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A GRADUATE CERTIFICATE IN ENVIRONMENTAL AUDITING

RALPH H. KUMMLER, COLLEEN HUGHES, JAMES H. MCMICKING
Wayne State University • Detroit, MI 48202

The fundamental concepts of the relatively new profession of Environmental Auditing provide corporate America with the self-policing tools necessary to insure compliance with the myriad set of complex environmental laws and regulations that apply at the federal, state, and local levels. A great deal of formal guidance on how to accomplish the auditing task is available, ranging from textbooks and journal articles to professional associations and Environmental Protection Agency's (EPA) guidance documents.[1] The field has come a long way since the Securities Exchange Commission (not EPA) originally decided that environmental liability had become too large to be ignored on the corporate balance sheet.

Today, environmental auditing guidance documents are even available from the Federal National Mortgage Association, the Federal Deposit Insurance Corporation, and the Resolution Trust Corporation, illustrating how pervasive economic environmental concerns have become.

After years of drafting by hundreds of environmental professionals, ASTM's (American Society for Testing Materials) Committee E-50 on Environmental Assessment issued standards for Phase I (E-1527) and transaction screen assessments (E-1528). Internationally, the International Standards Organization has given notice that there must be global environmental management standards similar to the ISO 9000 quality certification standards that multinational companies are working feverishly to attain.[2] The new standard will be called ISO 14000 when it is issued in 1996; it will set forth a voluntary guidance and certification program so that corporations will be implementing a single, general environmental management system independently from the countries in which they operate.

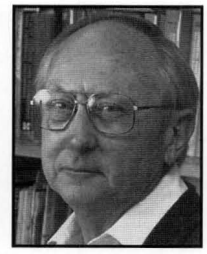
Like ISO 9000, ISO 14000 will be voluntary, but it is expected to quickly become a defacto trade requirement, supplanting differing environmental management systems[3] country by country. Environmental consulting companies wishing to participate in auditing multinationals may even have to qualify for ISO 9000 certification before being certified for ISO 14000.

In the U.S., we are still wrestling with the advantages and disadvantages of environmental auditing; the EPA can and has used a company's self-auditing to impose large fines. Because this seems intrinsically unfair and might actually inhibit auditing, some states have passed laws that would protect a company's self-evaluation as privileged information when it voluntarily performs an audit.[4] In one state, a company that discloses problems found in its audits can escape fines and prosecution by quickly correcting the failings. Even with such fundamental controversy, major corporations understand the benefits of continuing to audit, sometimes auditing under the advice of legal counsel, which provides some attorney-client protection.

At Wayne State University we have concluded that Envi-

Ralph H. Kummler *received his BS from Rensselaer Polytechnic Institute and his PhD from John Hopkins. He is Professor and Director of Hazardous Waste Management Programs in Chemical Engineering at Wayne State University and served as the Chair of Chemical Engineering for nineteen years. His research interests include air, water, and multimedia environmental engineering.*

Colleen Hughes *received her BS and MS in Chemical Engineering and her MS in Hazardous Waste Management from Wayne State University. She is currently studying for her PhD in chemical engineering, also at Wayne State University.*



James H. McMicking *received his BS and MS from Wayne State University and his PhD from the Ohio State University. He is Associate Professor and Associate Chair of chemical engineering at Wayne State University.*

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GRADUATE CERTIFICATE PROGRAM

Wayne State University, through its interdisciplinary programs led by the chemical engineering faculty, created a Graduate Certificate in Hazardous Waste Control and a Master of Science in Hazardous Waste Management in the late 1980s.[5] These programs were among the first of their kind in the United States and provided badly needed focused education for students in the Detroit metropolitan area. The demand for these courses has been great, as illustrated by the enrollment trend (shown in Figure 1) that documents the total number of people who have been involved in the Hazardous Waste Management Program. The Figure shows the total number of participants from 1984 to the year given on the graph.

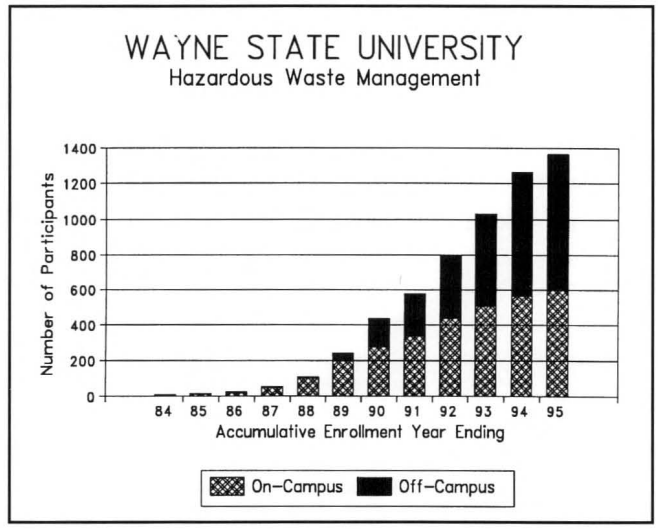

Figure 1. *Total participants at the end of each academic year.*

TABLE 1
Master's-Level Hazardous Waste Management Programs in the United States

- ▲ Idaho State University • Pocatello, Idaho
- ▲ University of Idaho • Moscow, Idaho, and Idaho Falls, Idaho
- ▲ National Technological University • Fort Collins, Colorado
- ▲ New Jersey Institute of Technology • Newark, New Jersey
- ▲ Southern Methodist University • Dallas, Texas
- ▲ Tufts University • Medford, Massachusetts
- ▲ Wayne State University • Detroit, Michigan
- ▲ University of Findlay • Findlay, Ohio
- ▲ University of San Francisco • San Francisco, California

As can be seen in Table 1, there are now nine such programs at the Masters level in the United States.[6] The University of California has an extensive, but noncredit, certificate program, operated on an open-enrollment system, and the University of Findlay has developed a BS program in Hazardous Materials Management along with an undergraduate Certificate Program.

These programs focus on the science underlying hazardous materials, on control strategies for eliminating problems, on the laws, regulations, and policies that underlie the administration of these programs throughout the United States and in Michigan, and on public affairs associated with the field. Thus, students gain the fundamental background necessary to practice in this dynamic, burgeoning field.

As a result of a United States Department of Health and Human Services contract[7] under which we had the opportunity to visit and evaluate the leading U.S. universities in this field, we found that there was a gap between the theoretical understanding of the fundamentals of the field and the actual practice of industry and consultants. The environmental profession has been deeply involved in creating a new methodology for implementing compliance with the new environmental practice. A new field has emerged; the best description of that field is Environmental Auditing. The new Environmental Auditing practitioner has the responsibility for evaluating corporate effectiveness in insuring that environmental laws and regulations are being observed in the company's plants and facilities or in facilities under current or proposed contracts for waste handling and/or disposal. The skills and tools of the environmental auditor are not presently required in any traditional degree or certificate program, but have been refined through a decade of professional practice.

In the fall of 1995, the Wayne State University Board of Governors recognized a collection of our existing courses as a new Graduate Certificate in Environmental Auditing. It will complement our existing Graduate Certificate in Hazardous Waste Control and should be of great interest to those who have gone through that program as well as to more advanced practitioners. It will also appeal to a broader segment of our society than the original industrial target audience because the banking, real estate, and insurance industries have also become totally committed to environmental

auditing. In addition, it will comprise an elective set of courses for those students who are taking the Master of Science program and will further encourage the completion of the Master's program. While the new certificate will act as a feeder to the MS program in Hazardous Waste Management, it will also support existing MS programs in chemical engineering, civil engineering, and occupational and environmental health sciences, as well as PhD programs in biology and engineering.

PROGRAM DESCRIPTION

Admissions Standards

The program is open to those students with a baccalaureate degree in engineering, chemistry, biology, physics, health or natural science, geology, or the equivalent who can meet the general graduate admission requirements of the university.

Mode of Delivery

In addition to traditional on-campus and extension or satellite campus offerings, the Graduate Certificate Courses in Hazardous Waste Management have been offered through the Michigan Information Technology Network via satellite TV and are being offered in a short course mode throughout the United States in cooperation with the Hazardous Materials Control Resources Institute (HMCRI), Thiokol, Environmental Quality (EQ), the U.S. Department of Interior's Bureau of Land Management (BLM), and the Engineering Society of Detroit.

Program Requirements

The required (semester credit) courses are:

- Introduction to Hazardous Waste Management (2 credits)
- Law and Administration in Hazardous Waste Management (2 credits)
- Fundamentals of Environmental Auditing (2 credits)
- Risk Assessment (3 credits)
- Real Estate Assessment (2 credits)

Four credits must be taken from the following initial set of elective courses (more courses may be developed as the demand is created):

- Chemical Process Safety (3 credits)
- Locational Issues in Hazardous Waste Management (3 credits)
- Air Pollution Control Management (2 credits)
- Insurance and Risk Management for Environmental Liabilities (2 credits)
- Facilities Compliance Auditing (2 credits)
- Principles of Environmental Sampling (2 credits)
- Hazardous Waste Laboratory (2 credits)

At least one course must be taken at the graduate-only level.

BRIEF COURSE DESCRIPTIONS

◐ Introduction to Hazardous Waste Management (2 credits)

Prerequisite: senior standing in engineering, biological or physical sciences with calculus and organic chemistry. An overview of the field, including the fundamental science, review of the Federal laws that apply, and the technology to minimize and control waste production.

◐ Law and Administration Issues in Hazardous Waste Management (2 credits)

Prerequisite: senior standing. Management guidelines for industrial waste control including: cradle-to-grave concepts, Resource Conservation and Recovery Act (RCRA), Superfund, the Solid Waste Disposal Act, identification, modification, reporting, standards, and permits and rules, using the Code of the Federal Regulations (CFR's) as text material.

◐ Fundamentals of Environmental Auditing (2 credits)

Prerequisite: Law and Administration. This course will provide environmental auditing skills and techniques fundamental to this new profession. The course will benefit students in the field as well as practicing auditors who want to learn the pedagogy of the field and codification of the techniques. Managers who are responsible for environmental affairs may also wish to take this course in order to design their auditing programs. A suitable textbook is *Environmental Auditing*, by J. Ladd Greeno of Arthur D. Little. The students will learn the types of audits, audit program design, audit protocols, pre-audit activities, the conduct of audit interviews, understanding management systems, assessing internal controls, verification techniques and strategies, evaluation of audit results, and the conduct of reporting audit findings.

◐ Air Pollution Control Management (2 credits)

Prerequisite: Introduction to Hazardous Waste Management. Covers the elements of air pollution control management as dictated by the 1990 Clean Air Act Amendments and related state and local legislation and prepares the practitioner for analysis, auditing, permitting, policy making, and implementation of control programs, including comparative studies with at least one other country.

◐ Risk Assessment (3 credits)

Prerequisite: Calculus, Probability, organic chemistry. An introduction to risk assessment in environmental hazard management with emphasis on the chemical industry, including hazard identification, exposure analysis, and risk characterization.

◐ Environmental Auditing: Real Estate Assessment (2 credits)

Prerequisite: Fundamentals of Environmental Auditing. Instruction in the elements that should be included in a professionally accepted real estate transaction audit. Includes instruction on sources to utilize for these audits and on ASTM Phase I, II, and III procedures that should be followed.

◐ **Chemical Process Safety (3 credits)**
Prerequisite: Calculus, Introduction to Hazardous Waste Management. Covers fundamental and practical experience necessary for safe operation of a chemical process plant. Actual industrial case studies are conducted under industry supervision.

◐ **Principles of Environmental Sampling**
An introduction to environmental sampling with emphasis in statistical design, quality control and quality assurance, and interpretation of data.

◐ **Locational Issues in Hazardous Waste Management (3 credits)**
Analyses of spatial aspects of hazardous waste sites; corporate and public considerations and reactions; legal issues in location considerations.

◐ **Facility Compliance Auditing (2 credits)**
Prerequisite: Fundamentals of Environmental Auditing. This course includes examples of environmental compliance and workplace audits. Emphasis is given to audits involving solid and hazardous waste, environmental discharges, and health and safety laws and regulations. Case studies are highlighted.

◐ **Hazardous Waste Laboratory (2 credits)**
Includes demonstration of equipment used in hazardous waste management.

SUMMARY

The practice of Environmental Management has become increasingly complex and specialized in the past decade. A large number of universities have begun to offer programs to augment traditional engineering and science degrees, thereby easing the entry of their graduates into a variety of new jobs that have been created.

One emerging specialty is Environmental Auditing. The Chemical Engineering Department at Wayne State University has created a Graduate Certificate in Environmental Auditing, a 15 semester-credit program covering the law and regulations, the fundamentals of auditing and risk assessment, and real estate and facilities compliance auditing, with opportunities for all related disciplines to add elective courses. The Graduate Certificate accepted its first class in the fall of 1995 and expects to issue the first Certificate in the summer of 1996.

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