appropriations, tuition and fees, and from a variety of gifts and grants.

The IH Program Director manages the program. He advises the chairperson on issues concerning the planning, operation, and track of the academic agenda and assures that proper actions are taken to fulfill the short and long-term expectations of program constituencies. The program director plays an essential role in recommending goals and objectives, curriculum changes, resources, quality assessment tools, and program strategies. For example, the IH program director evaluates monetary needs and makes annual requests for budget allocations to the department chair. The requests include funding for equipment, supplies, faculty development, and equipment maintenance.

Curriculum changes are initiated by recommendations made by faculty, members of the IH Program Advisory Committee, alumni, or employers of program graduates. Changes have also been made to bring the curriculum into compliance with guidelines for accreditation of Applied Science Accreditation Committee of the Accreditation Board for Engineering and Technology (ASAC-ABET). Any proposal concerning changes of the curriculum must be reviewed and approved in sequence by the following: members of the IH Program Advisory Committee; the Department of Chemistry and Industrial Hygiene; the Arts and Sciences Curriculum Committee; and the UNA Curriculum Committee.

b. Program Characteristics

The program leads to a Bachelor of Science or a Bachelor of Arts in industrial hygiene. This program contains a major component of chemistry courses, and offers, without the need of any extra coursework, the option of a double major in general chemistry and industrial hygiene. This is the only undergraduate program of IH offered in the State of Alabama, and considering its characteristics, it probably is a unique option in the Southeast region of the U.S.

The university is located in a geographical area of significant industrial activity with a great potential for further expansion and development. Important national and international companies have chosen this region for expanding their operation structure attracted by abundant and reasonably priced energy (hydro, fossil, and nuclear), economical incentives, and low costs of living. Newcomers are diversifying and possibly changing the economy of this region, which is becoming less dependent on the production of consumable goods and more oriented to the manufacture of complex, highly valued, durable products.

During the last five years, 13 graduating seniors with IH degrees have found permanent employment in the field of environmental health and safety with local companies, and another 6 have found employment in the region. Considering the level of industrial expansion observed recently in the local area, it is reasonable to expect that the demand for occupational health professionals will remain steady or even increase.

c. Program Objectives

The primary objective of the program is to prepare students for the comprehensive practice of industrial hygiene (IH) and for graduate studies in environmental health and safety. Secondary objectives are to provide supporting education for academic programs of environmental chemistry and environmental biology and to contribute to the advancement of the profession through applied research and service.

The primary and secondary objectives are met by providing:

a. A solid foundation in general sciences to support and broaden the understanding of principles of industrial hygiene and occupational health.
b. A systematic and general approach to problem solving that is applicable not only to IH but also to all disciplines of environmental health and safety and that includes the phases of anticipation, recognition, evaluation, and control.
c. Comprehensive education and training in core disciplines of industrial hygiene with additional learning of basic principles of environmental health and occupational safety.
d. Practical experience by laboratory and field activities, case studies, applied projects, and interaction with field professionals.
e. Opportunities for participation in industrial internships consultation activities, and applied research.
f. A genuine interest in professional service and advancement that is demonstrated by adherence to the Code of Ethics of the IH profession and by pursuing continual learning through self-studies, graduate education, and professional certification.

These objectives are consistent with the purpose, role, and goals of the University of North Alabama as described in the University Catalog.

d. Program Curriculum

The following is a list of the requirements of the industrial hygiene general chemistry major. Semester credit hours are given in parenthesis.

General Studies Component (required of all students)

Written Composition
EN 111 (3) Freshman Composition I.

EN 112 (3) Freshman Composition II.

Humanities and Fine Arts

EN 231 (3) Literature of the Western World I.
EN 232 (3) Literature of the Western World II.
COM 201 (3) Fundamental of Speech.
3 semester hours (1 course) selected from:
Art Appreciation, Art History, Foreign Languages, Music Appreciation, Art History, Foreign Languages, Music Appreciation, Philosophy, Theatre, or New Testament.

History, Social and Behavioral Sciences.

HI 101 (3) Survey of World Civilization to 1500 and
HI 102 (3) Survey of World Civilization since 1500, or
HI 201 (3) United States History To 1877
HI 201 (3) United States History Since 1877

6 semester hours selected from courses (2 courses) selected from:
Principles of Macroeconomics, Principles of Microeconomics, Human Growth and Development, World Regional Geography, Human Geography, US Government and Politics, General Psychology, or Introductory Sociology.

Major Core Requirements

Industrial Hygiene, Safety and Environmental

IH 301 (3). Fundamentals of Occupational Health and Safety.
IH 310 (3). Industrial Ergonomics.
IH 322 (3). Industrial Hygiene Problems.
IH 333 (3). Industrial Toxicology.
IH 411 (3). Industrial Safety.
IH 422 (4). Airborne Hazards (includes laboratory).
IH 444 (4). Sampling Methods in IH (includes laboratory).
IH 490 (3). Special Topics in Occupational Safety and Health.
Students must select one of the two courses listed below:
Hazardous Waste Operations and Emergency Response.
Management of Safety and IH programs.

Environmental science. Students must select one course of the following:
CH 460 (3). Aquatic Chemistry.
CH 465 (3). Environmental Regulations.
CH 470 (3). Atmospheric Chemistry.

Chemistry

CH 111 (3). General Chemistry I.
CH 111L (1). General Chemistry I Laboratory.
CH 112 (3). General Chemistry II.
CH 112L (1). General Chemistry II Laboratory.
CH 311 (4). Organic Chemistry I.

CH 311L (1). Organic Chemistry Laboratory.
CH 312 (4). Organic Chemistry II.
CH 312L (1). Organic Chemistry II Laboratory.
CH 321 (2). Quantitative Analysis.
CH 321LW (2). Quantitative Analysis Laboratory.
CH 322 (3). Instrumental Analysis.
CH 322LW (2). Instrumental Analysis Laboratory.
CH 341 (3). Applied Physical Chemistry.
CH 341L (1). Applied Physical Chemistry Laboratory.

Prescribed Supporting Courses

Biology
BI 111 (3). Principles of Biology.
BI 141 (4). Human Anatomy and Physiology I (includes laboratory).
BI 142 (4). Human Anatomy and Physiology II (includes laboratory).
BI 307 (4). Microbiology (includes laboratory).

Mathematics and Statistics
Select the sequence MA 121 and 122 or MA 125.
MA 121 (3). Calculus for Business and Life Sciences I.
MA 122 (3). Calculus for Business and Life Science II.
MA 125 (4). Calculus I.
MA 147 (3). Elementary Statistics.

Physics
PH 125 (5). Technical Physics I (includes laboratory).
PH 126 (5). Technical Physics II (includes laboratory).

Computer Science
Selects one of the following:
CS 110 (3). Introduction to Computers.
CS 120 (3). Intermediate Computer Topics.
CS 155 (3). Computer Science I.

Electives
Recommendations for electives include Biophysics (BI 402), Technology and the Environment (ES 375) or Research in IH (IH 495).

e. Internships, Practicum and Interdisciplinary Experiences

The program does not require a mandatory practicum. We recognize the value of this experience and the benefits that derive from it and advocate its inclusion as an integral component of the education experience. Unfortunately, the number of our current co-op /interns opportunities, which are all paid positions, is not enough to serve all IH students enrolled in the program. Currently, with the help of our alumni, we are trying to expand the offerings by articulating agreements with new companies. In addition, the program faculty in combination with the Advisory Committee is working to identify viable paid/unpaid options. At the present date, three standing cooperative programs offer employment to a total of six students. Summer internships complement the range of

opportunities in a variable number, depending on the specific needs of companies. During the summer of 2004, two students were hired by regional companies.

The program offers several opportunities for interdisciplinary experiences either, for complementary education (minor or double majors) or for additional courses beyond the minimum program requirements. The Department of Chemistry and IH now offers an environmental chemistry option that with little extra coursework can bring a valuable addition to the IH degree. The Department of Physics and Earth Science offers a degree in geology, with courses that can be useful for those considering work in the environmental field. The School of Business offers two minor options, management and business administration, which could be appropriate for an industrial hygienist.

Concerning inter- or intra-department collaboration, we have succeeded in combining resources of the industrial hygiene laboratory and the instrumental analysis laboratory for practices that consider an integrated approach to air sampling. For some experimental activities in ergonomics, we have obtained the cooperation of the Physical Education Department for the use of the Exercise Physiology Laboratory. In an effort to integrate resources available in the North Alabama area, we established a contract with the Bevil Center for Environmental Technology (part of the North West Shoals Community College) to assist in teaching a course in hazardous waste operations and emergency response. The equipment used for this training belongs to the Bevil Center and the training site used for the scenarios is part of the TVA training facilities.

The majority of the classes offered in the program include field activities that are conducted at local companies or in campus facilities such as the maintenance building. This arrangement represents an excellent addition to our laboratory practices and a good opportunity for serving employers and workers in the community. Over the years, students have conduct evaluations of exposures to chemical and physical agents, indoor air quality parameters, performance of engineering controls, and ergonomics risk factors. The course IH 322 (IH problems) includes a full session of noise monitoring, IH 310 (industrial ergonomics) two sessions of recognition and control, IH 422 (control of airborne hazards) two sessions on the evaluation of a multi-branched local exhaust ventilation system, and IH 444 (air sampling) two sessions of air sampling of chemical agents. The course IH 411 (industrial safety) requires that students develop a safety program concerning two particular OSHA regulations, which should be applied preferably, to a real industrial situation.

f. Undergraduate Research and Service

The Occupational and Environmental Health Laboratory (OEHL) is a unit administered by the director of the Industrial Hygiene Program. The main objective of the OEHL is to conduct applied research in occupational health and safety. A secondary objective of the OEHL is to provide consultation and service to local industry and the university community. The OEHL was active in consultation services few years ago. These services are now limited, probably due to a more competitive local market. The OEHL has switched its emphasis to research and has been successful obtaining funding grant opportunities. In all of these activities (consultation and/or research) the

participation of students has been ample and of great value. They have contributed with quality work and valuable insight of the overall process. In return, they have acquired experience, knowledge, interest in the field, and a modest salary for service rendered. The following is a list of the projects in which several IH students have participated.

a. University of North Alabama, College of Arts and Sciences Research Grant. Comparison of Methods for Personal Sampling of Inhalable and Total Iron- and Lead- Containing Aerosols in a Foundry Operation. Figueroa C., Olive B., and Weisenseel J (January 2001). Total contribution to this project: $3,290.00

b. University of North Alabama, College of Arts and Sciences Research Grant. Size-Selective Sampling Applied to the Evaluation of Wood Dust Exposures. Total contribution to this project: $8,280.00

c. Deep South Center for Occupational Health and Safety, UAB School of Public Health. Comparison of Methods for Personal Sampling of Inhalable and Total Iron- and Lead- Containing Aerosols in a Foundry Operation. Weisenseel J., Figueroa C., Total contribution to this project: $13,000

g. Tools for Quality Assessment

The following assessment tools are in place and used for the assessment of the quality of training and objective compliance.

- Course evaluations
  Students evaluate course contents, instructional methods and supporting materials by completing a standard questionnaire given at the end of each semester (tenured faculty receive evaluations every other year, in IH every semester).

- Exit exams
  Graduating IH seniors take two comprehensive exit exams during the last semester at UNA. One exam is the Major Field Test Chemistry II (Educational Testing Services, Princeton, New Jersey) and the other is a comprehensive exam in IH. The IH exam was created by the UNA IH faculty as recourse due to a lack of a national, independent assessment tool for industrial hygiene.

- Employers surveys
  Employers or direct supervisors are surveyed on their level of satisfaction concerning the UNA IH hires. New employers are contacted six months after initiating the contract.

- Graduate student surveys
  Students enrolled in graduate programs are surveyed on their perceived level of preparation for graduate studies.

- Internships evaluations
  Supervisors are asked to submit an evaluation of student's performance at completion of every appointment.

- Employment and professional certification
  Records of placement and certification are maintained by the program director.

h. Training Facilities and Resources

The University offers multiple resources that contribute to the educational process and facilitate general living activities. The University Center houses a bookstore, a cafeteria, an educational resource center, and multiple meeting rooms. The University Library offers a large collection of books, journals and documents (see summary below), and the access to computer terminals. In addition to the computer center at the library, there are at least two other centers where students have access to computers and the internet. The Chemistry and IH Department has a total of eleven chemistry laboratories, with two of them dedicated exclusively to industrial hygiene activities. The department also has a computer laboratory with twelve desktop personal computers (Gateway E-3200), that are available to the students of the chemistry and IH program.

Library resources

The UNA libraries currently house more than 340,000 cataloged volumes, an estimated 2,000 uncataloged government documents, and a microforms collection numbering more than 936,000 physical units. There are also 8,300 audiovisual materials, 160 machine readable items, and 3,800 maps, photographs, games and other materials. The libraries subscribe to 1,336 non-duplicated series titles and contain more than 67,000 bound volume of serials. Supplementing these serials subscriptions are several online database systems, e.g. EbscoHost, INFOTRAC, PROQUEST, the American Chemical Society Publications, as well as SCIENCEDIRECT. In addition, the library's homepage at http://www2.una.edu/library provides links to a growing number of full-text electronic journals and other Internet-based information sources through its Internet Resources Collection. Through UNA's participation in the Network of Alabama Academic Libraries (NAAL), the Southeast Library Network (SOLINET), the Online Computer Library Center (OCLC), and through utilization of online services such as OVID resources can identified and access via interlibrary loans. These services are provided free of charge to UNA faculty, staff, and students. The library system also provides in-house access to the full resources of the Internet through 70 public-use, networked computer workstations and fast laser network printers.

The library collection in industrial hygiene and related disciplines consist of approximately 960 book titles and 91 journal holdings (print and electronic format).

II. Accomplishments (with emphasis in the last three-year period)

The objective of our initial application for the NIOSH TPG was twofold. The grant was sought after to improve the enrollment figures of the UNA IH program, which were in decline, and to continue the process of quality improvement of our academic offering. The results and progress in relation to these two objectives are discussed hereafter.

a. Program Enrollment

The number of industrial hygiene majors in both the fall and spring semesters is presented in a tabular form below.

Table 1. Student Declaring IH as Academic Major, Fall Semester

Semester	IH Majors
1998f	20
1999f	19
2000f	14
2001f (NIOSH TPG Granted)	18
2002f	20
2003f	29
2004f	30

Table 2. Students Declaring IH as Academic Major, Spring Semester

Semester	IH Majors
1999s	18
2000s	16
2001s	17
2002s	19
2003s	26
2004s	29

The trend observed in the numbers of students majoring in industrial hygiene is encouraging; the rate of declining was turned around, transforming it into a steady rate of increase for the last three years. The increase has been important, if we consider that in the last three years, the enrollment has improved by 61.1% (taking as a base of comparison the enrollment during the fall semester 2001).

Undoubtedly the NIOSH TPG contribution to academic scholarships ($1,000 a year per student) has been effective for improving the IH enrolment and for recruiting qualified students into the program. The number of NIOSH academic scholarships awarded by the department has increased steadily over the three-year cycle, to reach the current rate of 14 awardees per year. At 14 scholarships per year we have achieved a cap (considering our current budgetary grant allocations) and therefore, the selection process from now on will

become increasingly competitive. The number of scholarships awarded in the last three and the current academic year is given in the table below.

Table 3. Number of Students Receiving NIOSH Academic Scholarships

Year	IH Scholarship, NIOSH
01-02	7
02-03	11
03-04	13
04-05	14

The recruitment effort has been directed to college students and most notably, to high school juniors and seniors who are considering possible career decisions. To reach high school candidates, the department has held for the last two years, a program we have entitled "Chemistry and Industrial Hygiene Day." At this event, regional high school students enrolled in chemistry courses are invited to the UNA campus to attend a series of demonstrations, hands on activities, and presentations of the academic programs offered by the department. The National Institute for Occupational Safety and Health, the American Chemical Society, the Office of the Vice President for Academic Affairs at UNA, and Southern Environmental Testing (local company), have helped offset the costs associated with this program. So far, more than 350 high school students have attended this program. Records of participants are gathered by means of a drawing for door prizes, and then entered in a database we created for monitoring the success of this program. In addition, the IH program director participates in the regular, university-wide, scheduled recruitment activities.

b. **Program Quality Assessment and Improvement**

A long-term objective of the IH program was seeking academic accreditation. We valued the process of accreditation as an opportunity for an in-depth peer-review evaluation, with success representing a benchmark for quality, and maintenance of status, as a continuous commitment for self-improvement. The intent for application was postponed by the university administration several times for financial reasons, until the decision to move forward became final in the year 2001.

After a demanding and extensive process of review and evaluation, the Industrial Hygiene (IH) Program at the University of North Alabama became accredited on August 15, 2003. The UNA IH program became the sixth baccalaureate program in IH to receive accreditation from the Applied Science Accreditation Commission of the Accreditation Board for Engineering and Technology in the U.S. The accreditation process was very successful, considering the positive assessment of the curriculum (no deficiencies, weaknesses, or concerns were found concerning this component), and the extension given for re-accreditation, which was the best possible outcome (6 years), a rare occurrence for a first time application. In a written statement of ASAC-ABET, the following was said about the academic program:

"A unique and innovative strength of the Industrial Hygiene program is that it is part of a dual track industrial hygiene-chemistry major. The students who complete this rigorous program form a close-knit group and radiate pride in their program that is unusual for an academic program."

We truly believe that our previous success with the application to the CDC-NIOSH influenced and encouraged the support of the university administration for the accreditation process. The NIOSH TPG largely funded the release time needed by the program director for the preparation of the self-study report and the evaluation visit. The NIOSH TPG was also a valuable addition to the records presented to ABET evaluators who looked at this accomplishment very favorably.

The applications for academic accreditation and NIOSH TPG renewals have influenced our methods for managing data and have demanded more effective quality assessment tools. Assessment methods currently in place are listed in section I-g of the program description section. Highlights of their application are given hereafter.

Surveys of alumni and employers are positive. Supervisors of IH graduates responding to a survey sent in the summer of 2002, strongly agreed or agreed with a positive assessment of the level of preparation, knowledge and professional proficiency of our graduates during their first year of employment.

The 2004 UNA industrial hygiene alumni survey was sent to twenty-six industrial hygiene majors. Twelve responded to the survey, for a response rate of 46.2%. When asked to rate their experience at UNA in different areas, responders rated their laboratory skills at an average of 4.50 (standard deviation, sd = 0.52), their instrumentation skills at 4.42 (sd = 0.67), and their preparation in industrial hygiene at 4.50 (sd = 0.67), on a scale from 1 to 5, with 5 as best. Concerning specific components of industrial hygiene science, they rated their preparation for the recognition of health and safety hazards at 4.82 (sd = 0.40), toxicology at 4.09 (sd = 0.54), evaluation methods at 4.91 (sd = 0.50), control methods at 4.64 (sd = 0.5), ergonomics at 4.09 (sd = 0.54), industrial safety at 4.45 (sd = 0.52), environmental compliance at 2.64 (sd = 0.81), and indoor air quality at 3.73 (sd = 0.79). The statement "My bachelor education contributed significantly to the skills needed for conducting my present job," received an average rating of 4.58 (sd = 0.79).

Students enrolled in graduate programs responding to a survey sent in the summer of 2002, strongly agree with a positive assessment of the appropriateness in the level of preparation received at UNA for graduate studies.

Professional accreditation as Certified Industrial Hygienist (CIH) and Certified Safety Professional (CSP) is granted with at least five years of professional practice, strict adherence to the code of ethics of the profession, and approval of a comprehensive exam. Our records indicate that from the graduates of the last 10-year cycle, seven hold a CIH designation, and nine a CSP designation.

c. Graduation Outputs and Placement Records

Since 1998-1999, a total of twenty five students have graduated with a double major in chemistry and industrial hygiene and one with a major in industrial hygiene. The following is the annual number of graduates from the program:

Table 4. Industrial Hygiene Graduates, University of North Alabama

Academic Year	Number of Graduating Seniors
1998-1999	3
1999-2000	6
2000-2001	4
2001-2002 (NIOSH TPG granted)	6
2002-2003	3
2003-2004	4
2004-2005 (expected number)	6

Our placement records show that 19 of these graduates hold positions in the field of environmental health and safety. From these, 13 have been employed by local industry (North Alabama area). Some of the local employers are BE&K contractors, Boeing, TVA Atomic Chemistry Laboratory, E. Roberts and Alley Associates, AJT & Associates (NASA/MSFC Medical Center), Mid South Testing, and TVA Brown's Ferry Nuclear Plant. The rest of the graduates are serving positions in the Air Force (1), chemistry (1), production management (1), graduate school (3), and unemployed (1).

d. Graduate Education

UNA IH students have been successful applying to graduate programs. Five students have applied and been accepted to graduate programs in IH in the last three years. From these, two have received scholarships from the American Industrial Hygiene Foundation (AIHF), and three have received the Vernon Rose, UAB School of Public Health, scholarship. Seven students completed graduated studies at the master level and one at the doctoral level during the last three years.

After our program became accredited, the undergraduate program at UNA and the graduate program at the University of Alabama in Birmingham (UAB) subscribed an agreement that would allow students with bachelor degrees in IH complete graduate studies at the Master's level in four to five semesters. Currently, three UNA graduates are taking advantage of this accelerated option.

e. Extramural Activities

Graduating seniors have had a valuable experience attending the American Industrial Hygiene Conference and Exposition (AIHCE). Three senior students attended the 2002 AIHCE in San Diego, California; three attended the 2003 AIHCE in Dallas, Texas; and six the 2004 AICHE in Atlanta, Georgia. The cost of attendance (trip,

subsistence, and registration) was paid by the NIOSH-TPG. Students at all levels are also invited and encouraged to attend local seminars and professional meetings with travel costs and participation fees paid by the NIOSH-TPG.

f. Speakers and Lecturers

Practicing professionals with expertise in specific areas of environmental, health and safety are invited to participate as lecturers to supplement content areas of the curriculum. The speakers and lecturers either have terminal degrees, professional certification (CSP, CIH), or significant experience and knowledge in the subject matter. Approximately seven different experts contributed with presentations lasting from 1 to 1.15 hours in length during the last year. The lectures receive a small contribution of $50.00 each from a line item of the NIOSH-TPG

List of Publications Resulting From the Grant

Due to its type, this grant did not generate any research publications.

III. Final Remarks and Conclusions

Through its existence, the IH program at the University of North Alabama has provided quality education and produced a sizable number of graduates in the field of industrial hygiene. However, low enrollment and cuts made in the state appropriations for higher education in Alabama were hindering our ability to continue the path of growth and threatening the viability of this program. Our response was oriented to increase enrollment by offering a program of recognized quality. During the first three-year cycle, the NIOSH TPG grant is impacting positively our enrollment, which shows a steady upward trend. Similarly, the number of students applying for and receiving academic scholarships has also increased during this same period.

The NIOSH-TPG favored our success securing accreditation. We now have greater advantage for recruiting students, especially those from outside this geographical region. Extramural activities, which are largely paid by the grant, enhance the overall educational process and increase the interest of students in the subject matter. Our commitment to maintaining the accredited status brings new challenges with a substained effort for maintaining and improving quality. We face a busy schedule ahead when we switch the quality assessment criterion from the conventional curriculum-based to an outcome-based mode. This task is demanding and time-consuming and will take years for completion. However, the benefits that derive from continuous reassessment, implementation of corrective measures, and the involvement of program constituencies in the establishment of goals and objectives cannot be overstated.