

**Emerging Technology Environmental
Science Consortium**

**Environmental Technology
Needs Assessment**

April, 1993

Survey conducted by Oakland Community College
Data Analysis and Report Completed by Schoolcraft College

Funded by Michigan Department of Education,
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*Special thanks to Paul
our industry expert*

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ENVIRONMENTAL TECHNOLOGY NEEDS ASSESSMENT

EXECUTIVE SUMMARY

- The Environmental Technology Needs Assessment was initiated by the Emerging Technology Environmental Science Consortium as part of a grant funded by the Michigan Department of Education. This Consortium sponsored an earlier needs assessment in the area of Water and Wastewater Treatment Technology. The Consortium members represent Schoolcraft College, Oakland Community College, Delta College, Grand Rapids Community College, Lansing Community College, Wayne County Community College, Northwestern Michigan College, and Kellogg Community College. Although this first needs assessment was conducted statewide, the second assessment of Environmental Technology was only for southeastern Michigan.
- Several sources were used to determine the employment outlook for an Environmental Technology Program. Federal, state, and local employment sources provided information regarding job requirements, position descriptions, employment opportunities, salary ranges, employer names and addresses, and four-year programs. In addition to secondary research, a survey was conducted to determine the need of local employers for environmental technicians.
- The program holds promise for graduates in that the literature indicates that more dollars will be available from the federal and state levels to assist in environmental clean-up and monitoring. On a national level, it's predicted that 22,500 environmental engineers are needed in the next few years to deal just with toxic chemicals, and the federal Department of Energy estimates it will need 10,000 to 20,000 environmental professionals in the next decade.
- Almost half of the employers wanted, at a minimum, an associate degree and 30% wanted at least a bachelor degree. Another 25% wanted a high school diploma or its equivalent.
- The 61 employers who were surveyed currently employ a total of 547 technicians. There were 38% of the employers who have an immediate need to hire and 90% who see a need in the near future. In total, the surveyed employers indicated that they would need 99 full-time technicians in the next year and 312 in the next five years.
- The salary for environmental technicians ranges from \$17,780 to \$22,500 per year. There are virtually no part-time positions with the employers surveyed.
- The key skills needed by employers include OSHA 40/24 Hour Hazardous Material Training, Federal and State Environmental Laws and Regulations, and Environmental Field Testing. Many employers indicated that advancement opportunities were best for those employees who, with an associate degree and work experience, continued on to finish a bachelor degree.
- A full 82% of the companies stated that they provide in-house training. In addition, 63% of the respondents indicated that they use external training. Approximately three-quarters of the respondents would send current employees to Schoolcraft or Oakland Community College for training in environmental technology continuing education.

EMERGING TECHNOLOGIES ENVIRONMENTAL SCIENCE CONSORTIUM

ENVIRONMENTAL TECHNOLOGY NEEDS ASSESSMENT

INTRODUCTION

In March of 1993, a survey was conducted to determine the employment need for environmental technicians in southeastern Michigan. This report combines that survey of local employers with a national literature search to provide data and information regarding the demand, salary levels, skill requirements and in-service requirements of environmental technicians. The report will be provided to college administrators to assist them in decision making and planning regarding new program development.

In the fall of 1992, a consortium was formed between Schoolcraft College and Oakland Community College. The two schools submitted a proposal to the Michigan Department of Education to assess the need for an Environmental Technology program. The Michigan Department of Education approved the grant and sent a letter to all community colleges in Michigan inviting them to participate in the consortium. The consortium members represent the following schools:

- Schoolcraft College
- Oakland Community College
- Delta College
- Grand Rapids Community College
- Lansing Community College
- Northwestern Michigan College
- Kellogg Community College
- Wayne County Community College

The Consortium supported a study in wastewater treatment technology, which was completed in April of 1993. The wastewater needs assessment included input from employers throughout the State of Michigan. The full report is available through Oakland Community College's Office of Planning and Analysis.

BACKGROUND

There were several sources that were used in preparing this report. The Dictionary of Occupational Titles was used to define the scope and description of the position. A complete ERIC search was conducted on recently published articles. Data from the

Michigan Occupational Information System (MOIS) was reviewed. Sixty-one area companies and firms were surveyed via the telephone and their input and remarks are an important component of this report.

OCCUPATIONAL INFORMATION: ENVIRONMENTAL TECHNICIAN

National Data

The Dictionary of Occupational Titles lists the title "Pollution-Control Technician" with an alternative title of environmental technician. The Dictionary describes the position as such:

029.261-014 POLLUTION-CONTROL TECHNICIAN (profess. & kin.) alternative titles:
Environmental Technician

Conducts tests and field investigation to obtain data for use by environmental, engineering, and scientific personnel in determining sources and methods of controlling pollutants in air, water, and soil, utilizing knowledge of agriculture, chemistry, meteorology, and engineering principles and applied technologies: conducts chemical and physical laboratory and field tests according to prescribed standards to determine characteristics or composition of solid, liquid, or gaseous materials and substances, using pH meter, chemicals, autoclaves, centrifuge, spectrophotometer, microscope, analytical instrumentation, and chemical laboratory equipment. Collects samples of gases from smokestacks, and collects other air samples and meteorological data to assist in evaluation of atmospheric pollutants. Collects water samples from streams and lakes, or raw, semi-processed or processed water, industrial waste water, or water from other sources to assess pollution problems. Collects soil, silt, or mud for testing, records data, and prepares summaries and charts for review. Sets monitoring equipment to provide flow of information. Installs, operates, and performs routine maintenance on gas and fluid flow, chemical reaction systems, mechanical equipment and other test instrumentation. May operate fixed or mobile monitoring or data collection station. May conduct bacteriological or other tests related to research in environmental or pollution control activity. May collect and analyze engine exhaust emissions to determine type and amount of pollutants and be designated Engine Emission Technician (profess. & kin.). May specialize in one phase or type of environmental pollution or protection and be identified according to specialty.

The Occupational Outlook Handbook provides full detail on information regarding this position. The following are excerpts from the total article:

Definition: Pollution-control technicians, also known as environmental technicians, are principally concerned with conducting tests and field investigations to determine ways to control contamination of air, water, and soil.

Nature of the Work: Five job titles describe the major types of environmental technicians: Water pollution-control technicians, estuarine resource technicians, air technicians, noise technicians, and hazardous waste technicians. Pollution-control technicians, regardless of specialization or type of position, need basic manual skills. They should like to work with their hands and be at home with a variety of

equipment and instruments. In some jobs, pollution-control technicians need good eye-hand coordination, vision, or manual dexterity. Pollution-control technicians need to be good at reading and interpreting maps, charts, diagrams, instruction manuals and other such materials. They must be able to make accurate and objective observations, maintain clear and complete records of data, perform certain types of computations, and prepare technical reports, both written and oral, to be used in further analyses by engineers and scientists.

Requirements: It is best to begin career preparation early, in high school if possible. The prospective technician should take advantage of as many mathematics and laboratory science courses as possible. This means a minimum of two years of high-school math, including algebra and geometry. Chemistry, physics, biology, and computer courses are all highly desirable, as are any courses in conservation or ecology that the high school may offer. Of vital importance are courses where the students can sharpen their written and oral communication skills. If courses are available in drafting, or statistics, they too should be included.

Two years of post high-school training is the average basic requirement for starting a career in pollution-control technology.

Employers are sometimes flexible in their requirements, recognizing the value of different combinations of technical training and experience. Job applicants may need only an associate degree with emphasis in a physical science, a scientific technology, or related field. For many positions, applicants must also have practical experience in such areas as sampling techniques, or with measuring and testing equipment. Additional course work in one of the sciences, engineering, or mathematics can be substituted in some circumstances.

Advancement: In general, as pollution-control technicians gain experience they receive more responsibility and higher pay. But in many positions in this field, the greatest advancement is possible only for those who continue to pursue formal education. Many technicians with two-year degrees decide after some work experience that a bachelor of science degree provides the best tools to ensure continued challenges and promotions.

Employment Outlook: In general, the future looks bright for the field of pollution-control technology. The expansion and improvement of water and waste water management activities in particular should mean continued demand for technicians during the 1990s.

Earnings: In the early 1990s, most engineering technicians earned between \$18,000 and \$30,000 a year, with the average being around \$25,000 a year.

Conditions of Work: Conditions range from clean and pleasant indoor offices and laboratories to outdoor hot or cold, wet, bad-smelling, noisy, even hazardous situations. Anyone planning a career in pollution-control technology should realize the possibility of exposure to unpleasant conditions at least occasionally in his or her career. Employers often can minimize these negatives through special equipment and procedures.

The Classification of Instructional Programs (CIP) lists the program title Environmental and Pollution Control Technology/Technician, CIP code number 15.0507: The CIP manual describes the program as:

"An instructional program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing and using indoor and outdoor environmental pollution control systems, and in disposing of hazardous materials. Includes instruction in environmental safety principles, biohazard identification, testing and sampling procedures, laboratory techniques; instrumentation calibration, hazardous waste disposal procedures and systems, safety and protection procedures, equipment maintenance, and report preparation".

One particularly good article, *Environmental Careers*, in the January/February 1992 issue of "Garbage: The Practical Journal for the Environment", V4, N1, p. 24-30, overviews the trends that are occurring nation-wide. There are currently 16 federal environmental-protection acts passed since 1970 that are helping to fuel the surge in jobs. Annually, there is \$15.6 billion spent to maintain present levels of waste disposal, and air and water quality. Cutting pollution was a \$115 billion operation in 1990. The EPA estimates that figure will rise to \$185 billion by 2000. Over 33,000 hazardous-waste sites are on the Superfund list. It's predicted that 22,500 environmental engineers are needed in the next few years to deal just with toxic chemical, and the federal Department of Energy estimates it will need 10,000 to 20,000 environmental professionals in the next decade.

State Data

MOIS (Michigan Occupational Information System) contained descriptions and information regarding Hazardous Waste industry workers. MOIS states that Hazardous Waste Technicians will see an increase in employment opportunities at a rate faster than the average for all jobs at both the state and national level. The increase in employment has been spurred by the \$9 billion federal superfund and Michigan's additional state funds.

MOIS indicates that "most enter this occupation by completing an Associate Degree, an Apprenticeship, or a Bachelor's degree". The average salary for an environmental technician in Michigan is from \$19,230 to \$37,897.

MOIS also states that federal law requires that every worker at a hazardous waste site receive a minimum of 40 hours in safety training, and that as many as 200,000 people will receive this training.

MOIS lists the community colleges currently offering applicable programs through the state of Michigan. They are:

Community College	Program Name
Jackson Community College	Chemistry (Pre Major)
Lansing Community College	Chemistry, General
Grand Rapids Community College	Chemistry
Lake Michigan College	Chemistry
Muskegon Community College	Chemistry (Transfer)
Southwestern Michigan College	Chemistry
Delta College	Chemistry

The 1991-1992 Financial Aid & Admissions Handbook lists the following community colleges as having programs in Hazardous Materials Technology (CIP Code number 15.0599/15.0701):

University	Program
Jackson Community College	Hazardous Materials Technology
Lake Michigan College	Hazardous Materials Technology
Kellogg Community College	Hazardous Materials Technology

The Handbook also lists the following four-year colleges and universities as having programs in Environmental Engineering:

University	Program
Michigan Tech University	Environmental Engineering (4 yr, Ph.D.)
Western Michigan University	Environmental Processes - Paper Eng. (4 yr)
University of Michigan	Environmental Science Engineering (4 yr)
Wayne Sate University	Hazardous Waste Management (5 yr, 6 yr)

Local Data

According to an Oakland University publication, there is a general shift in the focus of environmental protection away from the federal levels, with fewer government and agency jobs available now as compared with five years ago. Instead, a growing number of environmental consultants are working with state, county, and local governments as well as the private sector to provide specialized environmental services. Fewer companies today use their own permanent employees, although the largest operations are likely to have their

own in-house environmental staff. Opportunities for environmental improvement are slowly expanding in most areas, with a few areas (such as hazardous waste management) increasing rapidly. If the environmental interest that seems to have started the 90's continues, even more opportunities will be available, especially in the more technical fields.

An article which indicates the need for environmental technicians at the local level is from the Detroit News (1/4/93) and sites a recent study of employers conducted by Michigan State University. Environmental and Health Safety Analyst is sited as one of the top ten "best emerging jobs".

METHODOLOGY OF THE SURVEY

Methods of Data Collection

The research staff at Oakland Community College coordinated the development of the survey and conducted the telephone interviews. The process of building the survey included input from members of the consortium, faculty, administrators, and industry experts. In addition, the information from the literature search was used to identify the description of the position, the types of companies to contact, and the skill requirements for employment.

The employer lists came from three main sources. One was provided from consortium members. The second was from general mailing lists and included the Million Dollar Directory published by Dun & Bradstreet and Ward's Business Directory. The third source was from the Department of Natural Resources' Michigan Underground Storage Tank Financial Assurance Act Approved Contractor List. The MUSEFTAA contractors are approved as outlined in the Public Act 518 of 1988. In total, the list was comprised of approximately 300 companies. From this list, sixty-one employers were contacted.

The telephone interviews were conducted from February 24 to March 2 from a phone bank at Oakland Community College. The interviewers were trained in coding the surveys and each employer completed the same survey instrument. Employers were asked a series of questions regarding hiring practices and potential employment opportunities. Also, detailed information was solicited from these employers regarding desired qualifications and specific skill levels for entry level employees.

Environmental Technician was described as a person completing a program of study that "trained people to apply basic scientific and engineering principles and technical skills in

support of engineers and other professionals engaged in developing and using indoor and outdoor environmental pollution control systems, and in handling, storing and disposing of hazardous materials." Included would be "instruction in environmental safety principles, biohazardous identification, testing and sampling procedures, laboratory techniques, instrumentation calibration, hazardous waste disposal procedures, safety procedures, equipment maintenance, environmental rules and regulations, and report preparation."

METHODS OF DATA ANALYSIS

The survey findings were analyzed by the research staff at Schoolcraft College. The surveys were entered on a FileMaker Pro database and analyzed using SPSS-Mac Version. The key statistics generated were frequencies, percentages, measures of central tendency, and cross tabulations. Comments were entered into the database and reviewed for perceptions of employers. The comments are attached verbatim at the end of this report. The report was generated using Microsoft Word.

ANALYSIS

Employers

There were 61 employers who participated in the study. They represented a broad category of organizations. There were eight different areas that employers could use to describe the nature of their organization (they could choose more than one). The following chart indicates the types of businesses that were surveyed:

Type of Organization	# of Businesses Who Selected This Type	Percentage	# of Technicians (duplicated number)
Agriculture	2	3.3%	12
General Manufacturing, Production and Processing	2	3.3%	122
Federal, State or Local Government	3	4.9%	27
Transportation, Treatment, Storage, and Disposal Organization	16	26.2%	154
Health Care Facility or Testing Laboratory	9	14.8%	224
Environmental Engineering Service	42	68.9%	365
Consultant	45	73.8%	395
Chemicals and Allied Products	2	3.3%	75
Other:	6	9.8%	20

OTHER included:

- Soil and water investigation, witness testimony, and give permits.
- Site investigation and clean up full service.

Install and remove underground fuel system, site remediation and ground water recovery
 Nation-wide corporation. Corporate offices in St. Paul, Minn. Michigan District Office serves northern Ohio & northern Indiana with offices in Charlotte, Atlanta and Tampa
 Environmental Scientists
 Site remediation
 Food, nutritional labeling workshops on regulations state and local
 Manufacture and distribute chemicals (water treatment) industrial inorganic

As seen in the above table, the greatest number of those surveyed were involved in some type of consulting service. A cross tab of Environmental Engineering Service and Consultant indicated that 39 of the respondents represent both types of organizations. This means that 64% of the businesses provide consultant services as well as environmental engineering services.

Employers were asked to respond to seven tasks as to whether they provided these services. As indicated in the chart below, a full 93% of the companies stated that they "sample, analyze, and interpret collected waste materials." This has strong implications for knowing how to conduct field tests for graduates. And, later in the survey, the employers rated field testing as one of the most important skill areas.

Tasks	# of Companies that Task Applies To	%
Interpret government regulations, and implement strategies for compliance	46	75.4%
Coordinate emergency response efforts	30	49.2%
Store, transport and dispose of waste and hazardous materials	24	39.3%
Develop, implement, and evaluate training in compliance with government regulations	47	77%
Sample, analyze, and interpret collected waste materials	57	93.4%
Purchase supplies and contract services needed to manage waste and hazardous materials	50	82%
Provide engineering or environmental consulting services	52	85.2%

When asked if they employed environmental technicians working in any of these seven areas, 27% did not employ technicians in these areas while 73% did employ environmental technicians.

EMPLOYMENT OPPORTUNITIES

It is interesting that there were no respondents who hire part-time environmental technicians. All the companies only employ full-time technicians. These 61 companies currently employ 547 full-time technicians (work more than 30 hours per week). The range was from 1 technician to 100 technicians with the average being 9 and the median being 4. The standard deviation was 18, which indicates that there is a wide variance in the number of technicians that are employed by the companies in the sample.

New Job Growth

When asked if they had an immediate or a foreseeable future need for additional persons trained as environmental technicians, 38% said they had an immediate need and 90% felt that would have a need in the future. Of the 38% who have an immediate need, these employers currently employ 283 technicians and are mainly providing services in Consulting and Environmental Engineering Services.

There were 19 employers who gave a specific number as to the number of employees they plan to hire this year. These 19 employers plan to hire 99 full-time technicians, with an average of 5 per employer. Only one employer indicated that they would need one part-time technician. Over the next five years, 24 employers indicated that they would need 312 full-time technicians. No employer indicated a need for part-time technicians.

Number of Jobs Needed This Year	Number of Jobs Needed Over the Next Five Years
99 Full-time 1 Part-time	312 Full-time 0 Part-time

As indicated in the literature search, there is growth in the environmental technology fields. With the pressures of new legislation and increasing tax support, companies are expanding to meet the new demands. The majority of employers (82%) indicated that they plan to hire new employees because of expansion of operations. Over half also indicated that they would need more technicians because of the additional work needed to meet regulations or legislation. There were only 7% who would need additional employees due to employee turnover.

Main Duties Of Environmental Technicians

In general, environmental technicians (or related positions) are responsible for field work, such as sampling, drilling and testing, report writing, equipment maintenance, and serving in a support capacity for engineers and scientists. The employers who responded to the survey listed the main duties and responsibilities of their environmental technicians in the following ways:

Sampling, sample preparation, sample shipping, chain of custody responsibility, quality control. Site sketching, mapping. Know equipment (operation of) for sampling soil, water, air. Maintain low-tech retention systems, trouble shoot equipment, compressors, solenoids.

Collect and analyze soil and ground water samples. Routine operation and maintenance of remedial equipment. Assist scientists and engineers in investigation and remedial tasks.

Asbestos air training. Have pumps for OSHA compliance studies; make surveys; do surveys; (do not design surveys); review plans.

Act as support to geologist of higher trained technicians; monitor, survey, collect samples; report writing.

Must know government regulations, sampling techniques.

Need 40 hours of OSHA training. Operate machinery & equipment. Medical monitoring training. Sampling waste.

Field & environmental sampling; operation of remedial systems; carpentry; knowledge of electrical systems; construction, oversight, installations, startup of remediation systems; environmental sampling of existing wells; air quality testing, testing of underground storage tanks.

Function as a support to field engineers in job specified and job completion areas. Collect samples and physical data, assist in report writing, maintain equipment. Inventory equipment and materials.

Field samples, observations, preparing reports, recording construction activities.

EPA Regulations, compliance audits, writing programs (EPA & OSHA). Dissemination of regulatory issues/training other employees.

Educational Requirements

Employers were asked what the minimum educational qualifications were for entry-level environmental technicians. Almost half wanted, at minimum, an associate degree and 30%

Less than half of the employers experience difficulty in finding well-qualified, entry-level technicians. The comments on recruiting problems that they tend to encounter included such statements as:

- "Not a large pool of trained technicians. No one has OSHA 24/40 hours training. People lack communication skills."
- "It is a new field; more demand than trained people available."
- "Finding experienced people who are familiar with environmental procedures."
- "No program for technicians aside from 4-year degree program."
- "It is not a glamorous job, few people are trained in the field."

Most employers (60%) indicated that they tend to use the newspaper as a major source of recruitment. Others work with colleges and universities through co-ops and interns to recruit new technicians.

Wages and Benefits

Employers were asked the entry-level job titles and the corresponding entry-level salary ranges. Job titles were identified by employers, and these entry-level positions fall under seven general areas:

- 1) Environmental Technician
- 2) Industrial Hygiene Technician
- 3) CAD Operator
- 4) Environmental Sampling Technician
- 5) Waste Coordinator
- 6) Lab Technician
- 7) Hazardous Waste Material-Certified Technician

Environmental Technician was the most widely used job title with 42 or 69% of the companies employing those persons. In identifying program names, it would be consistent with industry to use the program title, "Environmental Technology" or "Environmental Technician Program".

Salaries range from \$17,780 to \$22,500 for entry-level positions. The following chart indicates that salaries were fairly consistent among job titles:

Title	# of Companies (percentage)	Entry Level Salary (median)
Environmental Technician	42 (69%)	\$20,064
Industrial Hygiene Technician	4 (7%)	\$18,760
CAD Operator	1 (2%)	\$20,500
Environmental Sampling Technician	2 (3%)	\$20,000
Waste Coordinator	2 (3%)	\$20,920
Lab Technician	1 (2%)	\$22,500
Hazardous Waste Material Certified Technician	2 (3%)	\$17,780

Technician I through III; field supervisor (with additional 4-year degree) engineer; geologist; designer (path splits to); technical project manager; field engineer; oversee a department; business, office manager, regional marketing.

Highest with associate degree (after 5 years without 4-year degree): Associate engineer. After 8-10 years (without 4-year degree): senior associate engineer.

With additional education, can advance to supervisory or management position.

Skill Requirements

"Environmental Education is as interdisciplinary as the ecological web of life is interconnected. Many job-placement experts agree that in any career situation, especially one in the environmental field, a balance must be played between well-rounded generalism and marketable specialization." (Garbage: The Practical Journal for the Environment)

Skills in communications (written and verbal), interpersonal relations, work ethics, and logical and critical thinking are important to job success in any field. The draft survey had a question asking the importance of each of the above areas. However, it seemed obvious that employers want employees who possess these skills. And in fact, employers included comments regarding the need for these skills. However, in order to prioritize the information needed, the survey focused only on the technical components of core courses. There were 24 skill areas that were listed on the survey and employers were asked to rate them as Very Important = 3, Somewhat Important =2, Not Important =1, and Unaware of (no rating).

wanted at least a bachelor degree. Another 25% wanted a high school diploma or its equivalent.

Minimum Education	Yes	No
No specific requirement	12%	85%
High School diploma or equivalent	25%	72%
Certificate	2%	93%
Associate Degree	46%	51%
Bachelor Degree	30%	67%
(Percentages do not add to 100% because of missing responses)		

Other requirements that were listed by employers included:

- 40 Hours of OSHA Training
- Chemical Engineering (4 year)
- Masters Degree

Advancement Opportunities

Potential career paths were discussed with employers. They were asked about advancement opportunities that are available and examples of typical job titles. Over 90% of the respondents discussed potential career paths and advancement opportunities for environmental technicians. The comments were positive about the future job advancement. Overall, it appears that those who are employed as technicians, get practical job experience, and continue their education to complete a four-year degree, are the most likely to advance to upper levels. Several examples of advancement opportunities are:

Once in a company, employees are supported by tuition reimbursement so they can move up the ranks: field team leaders; engineers; project leaders; equipment managers; department heads.

With B.S. degree advancement unlimited to President of company.

Junior project manager, senior project manager, job site foreman, marketing department. Company promotes from within-advancement unlimited.

Technician; professional technician project manager. With additional education to department head, vice president.

If they get a 4-year degree, they can move to an environmental scientist.

Depending on initiative, success in completing projects, ability to manage, ability to do additional quality work, an individual's future is unlimited because the field is growing/expanding quickly.

Skill Area	Very Important	Somewhat Important	Not Important	Unaware of	Mean
OSHA 40/24 Hour Hazardous Material Training	89%	10%		2%	2.90
Federal and State Environmental Laws and Regulations	80%	18%	2%		2.79
Environmental Field Testing	79%	21%			2.78
Health & Safety Training	77%	23%			2.77
Technical Writing	72%	25%	2%	2%	2.71
Laboratory Procedures/Sampling/Testing	64%	33%	2%	2%	2.63
Site Characterization & Remediation	66%	26%	8%		2.57
Soil Testing	67%	28%	5%		2.62
Physical Geology and Geography	62%	33%	5%		2.57
College Math (Algebra/Trig)	62%	28%	8%	2%	2.55
Chemical Right-to-Know	56%	41%	3%		2.52
Fundamentals of Surveying	57%	36%	7%		2.50
Organic Chemistry	49%	39%	12%		2.38
Equipment Maintenance & Repair	44%	49%	7%		2.37
Conservation/Environmental Science	46%	44%	10%		2.36
Construction Quality Control	43%	43%	15%		2.27
Biology	43%	39%	18%		2.24
Emergency Response Planning	36%	49%	15%		2.21
Physics	39%	36%	25%		2.14
Waste Minimization	34%	44%	21%		2.13
NICET Certified Technician	31%	48%	21%	25%	2.10
Environmental Microbiology	26%	30%	20%		2.08
Computer-Aided Design	31%	36%	33%		1.98
Transportation, Storage & Disposal of Hazardous Materials	33%	30%	38%		1.95

As indicated on the preceding table, the OSHA 40/24 Hour Hazardous Material Training is one of the key components of an environmental technology program. This training would certify students as required through state and federal legislation. Employers also felt that a strong knowledge of state and federal environmental laws and regulations was very important to meet their needs. Experience with field testing, sampling, and procedures should be included in the curriculum in order to give students the hands-on experience that will be required on the job. As part of this hands-on training, employers felt a need for technical report writing, a skill which was also cited as part of the main duties of environmental technicians.

In general curriculum areas, employers want technicians to have a background in math (Algebra/Trig), geology and geography, and organic chemistry.

Program areas listed as being not important were "Computer-Aided Design" and "Transportation, Storage & Disposal of Hazardous Materials".

Employers were asked through an open-ended question to name other specific courses, seminars or workshops which they felt should be tailored to meet their needs.

Department of Public Health has requirements NIOSH 582- course on Air. This would be great to offer.

Mechanical Repair is important.

Communication skills and quality control courses could help a great deal.

Writing skills are very important, since everything needs to be documented in this business.

Training in air regulations and air contamination prevention. The area of air regulation is growing faster than needs can be met.

Introduction to treatment technology (used in field) of waste material.

People need knowledge of word processing, ability to generate reports and computer literacy.

Training Programs

The Michigan Community Colleges are active in business and industry training. As part of this mission, the colleges were interested in finding out what kinds of training are being provided for current employees and if the companies would use the community colleges to conduct this type of training. A full 82% of the companies stated that they provide in-

house training and that over 300 of these were provided each year (one company stated that they did 200). In addition, 63% of the respondents indicated that they use external training. Approximately three-quarters of the respondents would send current employees to Schoolcraft or Oakland Community College for training in environmental technology continuing education. Only 10% said that they would not and another 15% were uncertain.

Of those that were uncertain, many indicated that it would depend on the type of training and when it was being offered (evenings). Several companies had tuition reimbursement programs, and students sought out the training and received approval for reimbursement. One employer commented that it is important for the companies to know about the kinds of training that will be offered. Another stated that "there is a great need for this (Continuing Education)".

There was support from employers to support an internship program in Environmental Technology. Almost 70% said they would support a paid internship program. There were also 23 employers who would support an unpaid program. In total, there would be 45 slots available, with most being paid positions. Approximately 15% were uncertain. They stated their uncertainty as "safety requirements in the lab", they "would have to see the individual and the program", and "Absolutely. If they have 20/40/80 OSHA training".

The support of the program from industry is positive. Fifty-one of the respondents, or over 80%, would be willing to help in the design and development of an Environmental Technology program.

RECOMMENDATIONS

Based upon the research findings, it appears that a program in Environmental Technology would be warranted. The sample of employers that was surveyed indicated that there will be 99 jobs available in the next year and 312 over the next five years. The key to preparing students for these jobs would be to design a program that meets employer needs, provides certification training, incorporates federal and state regulations and laws, builds a solid science and math background, and includes hands-on experiences in soil testing, lab work, and documentation.

The program holds promise for graduates in that the literature indicates that more dollars will be available from the federal and state levels to assist in environmental clean-up and monitoring.

The pay range for technicians is comparable to other occupations that require associate degree training. The preferred educational requirement is for a person trained at the associate degree level. The technical skills required for the job appears to fit the two-year programs provided by community colleges. It seems, however, that it would be in the best interest of the students to design programs to articulate with four-year colleges, since many employers feel that four-year degrees provide the best opportunities for advancement.

ATTACHMENTS

COMMENTS

Question

5: What are the main duties and responsibilities of your environmental technicians?

Sampling, sample preparation, sample shipping, chain of custody responsibility, quality control. Site sketching, mapping. Know equipment (operation of) for sampling soil, water, air. Maintain low-tech retention systems, trouble shoot equipment, compressors, solenoids.

Collect and analyze soil and ground water samples and routine operation and maintenance of remedial equipment. Assist scientists and engineers in investigation and remedial tasks.

Asbestos air training. Have pumps for OSHA compliance studies; make surveys; do surveys; (do not design surveys); review plans.

Go to job sites. Witness soil test borings, sample soil and do chain of custody of water and soil. Do field tests on the site.

Installing and air monitoring. Asbestos remediation projects. Well sampling. In charge of day to day operations, coordinate sub-contractors' work. Physical running of equipment, taking samples, running drill rigs. Run plant that incinerates contaminated soil.

Do field service. Take material samples; monitor site work; do basic lab functions; do basic research functions.

Act as support to geologist of higher trained technicians; monitor, survey, collect samples; report writing.

Field Sampling, Testing- well recovery and field tests and lab tests, writing work plans.

Wide range collecting historical information, research, samples.

Work with Geologist to get hands on experience at site. Investigation and clean up the brook. Work closely with DNR, the Governor and with the Project Manager. Clean by Bio-Remediation.

Analysis and prep samples.

All different areas, air monitoring and asbestos abatement operations Industrial work.

Project Management, do reports, know terminology, take care of entire project from start to finish.

CAD, drafting is very important, writing reports, and collecting samples.

Ground Water Remediation, Sub-surface conditions, Need Writing Skills.

Variety, lab work- collect samples, writing reports.

Lab work with a senior person, Field Service Technician (sample collection).

Diverse, pull samples, deal with client's different duties.

Assist the Environmental Scientist in sampling.

Must know government regulations, sampling techniques.

Need 40 hrs of OSHA training. Operate machinery & equipment. Medical monitoring training. Sampling waste.

Hands-on labor.

Laboratory testing and sampling.

Environmental monitoring. Regulatory work.

Work with industrial sector. Treatment and disposal of chemicals (hazardous and non-hazardous).

Field sampling (Assist with well and soil samples with Engineers. Operate treatment equipment. Assist and operate drilling unit.).

Collect samples. Take and make soil gas surveys.

On water treatment systems - installation, monitoring of ground / surface water; soil treatment systems. Act on engineers' specifications on blowers, pumps. Take samples.

Field & environmental sampling; operation of remedial systems; carpentry; knowledge of electrical systems; construction, oversight, installations, startup of remediation systems; environmental sampling of existing wells; air quality testing, testing of underground storage tanks.

Taking samples of water, air, soil by DNR set protocol; develop, install, monitor wells; floor tests on wells; field surveying, leveling; gathering data.

Field work; waste water sampling.

Implement plans written by engineers (investigation and sample plans). Environmental assessments for real estate transactions (background - title checks) and generate reports.

Work with engineers to evaluate hazardous waste sites, waste water plants, take site samples.

Function as a support to field engineers in job specific and job completion areas. Collect samples and physical data, assist in report writing, maintain equipment. Inventory equipment and materials.

Handle field samples, documentation, protocol follow chain of custody, document for analysis, maintain field logs of project activities, chemical and

waste inventories, chemical and waste packaging and labeling and marketing waste containers. The technician provides technical oversight to sub-contractors for underground storage tanks, runs instruments, DOT qualified (drivers).

Field work, sample collection, evaluation of contractor work performance, report writing, data evaluation, basic client interaction at work site.

Mobilize for and conduct environmental sampling activities. Operate field analytical instruments.

Collect field data, collect ground water samples, maintain records, oversee drill rigs, construction management, soil sampling, solid waste recording.

Asbestos Management.

Field supervision of joint operations, sample collection; data interpretation; sample storage; lab testing.

Field samples, observations, preparing reports, recording construction activities.

Supervises drilling, takes samples.

Measure water levels in wells. Install remediation systems. Take samples of drums. Drilling.

Take field samples and lab analysis.

Field data collection, monitoring and collection of samples, wells and streams.

Field work, sample monitoring.

We don't have any environmental technicians.

We don't have environmental technicians. We have 4-year degree Environmental Specialist.

EPA Regulations, compliance audits, writing programs (EPA & OSHA), Dissemination of Regulatory Issues/training other employees.

Regulatory Compliance, Bigger companies like Dow Chemical could use environmental technicians. Environmental technicians (2-year) do well in a consulting firm.

We don't have environmental technicians. We have Environmentalist (4-year degrees).

On site field screening, soil sampling, report writing.

Support work, working under an engineer's guidance.

Site assessment, work in field, monitor underground storage tanks.

6: How do you recruit entry-level technicians?

Ads, unsolicited resumes, word of mouth, local newspaper ads.

Ads in the newspaper, through Corporate office. Recruit at American Industrial Hygiene Convention; Temporary contract services.

Usually take employees from other divisions of company and train them for the environmental tech position.

Ads.

Word of mouth.

Ads in newspaper.

Ads in newspaper.

School co-ops and advertisements.

Advertise use students from U of M, Western Michigan, Eastern Michigan.

We work with colleges, such as Michigan Tech. Advertise in Detroit News.

Advertise in papers, U of Findlay, Ohio- recruit students.

People send in resumes often. We don't have to look for new employees.

Advertise in newspapers.

Very small company, haven't had to recruit yet (1 year old).

U of M co-op students.

Advertise, Walk-ins.

Would call O.C.C. We haven't had to yet, we are a very small company.

Advertise.

Use interns from colleges.

Advertise.

Advertise / Walk-ins.

Advertise.

Promote from within and recruit from newspaper.

Advertising.

Advertise, people and students apply (U of M).

Advertising.

Advertising, local contacts, unsolicited resumes.

Word of mouth, advertising.

Call community colleges for CAD operators; through friends and employees.

Ads in newspapers, trade publications. Recruit in schools.

Ads in newspaper, head hunters take people from other disciplines within the company.

Ads in newspaper, recruit through colleges.

Word of mouth, some ads in paper.

Network, word of mouth, ads in newspapers, work with the universities for references, unsolicited resumes.

Word of mouth, ads in paper.

Recruit at community college and university levels.

Newspaper ads.

Applicants contact the company.

Ads in Detroit News, Ann Arbor paper.

Recruit through universities.

Classified ads.

Ads in papers and word of mouth.

Have a Corporate Recruiting Office. Ads in paper.

Through media, newspaper ads in schools (Department of Placement).

Ads and ask professors at EMU.

We don't, but we would advertise.

Advertise and school placement service.

Advertise.

Personal contacts.

Recruit from EMU and Michigan Tech. We tend to have more practical knowledge. Wayne State students in environmental technology have concentration on urban/city problems. U of M grads are more interested in saving the rain forests.

Most applicants come to them.

**10: What is the primary reason for needing these additional employees?
Other reasons. Please specify:**

Cost-control pressure. The market is changing. In the past technicians were "gophers". Now more is expected of technicians. We are going to have to do more scientific tasks at a lower billing rate.

**11: What is the minimum educational qualification required by your organization for entry-level persons in Environmental Technology?
Other education or degree, not listed (please specify):**

2-year to 4-year.

A 2-year degree would be great.

At least a 2-year degree.

2 or 4-year degree preferable.

We hire 2-year and 4-year degree.

40 Hours of OSHA training.

Driver of field tech, may have 4-year degree or none. Field technician can be created but helpful if he has scientific training for college.

Add college chemistry.

Chemical engineering (4-year).

Masters Degree.

12: As part of our review we are interested in understanding potential career paths for entry technicians. Could you explain what advancement opportunities are available, with examples of typical job titles.

Once in a company, employees are supported by tuition reimbursement so they can move up the ranks. Field team leaders; engineers; project leaders; equipment managers, Department heads.

Technician, senior technician, master technician.

Company promotes from within; helps employees with additional education to become professional (4-year) geologists, senior hydrogeologist; environmental managers; department heads; corporate vice president.

With B.S. degree advancement unlimited to president of company.

Jr. project manager: senior project manager, job site foreman, marketing department. Company promotes from within--advancement unlimited.

From individual assignments: as one becomes able to handle more complex duties, as experience broadens, may move up ladder. May become a manager or coordinator for less senior technical projects.

Technician; professional technician project manager. With additional education to department head, vice president.

Project manager.

Yes, there are many advancements.

Yes, all the way up to the vice president.

Yes, there are many advancements.

Yes, always advancement opportunities.

Yes, to management level.

Yes, there is a lot of advancement possibilities.

There are great advancement opportunities.

Yes, management level.

Management level.

Supervisory levels, with more schooling environmental scientist.

Yes, we are a small company, very limited.

To management levels.

Advance to management level.

Yes, to management level.

To regulatory specialist or operations manager or supervisor.

Increase in pay.

To management levels or specialized areas (drilling).

Can move up ranks to management with degree.

Field technician: specialist, field service. Department: systems manager.

Technician I through III; field supervisor; (with additional 4-year degree); engineer; geologist; designer (path splits to); Technical project manager; field engineer, oversee a department (and) Business; office manager, regional, marketing.

CAD technician; field surveyor, environmental field technician supervisor.

Follow State of Michigan qualifications for advancement.

Highest with associate degree: (after 5 years, without 4-year degree). Associate engineer; after 8-10 years (without 4-year degree), senior associate degree.

With added education, advance to field supervisor up to management. Entry environmental technician I through IV.

With additional education, can advance to supervisory or management position.

If a field technician (with 2-years experience) continues to complete a 4-year degree, can become scientist I through III, project manager, human resource manager,(no limit).

Technician 1-4; specialist 1-4, with additional training; draftsman; CAD work.

Company has a structured career track. Technical career track leads toward senior or principal engineer; project management; principal project management. Line management; sales and marketing line leads to vice president.

Technician 1-4; senior technician; field supervisor. The 4-year degree people do technicians' work until they get enough experience to advance.

Industrial hygienist I, II; senior hygienist project manager; operations manager; senior project or operations manager.

Entry level enters into training program (pay increases with experience); company finances continued education; opportunity for management positions.

(1) sampling, (2) office experience (WONC with data), (3) field inspector, (4) 4-year degree in engineering.

If we get a 4-year degree, we can move to an environmental scientist.

From environmental technician (with 4-year degree completed). Project manager, project coordinator.

Small company worker to owner.

Supervisory on construction project. Environmental technical crew foreman. With 4-years degree, knowledge of finance, marketing, construction can become project manager.

Four grades in their organization: project manager, assistant manager, construction services manager.

His firm is limited because of the small size (17 employees). Advancements are made from field data collection to training others and also interpreting of data.

From field work to management with additional schooling.

To engineer (project engineer).

Advance to environmental specialist.

Advancement to upper management.

This is a small firm. Advancements from project manager, engineer, sales engineer.

Depending on initiative, success in completing projects, ability to manage, ability to do additional quality work. An individual's future is unlimited because the field is growing expanding quickly.

Opportunity for 2-year, Associate Degree, technician limited. With a 4-year degree, one becomes a professional. Science or engineering degree has an unlimited future.

One can advance from a technician to environmental specialist, science specialists, project manager. Our Company promotes from within.

Opportunity to advance to a higher level such as a specialist.

14: What kinds of recruiting problems do you encounter?

Applicants had no mechanical skills.

Finding experienced people who are familiar with environmental procedures.

Not many environmental technician trained people. We typically train employees for what is needed. We would prefer to hire a trained individual rather than having to train them.

There is not a large pool of trained technicians. No one has OSHA 24/40 hours training.

People lack communication skills.

Barrier--40 hours training needed, medical monitoring for internships is not worth it, our program should incorporate the 40 hours OSHA training.

It is hard to find good people.

It is hard to find good people.

Hard to find people with chemical engineering background.

Difficult to find people to do the work. The weekends and long hours are not glamorous.

Hard to find qualified technicians.

Most are not knowledgeable in practical applications and do not have adequate experience.

At present we have to train entry level people.

Most do not have OSHA training. There is a lack understanding of the basic electrical systems, plumbing, mechanical systems and carpentry.

Environmental technology is new , no one is trained in this field. New technology and instruments are being developed daily but no one knows how to use them.

It is not a glamorous job. Few people are trained in the field.

It is a new field. There is more of a demand than there are trained people available.

Difficult to attract people to Detroit area. A plus, however, the opportunity to work on big projects attracts people.

There are no experienced people available.

It is difficult finding qualified people.

There is no program for technicians aside from 4-years degree program.

Most have no educational background.

There are not enough people for the demand.

Most have no work ethics.

There are no 2-year degree people, only 4-year at present time.

Lack of appropriate training in core areas. Most have no experience.

People need to have communication skills.

People do not know how to adopt knowledge and skills to practical tasks.

There is excessive expectation on part of degreed people in first year out of college.

16: Are there other specific courses, seminars or workshops which you feel should be tailored to meet your local training/education needs?

Accounting, budget skills, mechanical skills. We also need to know how to troubleshoot equipment.

Applicants need some small business or financial training. We also need knowledge of how and why a business is run.

Department of Public Health has requirements: NIOSH 582- course on Air. This would be great to offer.

Mechanical repair is important.

Applicants should know all the basic skills and have 40 hours of OSHA training completed.

It is important that we have mechanical aptitude and 40 hours OSHA training.

No, there are no other courses needed.

Applicants need better communications skills and basic background in everything.

No, there is no need for additional courses.

Chemical engineering courses.

No, there is no need for more courses.

Yes, please call him for advice. He taught program for 23 years (U of M) Computer training and auto CAD.

People need more communication documentation skills such as speaking and writing.

No, there is no need for additional courses.

General chemistry could be added.

Training in air regulations and air contamination prevention. The area of air regulation is growing faster than needs can be met.

Ability to deal with clients' needs could be taught through interpersonal skills, interfacing skills and communication skills. Financial training would help also.

Communication skills and quality control courses could help a great deal.

Writing skills are very important, since everything needs to be documented in this business.

Basic knowledge of word processing and computer literacy.

People need knowledge of word processing, ability to generate reports and computer literacy.

Air quality.

MUSTFA, DNR training is needed.

Introduction to treatment technology (used in field) of waste material.

24/40 OHSA is very helpful, if schools would teach classes that would make graduates employable.

Bench scale treat ability and analysis.

Statistics are needed.

Have students work a co-op with drilling companies. This would teach them how to monitor a well installation. We should be able to drill and take samples of soil and rock. More classes are needed in general geology, hydro-geology, hydrology. Classes are needed on ground and surface water.

The OSHA training is most important.

Hands on field skills basic reading, writing and arithmetic.

18: Can you describe the nature of the training?

Specific to ones needed.

Health and safety training for in-house employees. Give health and safety classes for clients and asbestos training in-house to clients. Have employee reimbursement program, send employees to continuing education programs, conferences, seminars.

OSHA Safety, four levels of training in asbestos inspection, largest trainer in asbestos technology (to Clients) in the country. We send employees to seminars.

Training classes on a personal needs basic.

Seminars that are external, in house safety training.

On the job training.

Seminars, workshops, very important to them, they encourage continuing education.

Seminars and workshops.

Workshops and on the job.

Workshops and on the job.

Workshops.

Seminars, workshops and on-the-job training.

On-the-job training, 40 hours safety training/seminar (OSHA).

Seminars/ workshops.

Seminars, workshops, on-the-job training.

On-the-job.

On-the-job training.

40 Hours of haz-mat training. In-house training.

Workshops/seminars.

Workshops/Seminars.

Courses at government institutes, or Wayne State University.

Workshops & seminars.

On-the-job & workshops.

Send to Lansing, Mich State, for short-term seminars.

By special request related to one's job.

Michigan DNR seminars.

Seminars put on by Engineering Society of Detroit, Michigan and National Professional Engineering Society; Executive Enterprises; DNR.

Construction management, financial planning, waste management has education reimbursement program.

Seminars, specific interest classes, employees select classes of interest to themselves. Have education reimbursement program.

Seminars.

OSHA standards. Asbestos awareness (inspection, handling management planner; construction; design), underground storage, sales.

OSHA.

Professional organizations, NGWA seminars, change in sampling techniques, civil engineers council seminars.

OSHA 40 hours.

Seminars, professional cont. education credits, vendors, ASRM specs level I.

40 hours health and safety training and other informal training.

BBU's sampling, protocol, basic do's and don'ts.

HMMC Chemical certified; hazardous management training. Health and safety, waste categorization, confined entry, drill rig safety.

OSHA 24/40 seminars are provided for those in need (case by case basis), N.G. ground water association seminars.

OSHA 40 hours 24, 36, 8 hours. DOT, special seminars.

On-the-job training.

Workshops and seminars.

Seminars, workshops.

Seminars.

On-the-job training and workshops.

Send employees to seminars, usually 1 or 2 employees per year. Out of state (1 to 4 day seminars).

Environmental law seminars. Send employees to University of Findley, Ohio, they have a good OSHA 40 hour training.

On-the-job and seminars.

Workshops, seminars, medical monitoring.

19: Would your organization send current employees to either Schoolcraft or OCC of training in an Environmental Management Technology continuing Education Program? Uncertain, Please explain:

Have tuition reimbursement.

Have employees reimbursement program, send employees to continuing education programs, conferences, seminars.

It would be beneficial for the company to know these programs exist.

Have to see program. Company has educational reimbursement program.

NOTE: Nothing against either school -- our company does not have a tuition reimbursement program.

Reimbursement program, Employee attends program on own hours.

Depends on need, if useful, if credited, have to look at curriculum.

Specific (seminars) rather than credit classes.

Evening courses are needed.

Depends on curriculum.

Most people should already have knowledge/skills needed.

A 2-year degree person would be good. Presently use 4-year degree people to handle low level skills jobs. Could pay 2-year persons less to do same work. Would make the company more competitive in the market.

Use Wayne State for governmental laws and regulation courses.

There is a great need for this (Continuing Education).

Not sure, most of our employees have Master Degrees.

Possibly depends on what is offered.

Reimbursement program if have covering in class. Employees seek out classes, get class approved by company.

Company has education reimbursement program.

20: Would your organization consider offering internships (either paid or non-paid) for students in an environmental technician program?

PAID:

Uncertain, please explain:

Probably would have had summer interns in past.

It depends on current work load.

We are not sure due to economy.

We have in the past.

Limited due to safety requirements in the lab.

Perhaps would have to see the individual and the program.

In future, perhaps, if the program is good.

Yes, perhaps, it depends on the program.

Possibility a summer internship.

Depends on individual (paid or unpaid).

Either paid or unpaid.

We usually want interns for future employment, students in a 4-year program.

Absolutely. If we have 20/40/80 OSHA training.

UNPAID:

Not sure due to economy.

Either/or we are not sure yet.

We are limited due to safety requirements in the lab.

If we do not have 20/40/80 OSHA training, no pay.

EMPLOYERS' NAMES, ADDRESSES AND PHONE NUMBERS

Engineering -Science Inc.
Environmental Engineering Service -Consulting
Birmingham 48010, 443-2700
Dave Lomas, Department Head

Geraghty and Miller, Inc.
Environmental Engineering Services-Consulting
Troy 48084, 524-9030
Kevin Wolka, Principal Engineer

Kemron Environmental Services, Inc.
Environmental Engineering Consulting
Novi 48050, 474-4200
Julia Hill, Sales Representative

McDowell and Associates
Environmental Engineering Services and
Consulting, Ferndale 48220, 399-2066
Robert McDowell, Partner

Professional Services Industries, Inc.
Environmental Engineering Consulting
Detroit, 48039, 255-4200
Robert Andrews, Vice President

Carlo Environmental Technologies
Environmental Cleanup
Mt. Clemens 48046-0744, 468-9580
Michael Carlo Catrenacci, President

Schleede Hampton Associates, Inc.
Env. Engrs Consulting
Birmingham 48009, 540-3044
James Berry, Office Manager

U.S. Environmental Consulting Inc.
Env. Engr. Serv. Consulting
Troy 48084, 380-1600
Frank Saad, VP - Business Development

Soil and Materials Engineers
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Gary Evans, Manager

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Auditing & Investigation
Ann Arbor 48106, 994-4000
William Henderson, Director of Training

Service Environmental Engineering
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Mr. Teasel, Vice President

Environmental Quality Labs
Lab Testing and Sampling
Sterling Heights 48314, 731-1818
Thomas Megma, President

Huntingdon Engineering and Environmental Serv.
Engineering and Consulting
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Pro-Tank Technologies, Inc.
Instl & remove undergrd fuel sys. & onsite remed.
Utica 48316, 781-5700
David Jacklyn, Director

O'Brien and Gere Engineers, Inc.
Engineering Services and Consulting
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Scott Adamowski, Pres./Mich. Branch

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Inkster 48141, 561-1400
Doug Andrews, Compliance Manager

Envotech
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Jerry Fore, President

Enviro-Vac Services, Inc.
Transporting Waste
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Janine Carr, President

Encotec, Inc.
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Dr. John Schenk, President, 761-1389

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Cindy, Technical Services Manager

Great Lakes Environmental Services
Environmental Engineering Services
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Vincent Schager, President

MPC Environmental
Waste Hazardous Material
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Mike Popa, Director of Training

National Sanitation Foundation
Provides guidelines for the Gov't (NSF standards)
Ann Arbor 48105, 769-8010
George Kupfer, President

Nortru, Inc.
Hazardous materials
Detroit 48209, 824-5850
Chuck Benky, Dir/Envir. Compliance Serv.

Interstate Chemical & Disposal Co.
Transport & Disposal of Haz. Waste
Commerce Twp. 48382, 669-4880
Frank Fagan, Sales Manager

Traverse Group, Inc.
Environ / Eng Serv
Ann Arbor, MI 48108, 747-9300
John Armstrong, President (CEO)

Industrial Waste Management Inc.
Env Investigation, Consulting
Riverview, 48192, 283-5520
Peter Uhse, President

Delta Environmental Consultant, Inc.
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Farmington Hills, 48331, 489-3003
Sam Hu, Project Engineer

Costal Remediation Co.
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Charles Kureth, Jr., Operations Manager, 496-5714

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Avinash Raclumale, Manager

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David Russell, Senior Environmental Engineer

Camp Dresser & McKee,
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A. Berry Seymour, Sr VP of MI, OH, IN offices,

Eder Associated Consulting Engr.
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Gene Ciepley, Vice President

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Edward Hogan, Assistant Vice President

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Matthew Jerue, Manager, Michigan Operations

NTH Consultants
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Rick Burns

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Robert Peters, Manager

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Tom Doran, Director

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Jennifer Geelhood, Accounting Office Manger

Caleb Environmental Contracting Inc.
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Richard Christensen, Owner

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Farmington Hills 48331, 553-4440
Karen Lyons, Director of Projects

Testing Engineers and Consultants
Troy 48099, 588-6200
Gerald Belain, Executive Vice President

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Brighton 48116, 227-6240
Dr. George Kunkle, Owner

Analytical and Biological Lab, Env.
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Farmington Hills 48335, 477-6666
Suzanne Cole, Vice President Marketing

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Env. Engrs- Consulting
Northville 48167, 349-4333
Joe O'Brien, Manager, Hydrogeological Services,

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Mike Selman, Marketing Director

Waste Management of North America, Inc.
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Livonia 48104, 462-6900
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Southfield 48075, 358-5800
Bill Moore, Corporation Manager

Pressure Vessel Services Chemical, Inc.
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Wyandotte 48192
Mary Schenk, Corporate Environmental Manager

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Al La Cole, Director

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Bob Gracin, Project Manager

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Env. Engr. Consulting
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Alan Greenberg, Associate

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R. Charles Larkham

Site Assessment Specialists, Inc.
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Christopher Miller, Vice President

Castle Medical Disposal
Bio-Medical Waste (incineration)
Troy , 925-6600
Roger Essenmacher, Sales Manager

Millgard Environmental Corp.
On-Site Treatment of Hazardous Waste
Livonia 48151, 261-9760
Roger Kappler, President

TIMELINES

Objectives	Timelines	Person(s) Responsible
1) Identify other potential consortium members.	7/1/92-7/15/92	M. Orłowski/ D. Sigworth
2) Conduct a literature search.	7/1/92-8/1/92	Primary Researcher
3) Meet with focus group.	8/1/92-9/1/92	M. Orłowski/ D. Sigworth/Primary Researcher
4) Generate mailing lists. Identify experts and employers for indepth interviews.	9/1/92-9/14/92	Primary Researcher
5) Develop survey.	9/14/92-10/1/92	Primary Researcher
6) Review and validate survey.	10/1-10/15/92	Focus Group
7) Phone interviews.	10/15/92-11/1/92	Primary Researcher/ Interview Team
8) Data analysis.	11/1/92-11/15/92	Primary Researcher
9) Final report.	11/15/92-12/1/92	Primary Researcher
10) Review by focus group.	12/5/92	Focus Group
11) Distribution of final report.	12/15/92	M. Orłowski/ D. Sigworth

BUDGET:

Item	Amount	Rate	Hours	Descriptions
Primary Research	\$3000.00	\$12.00	250	Approximately 6 months
Interviewers	\$350.00	\$7.00	50	Survey of 100 employers
Secretarial Support	\$240.00	\$10.00	24	Typing, copying, etc.
Focus Group	\$450.00			Includes meeting expenses (no salaries)
Documents/Reports	\$600.00			Supporting materials
Literature Search	\$400.00			Examination and collection of reference material
Travel	\$125.00	.28 /mile		Mileage (based on college rate)
Phone	\$450.00			Employer and expert interviews
Copying	\$150.00			Supporting material, final report
Sub-Total:	\$5765.00			
8% Indirect	<u>\$461.20</u>			
	\$6226.20			

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EMERGING TECHNOLOGIES CONSORTIUM PROPOSAL

The Southeastern Michigan Environmental Science Consortium

Purpose: Schoolcraft College and Oakland Community College are seeking support from the Michigan Department of Education, Higher Education Management Services, Community College Services Unit, to research, and if warranted, develop an Environmental Science Associate Degree program for the two schools.

Background: For the past several months, Washtenaw Community College, Macomb Community College, Oakland Community College and Schoolcraft College have been meeting on a regular basis to coordinate various research activities. The colleges have been sharing needs assessments, evaluation tools, and assessment processes. Through the course of these meetings, both Schoolcraft and Oakland expressed a desire to develop a program in Environmental Sciences. Oakland Community College recently completed a scanning report which identified various aspects of this field of study. First, there are over 25 job titles that are related to the Environmental Sciences. Secondly, there is a need to further document potential employers in southeastern Michigan of program graduates. And, thirdly, there is a need to prepare a task analysis of key job competencies and required educational degrees needed to work in this field.

During this past year, Schoolcraft College completed a committee review during which all available career publications at the local, state and national level were studied. Based on these findings, it was the recommendation of the committee to conduct a full needs assessment.

Current Needs: Schoolcraft and Oakland prefer to jointly assess and develop this new program. This would allow the two schools to develop curricula that, although not duplicative, would result in broad based planning of basic courses. Oakland's goals are to develop two programs: the first is a transfer program in pre-Environmental Sciences that would allow students to transfer to four-year college programs. The second program is an extension of the Alternate Energies Technology/Energy Management program to an Environmental Studies/Energy Management program.

Schoolcraft College has been approached by industry representatives to review the potential for a Waste Management program. In addition, faculty from the sciences are interested in developing an articulated pre-environmental sciences program with four year Bachelor of Science programs.

Proposed Needs: Schoolcraft and Oakland have identified the need to survey local employers to determine the employment outlook and job competencies for students who wish to enter these programs. Here-to-date no such assessment has been done in Southeastern Michigan. The Southeastern Michigan Environmental Science Consortium will work with other consortia and existing programs to collaborate findings and coordinate program development.

There are several activities that have been identified to occur during a six month time period.

Methodology: A literature search will be conducted which documents all recent developments in Environmental Science. This literature search will include state and national initiatives (such as grant and bond funding of programs), educational program development, and job outlook and projections. There will be a review and examination of the reference material. A focus group, comprised of industry leaders and faculty from each of the colleges, will be responsible for overseeing the program development. Their role will be threefold: 1) they will review the literature and collaborate the findings; 2) they will review the survey to determine the validity of the instrument; and 3) they will provide input on the development of the program if the assessment warrants the development of a program.

The survey instrument will be developed by a primary researcher. The survey will be conducted by phone by a team of interviewers. Approximately 100 employers in Southeastern Michigan will be surveyed. In addition, another 20 employers and experts will be interviewed indepth. Employers will be identified by a variety of sources. One will be general business databases (such as Dun & Bradstreet). Another, and better source, is the mailing list of businesses that are part of state organizations (i.e. Association for Energy Engineers Mailing List, Independent Energy Industry Directory). The Yellow Pages will also be incorporated into the study. A final potential for names of employers is the classified ads of the Detroit News.

The survey results will be analyzed using a PC based statistical program. The final report will highlight the key areas of the assessment. All throughout the process, the focus group will review drafts, provide input and link information to workplace training needs.

The survey will focus on four major areas: employment outlook, job competencies, definitions of technical terms, and training and upgrading occurring in industry.

The final report will cover in detail the four major areas, as well as discuss the educational opportunities and transferability of courses to other colleges.

THE ENVIRONMENTAL STUDIES CONSORTIUM
Environmental Technology Needs Assessment Employer Survey: Dialogue Sheet

"Hello, this is *insert your name, first and last*. I am calling from a two college consortium between Schoolcraft College and Oakland Community College.

Step 1	<i>You reach the person.</i>	<i>You reach someone else and the person you need is available.</i>	<i>Person is not available.</i>
Step 2	<p>Hello, this is <i>insert your name, first and last</i>. I am calling from a college consortium which is studying ideas for new environmental programs. Continue with the following:</p>	<p>Ask to speak with the respondent. When he/she is on the line, continue with the following:</p> <p>Hello, this is <i>insert your name, first and last</i>. I am calling from a college consortium which is studying ideas for new environmental programs. Continue with the following:</p>	<p>Try to find out when the person may be reached. If asked why you are calling, explain the following:</p>
Step 3	<p>I am glad I was able to reach you. I am conducting a survey on behalf of a college consortium. We are considering implementing Environmental Technology programs at the community college level.* Your knowledge and experience in the field would be very helpful to us. Would you be willing to take a few minutes to answer some questions about Environmental Technology?</p> <p><i>If yes, begin the survey. If no, see if there is a better time to call them back, note the call-back time on the phone list, and indicate that someone will attempt to call them then.</i></p> <p><i>If they are unwilling to complete the survey, simply thank them for their time and indicate that on the phone list.</i></p>		<p>Our consortium is in the process of exploring ideas for new environmental programs. We would like to ask</p> <hr/> <p><i>(the name of the personnel director) about employment opportunities and training requirements at your company. Record the callback time on the phone list.</i></p>

*If the respondent asks for the names of the colleges, they are: Schoolcraft College and OCC.

NOTES TO INTERVIEWER:

1. Please record call back times on the employer list.
2. Please record name, type of business, name of the personnel director, phone number on the top of the survey.

Survey Number _____

**ENVIRONMENTAL TECHNOLOGY
NEEDS ASSESSMENT
EMPLOYER TELEPHONE SURVEY**

Name of Business: _____

Type of Business: _____

City and Zip Code: _____

Telephone: _____

A. Once you reach the Director of Training, Personnel, Human Resources or other appropriate supervisor, be sure to record:

Name: _____

Title: _____

Phone: _____

Time Interview Begins: _____

B. Begin survey here:

SURVEY

Environmental Technician:

Schoolcraft College and OCC are considering implementing Environmental Technology training programs which could lead to a two year associate degree or to a one year certificate program. The purpose of the program would be to train people to apply basic scientific and engineering principles and technical skills in support of engineers and other professionals engaged in developing and using indoor and outdoor environmental pollution control systems, and in handling, storing and disposing of hazardous materials. We are considering instruction in environmental safety principles, biohazardous identification, testing and sampling procedures, laboratory techniques, instrumentation calibration, hazardous waste disposal procedures, safety procedures, equipment maintenance, environmental rules and regulations, and report preparation.

We are calling because your input will assist us in program development and design.

1. Which of the following categories best describes the nature of your organization?
(Please circle all which apply)

	<i>Yes</i>	<i>No</i>
a) Agricultural	1	0
b) General Manufacturing, Production and Processing	1	0
c) Federal, State or Local Government	1	0
d) Transportation, Treatment, Storage, and Disposal Organization	1	0
e) Health Care Facility or Testing Laboratory	1	0
f) Environmental Engineering Service	1	0
g) Consultant	1	0
h) Chemicals and Allied Products	1	0
i) Other:		

2. Which of the following tasks apply to the services your organization provides?

	<i>Yes</i>	<i>No</i>
a) Interpret government regulations, and implement strategies for compliance.	1	0
b) Coordinate emergency response efforts.	1	0
c) Store, transport and dispose of waste and hazardous materials.	1	0
d) Develop, implement, and evaluate training in compliance with government regulations.	1	0
e) Sample, analyze, and interpret collected waste materials.	1	0
f) Purchase supplies and contract services needed to manage waste and hazardous materials.	1	0
g) Provide engineering or environmental consulting services.	1	0

3. How many environmental technicians do you have working in these areas?

3a. Part-time (30 hours or less per week)? _____ (actual number)

3b. Full-time (more than 30 hours per week)? _____ (actual number)

4. Among the technicians you employ full or part time, what are examples of their job titles and salary ranges for entry level positions?

Entry Level Job Titles

Entry Level Salary Range

a) _____ to _____ per hour

b) _____ to _____ per hour

c) _____ to _____ per hour

5. What are the main duties and responsibilities of your environmental technicians?

6. How do you recruit entry-level technicians?

7. If a two-year associate degree program to prepare environmental technicians is developed and implemented at Schoolcraft College or Oakland Community College would you look to these colleges as a source for potential new employees?

I _____ Yes

O _____ No

8. Do you have an immediate or do you foresee a future need for additional persons trained as environmental technicians?

Immediate

Future

1 _____ Yes

1 _____ Yes

0 _____ No

0 _____ No

(If "No" to both, skip to 11)

9. How many employees do you plan to hire this year?

_____ Full-time

_____ Part-time

Over the next five years?

_____ Full-time

_____ Part-time

10. What is the primary reason for needing these additional employees?

	<i>Yes</i>	<i>No</i>
a) Expansion of your operations	1	0
b) Employee turnover	1	0
c) Additional work needed to meet regulations or legislation	1	0
d) Other reasons. Please specify: _____		

11. What is the minimum educational qualification required by your organization for entry-level personnel in Environmental Technology?

	<i>Yes</i>	<i>No</i>
a) No specific educational requirement	0	1
b) High School diploma or equivalent	1	0
c) Certificate	1	0
d) Associate degree	1	0
e) Bachelor degree	1	0
f) Other education or degree, not listed (<i>Please specify</i>) _____		

12. As part of our review we are interested in understanding potential career paths for entry technicians. Could you explain what advancement opportunities are available, with examples of typical job titles.

13. Do you experience any difficulty finding well qualified entry level technicians?

1 _____ Yes

0 _____ No (Skip to 15)

14. What kind of recruiting problems do you encounter? _____

15. As you know, there are many skills and applications needed in your field. The following list is lengthy, but it is important for us to have accurate feedback from you in order to respond to your needs. Please rate how important it is for entry level technicians to have a strong knowledge base in the following applications using the scale: 3=Very Important, 2=Somewhat Important, 1=Not Important.

	<i>Very Important</i>	<i>Somewhat Important</i>	<i>Not Important</i>	<i>Unaware of</i>
a. Environmental Microbiology	3	2	1	8
b. OSHA 40/24 Hour Hazardous Material Training	3	2	1	8
c. Site Characterization & Remediation . .	3	2	1	8
d. Chemical Right-to-Know	3	2	1	8
e. Organic Chemistry	3	2	1	8
f. Computer-Aided Design	3	2	1	8
g. Waste Minimization	3	2	1	8
h. Transportation, Storage, & Disposal of Hazardous Materials	3	2	1	8
i. NICET Certified Technician	3	2	1	8
j. Emergency Response Planning	3	2	1	8
k. Construction Quality Control	3	2	1	8
l. Laboratory Procedures/Sampling/ Testing	3	2	1	8
m. Biology	3	2	1	8
n. Physical Geology and Geography	3	2	1	8
o. Conservation/Environmental Science . .	3	2	1	8
p. Health & Safety Training	3	2	1	8
q. Environmental Field Testing	3	2	1	8

r. Federal and State Environmental Laws and Regulations	3	2	1	8
s. Equipment Maintenance & Repair	3	2	1	8
t. Fundamentals of Surveying	3	2	1	8
u. Physics	3	2	1	8
v. Soil Testing	3	2	1	8
w. College Math (Algebra/Trig)	3	2	1	8
x. Technical Writing	3	2	1	8

16. Are there other specific courses, seminars or workshops which you feel should be tailored to meet your local training/education needs?

17. Does your organization provide any formal in-house or external environmental technology training for employees (not including orientation programs)?

a) In-house training:

1 _____ Yes If "yes," approximately how many programs do you do each year? _____
0 _____ No

b) External training:

1 _____ Yes If "yes," approximately how many programs do you attend each year? _____
0 _____ No *(If response to BOTH a and b are "NO", skip to 19)*

18. Can you describe the nature of the training? _____

19. Would your organization send current employees to either Schoolcraft or OCC for training in an Environmental Management Technology Continuing Education Program?

1 _____ Yes
0 _____ No
7 _____ Uncertain, please explain: _____

20. Would your organization consider offering internships (either paid or non-paid) for students in an Environmental Technician program?

PAID?

1 _____ Yes

0 _____ No

7 _____ Uncertain, please explain: _____

UNPAID?

1 _____ Yes

0 _____ No

7 _____ Uncertain, please explain: _____

21. Would you be willing to help in the design and development of an Environmental Technology program?
(This could include activities such as focus groups, advisory committee)

1 _____ Yes

0 _____ No

Thank you for your time and assistance. We appreciate your help and believe that your responses will help to influence what happens in our community colleges in the future. If you have any further questions please contact OCC's Office of Planning and Analysis at (313) 471-7746 or Schoolcraft's Office of Grants and Institutional Research at (313) 462-4470.

Interviewer: _____

Date: _____

Time interview finished: _____