

ENVIRONMENTAL STUDIES/  
ENERGY MANAGEMENT  
PROGRAM ASSESSMENT:  
Employment Opportunities and Outlooks

Prepared by

The Office of Institutional Planning & Analysis  
Oakland Community College

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TABLES

Table 1:	Employment Outlook for Careers Related to the Energy and Resource Management Option . . . . .	5
Table 2:	Employment Outlook for Careers Related to the Pre-Environmental Science Option . . . . .	6
Table 3:	Employment Outlook for Careers Related to the Environmental Site Analysis Option . . . . .	7
Table 4:	Employment Outlook for Careers Related to the Waste Management Option . . . . .	10
Table 5:	Employment Outlook for Careers Related to the Environmental Health Option . . . . .	11
Table 6:	Employment Outlook for Careers Related to the Pollution Control Option . . . . .	13
Table 7:	Environmental Studies/Environmental Management Programs at Michigan Educational Institutions . . . . .	14
Table 8:	Enrollments in and Graduates of Michigan Two-year and Four-year Environmental Programs (1986-1990) . . . . .	15

## CONTENTS

INTRODUCTION . . . . .	4
Initiation of Proposed Program . . . . .	4
Overview of the Assessment . . . . .	2
CAREERS AND CAREER OUTLOOK FOR PROGRAM OPTIONS . . . . .	2
Energy and Resource Management . . . . .	2
Pre-environmental Science . . . . .	2
Environmental Site Analysis . . . . .	2
Waste Management . . . . .	2
Environmental Health . . . . .	2
Pollution Control . . . . .	2
Option #1: Energy and Resource Management . . . . .	3
1. Alternative Fuels Technician . . . . .	3
2. Energy Auditor . . . . .	3
3. Energy Managers . . . . .	4
4. Energy Technician/Climate Control Mechanic . . . . .	4
5. Installer . . . . .	4
6. Manufacturer's Representative/Salesperson . . . . .	4
7. Sales Technician . . . . .	4
8. Service Technician . . . . .	5
Option #2: Pre-Environmental Science . . . . .	5
1. Environmental Professional . . . . .	5
Option #3: Environmental Site Analysis . . . . .	6
1. Chemical Laboratory Technician . . . . .	6
2. Engineering Technician . . . . .	7
Option #4: Waste Management . . . . .	7
1. Recycling Coordinator . . . . .	8
2. Waste Management Planning Coordinator . . . . .	8
3. Waste Management Technician . . . . .	8
4. Wastewater Treatment Plant Operator/Water Treatment Plant Operator Specialist) . . . . .	8
5. Water Quality Technician . . . . .	8
6. Water Treatment Laboratory Technician/Wastewater Treatment Laboratory Technician . . . . .	9
7. Water Treatment Plant Operator . . . . .	9
Option #5: Environmental Health . . . . .	10
1. Asbestos and Lead Removal Technicians . . . . .	10
2. Environmental Health Technician . . . . .	10
3. Radiation (Radon) Laboratory Technician . . . . .	11
4. Radon Technician . . . . .	11
Option #6: Pollution Control . . . . .	12
1. Air Pollution Control Technician/Air Technician . . . . .	12
2. Field Technician/Environmental Sampling Technician . . . . .	12
3. Pollution Control Technician . . . . .	12
4. Water Pollution Control Technician . . . . .	12
ENVIRONMENTAL STUDIES/ENERGY MANAGEMENT PROGRAMS IN MICHIGAN . . . . .	13
Colleges and Universities that Offer Two-Year and Four-Year Programs . . . . .	13
Enrollments and Graduates (1986-1990) . . . . .	14
INTERVIEWS OF POTENTIAL EMPLOYERS . . . . .	15
Procedures . . . . .	16
Results . . . . .	16
SUMMARY . . . . .	18
APPENDIX A: EMPLOYERS INTERVIEWED . . . . .	21
REFERENCES . . . . .	25

OAKLAND COMMUNITY COLLEGE  
ENVIRONMENTAL STUDIES/ENERGY MANAGEMENT  
NEEDS ASSESSMENT

INTRODUCTION

The purpose of this report is to explore the need for expanding the Alternate Energies Technology/Energy Management program, presently offered at the Auburn Hills campus of Oakland Community College, to an Environmental Studies/Energy Management program.

Initiation of Proposed Program

In April, 1991, Dr. Debra Rowe, Faculty member, presented a proposal for the expansion of the Alternate Energies Technology Program into an Environmental Studies/Energy Management Program to Dr. Bill Rose, Dean of Academic Services. The proposal outlined the following preliminary findings as a basis for the proposed program:

1. National, state and local governments express concerns about the environment and environmental health issues, e.g., increased attention given to environmental issues of hazardous waste and wetland destruction.
2. Most entry and higher level jobs require more formal education or experience.
3. Job opportunities in environmental fields seem to be expanding.
4. Business schools are beginning to offer courses on the environment because of the increase in environmental regulations and the availability of new environmental products.
5. Increased environmental regulation at the federal, state and local levels appears to create more jobs and retraining needs in both the public and private sectors.
6. Advisory committee members suggest that repositioning the Alternate Energies Technology (AET) program as part of an environmental studies program will increase enrollment in the AET program option as well as attract more students to the other option(s) in environmental studies.
7. The University of Michigan-Dearborn and Oakland University have expressed an interest in creating a 2 + 2 environmental studies program with OCC.

The proposal describes two program options: 1) Energy Resource Management, and 2) Pre-environmental Science. Energy Resource Management graduates will be ready for careers that require an associates degree, whereas Pre-environmental Science graduates will continue with requirements for completing a four-year degree program, such as the Environmental Management Program offered at Oakland University and The University of Michigan-Dearborn. The proposal also recommends needs analyses for other environmental program options as well. Thus, this report identifies and describes four additional options for the proposed program expansion.

## Overview of the Assessment

This preliminary report presents results of explorations in three areas, namely:

1. Careers and career outlooks for proposed OCC program options in Environmental Studies/Energy Management,
2. Michigan degree programs in Environmental Studies/Energy Management, and
3. Interviews of potential employers of OCC graduates.

Many careers involve expertise in dealing with the environment. Some environmental careers require completion of a two-year associates degree program, while other environmental careers require completion of a four-year degree program and beyond.

The major category for environmental careers that require a two-year associates degree is that of Environmental Technician. Environmental Technicians typically attend to hands-on activities designed to bring about environmental health, environmental safety, and pollution control. They facilitate cost effective and environmentally effective uses of energy resources. Such technicians generally work in lab settings, field settings, and/or business and institutional settings.

The overall category or title for environmental careers that require a four-year degree (and beyond) is that of an Environmental Professional. Environmental professionals protect our health and physical surroundings. They may be generalists or specialists.

Forecasters predict that career opportunities in environmental industries will increase. For example, Naisbitt (1991) predicts that the 1990's "will open up an extraordinary variety of career opportunities, both technical and nontechnical...Recycling laws will bring a flood of jobs."

Nevertheless, career opportunities among and within program options vary. The opportunities are significantly more evident for the environmental professional than for the environmental technician.

The viability and effectiveness of the existing Michigan degree programs in Environmental Studies/Energy Management are questionable. Only a very small percentage of students enrolling in these programs graduate.

Results of employer interviews reveal yet additional job titles and employment outlooks that vary from excellent to very poor. Nearly two-thirds of the companies, however, are currently looking for new employees.

## CAREERS AND CAREER OUTLOOK FOR PROGRAM OPTIONS

Six options for the proposed Environmental Studies/Energy Management program follow:

1. Energy and Resource Management (climate control)
2. Pre-environmental Science
3. Environmental Site Analysis (environmental laboratory, land management)
4. Waste Management (incineration, recycling, composting, household hazardous wastes)
5. Environmental Health (occupational safety and health)
6. Pollution Control (water and air pollution)

Each option for the proposed Environmental Studies/Energy Management Program opens career specialties to students who earn a two-year degree, or a four-year degree in their field of interest.

All of the suggested field options except the Pre-Environmental Science option, relate to career opportunities that are available to students with two year degrees. For the five options that require a two-year degree most jobs are for technicians: "These jobs are heavily oriented toward fieldwork or lab work and hands-on skills" (The CEIP Fund, 1989, p. 40).

For the Pre-Environmental Science option, a wide variety of positions as environmental generalists or specialists are available to students providing they attain a baccalaureate (or higher) degree.

A major challenge for encapsulating career outlooks for the entire environmental technician/energy management work force is that diverse types of institutions hire this work force under a wide variety of job titles. The types of institutions that employ environmentalists include, for example, energy auditing firms, management companies, energy products companies, architectural firms, health agencies, pollution control agencies, water treatment plants, and consulting firms. The complete list is coextensive with the extent that environmental and energy management problems that affect people, and subsequently, business and industry. The employment demands of each institution may vary greatly.

Neither the current Michigan Occupational Information System (MOIS) data files, nor the Michigan Employment Security Commission (MESC) Occupation/Industry Forecasts for 1995 attempts to project a general outlook for environmental technicians. This is because multiple job titles that claim fewer than 50 employees per year divide the field. In general, information from sources other than MOIS/MESC on environmental career outlooks for technicians is often tentative or vague.

The following descriptions sketch out the varied career specialties, diverse employers, and employment outlooks currently available for each of the six program options.

#### *Option #1: Energy and Resource Management*

Exploration of career outlooks for the eight career specialties identified with the Energy and Resource Management Program yielded limited opportunities. The most promising of these specialties for employment in the next five years is that of energy technician (MESC/MOIS, 1991), although a two-month examination of Sunday advertisements in The Detroit News and Free Press (1991) revealed no demand for an energy technician nor for any of the other Energy and Resource Management specialty careers.

#### 1. Alternative Fuels Technician

**Description.** Alternative Fuels Technicians work with engineers to develop and test cleaner gasolines, methanol, and methane for automobiles and special fleet programs.

#### 2. Energy Auditor

**Description.** Energy Auditors conduct audits of facilities to assess energy use and their potential for energy savings. They determine the energy saving products that are cost-effective for a given facility.

**Employers.** Energy auditing firms, utility company subcontractors, energy product manufacturers, and retailers and their representatives employ Energy Auditors.

### 3. Energy Managers

**Description.** Energy Managers have the same duties as Energy Auditors. Energy Managers also manage maintenance crews on energy saving product installation and maintenance, develop and manage preventive maintenance programs, and report to upper management on energy costs, savings, and new projects.

**Employers.** Medium-to-large corporations, management companies, cities, and universities are most likely to hire Energy Managers.

### 4. Energy Technician/Climate Control Mechanic

**Description.** Installing, maintaining and troubleshooting energy conservation equipment are major duties of Energy Technicians/Climate Control Mechanics.

**Employers.** Heat and cooling companies with energy divisions, energy products companies (e.g., energy management systems, energy efficient lighting companies), and energy contractors hire Energy Technicians/Climate Control Mechanics.

**Outlook.** The Michigan outlook appears to be better than the national outlook. *Nationally:* MOIS predicts average growth in employment of Energy Technicians. *Michigan:* MOIS predicts a shortage of Energy Technicians in Michigan and faster than average growth in job opportunities through 1995. Qualified Energy Technicians may select from an average of 260 job opportunities in Michigan annually (100 due to growth). Detroit area employers will offer 150 of those opportunities. (MOISCRIP T #156, 1991)

### 5. Installer

**Description.** Installers are a subgroup of Energy Technician/Climate Control Mechanics.

### 6. Manufacturer's Representative/Salesperson

**Description.** Salespersons and Manufacturers' Representatives sell energy conservation and pollution control equipment.

**Employers.** All pollution control and energy conservation product manufacturers, distributors or retailers, and energy contractors are the most likely hiring agents for knowledgeable Manufacturers' Representatives and Salespersons.

**Outlook.** The demand for salespersons is highly dependent upon the state of the economy. *Nationally:* Growth in demand for salespersons will be slower than for most occupations through 2000. Additional growth will occur with increasing demand for technical products but with economic downturns, manufacturers will demand fewer representatives because they will switch to retailers to sell their products. *In Michigan:* Depending on the state of the economy, the number of job opportunities will vary each year. (MOISCRIP T #105, 1991)

### 7. Sales Technician

**Description.** Sales Technicians help design energy conserving products for specific energy applications.

**Employers.** Institutions with a maintenance crew, energy contractors, or heating/cooling contractors are the major employers for Sales Technicians.

Outlook. Future projections for Sales Technician positions are not currently available. However, The Detroit News and Free Press is currently advertising for Sales Technicians.

### 8. Service Technician

**Description.** Service Technicians service energy conserving products.

**Employers.** Potential employers for Service Technicians are the same as for Sales Technicians.

In sum, current and future employment opportunities for students who specialize in Energy and Resource Management appear limited. If other jobs are available, employers may be advertising, if at all, elsewhere than in The Detroit News and Free Press. MOIS/MESC offers information only for two of the career specialties of Energy and Resource Management. The other career specialties are either only mentioned or omitted altogether because of the small number of Michigan employees in the specialized fields. The most promising career forecast is that of Energy Technician/Climate Control Mechanic (see Table 1), although a recent lack of demand evident in classified advertisements for these technicians does not support the assertion of current shortages in the field.

**Table 1: Employment Outlook for Careers Related to the Energy and Resource Management Option**

OPTION 1: ENERGY AND RESOURCE MANAGEMENT	
Career	Outlook
Alternative Fuels Technician	NA
Energy Auditor	NA
Energy Manager	NA
Energy Technician/Climate Control Manager	Nat: ave. growth MI: "shortage", 260 *
Installer (subgroup of Energy Technician)	
Manufacturer's Representative/Salesperson	Nat: ave. growth MI: varies, growth dependent upon economy
Sales Technician	NA
Service Technician	NA
*jobs annually	

### *Option #2: Pre-Environmental Science*

Students choosing the Pre-Environmental Science option position themselves for academic study beyond a two-year degree. They prepare for careers as environmental professionals. The field for environmental professionals is very diverse, and continues to change and evolve dramatically. As Environmental Protection Agency (EPA) representatives suggest "opportunities for meaningful and rewarding careers will be as diverse as the environment itself" (The CEIP Fund, 1989; 92).

### 1. Environmental Professional

**Description.** Environmental Professionals protect human health and the environment. Environmental Professionals are either general practitioners or specialized practitioners. General practitioners are either environmental scientists or environmental specialists, on the other hand, specialized



practitioners are geologists, chemists, engineers, toxicologists, epidemiologist, biostatisticians, industrial hygienists, hydrologists, or environmental lawyers, for example.

**Employers.** Potential employers of environmental professionals include architectural firms, the Federal government (e.g., U.S. Environmental Protection Agency), state and local governments, corporations, health agencies, management companies, research firms, and universities.

**Outlook.** *Nationally:* Environmental groups project growth of the environmental field into the next century. Representatives of the Center for Environmental Intern Programs, for instance, state that "there will be a continuing need for skilled professionals in all aspects of environmental protection and preservation"..., and "the environmental profession is in great demand"..., and further, that "by the year 2000 the environmental profession will be comprised of a larger percentage than ever before of individuals whose entire academic work experience and academic training has been 'environmental'." (The CEIP Fund, 1986; 1990, pp. 92, 98, 99; The CEIP Fund, 1986)

The number of classified advertisements for two-year degree candidates versus four-year degree candidates indicate that employment opportunities are more plentiful for someone with a four-year degree than for someone with a two-year degree. The listed opportunities for environmental professionals are eight times as great as opportunities for Environmental Technicians. That is, over a period of two months the Sunday "Classified Marketplace" of The Detroit News and Free Press advertised more than forty positions for persons at an Environmental/Energy professional level as compared to five employment opportunities for persons at a technician level.

In sum, employment opportunities for Environmental Professionals are great currently and the demand will increase into the next century (See Table 2). Qualified environmental generalists and specialists will find abundant career opportunities.

**Table 2: Employment Outlook for Careers Related to the Pre-Environmental Science Option**

<b>OPTION 2: PRE-ENVIRONMENTAL SCIENCE</b>	
<u>Career</u>	<u>Outlook</u>
Environmental Professionals	great demand, increasing demand through 2000

**Option #3: Environmental Site Analysis**

Employment opportunities are possible in two technical specialty careers of site analysis, namely, those of Chemical Laboratory Technician, and Engineering Technician.

**1. Chemical Laboratory Technician**

**Description.** Chemical Laboratory Technicians maintain equipment, weigh and mix chemicals, perform routine chemical and physical tests, and calculate amount of pollutants present in air. They may also analyze samples from soil, water, seawater, and industrial waste or sewage.

**Employers.** Private industry, environmental engineering firms, research companies, health agencies, treatment plants, and government agencies hire Chemical Laboratory Technicians.

**Outlook. Nationally:** Opportunities for Chemical Technicians (of which Chemical Laboratory Technicians are a specialty) will grow faster than average for all occupations through 2000. Private industry offers some job opportunities for Chemical Laboratory Technicians, while government agencies have even fewer job opportunities (Shapiro, 161). **Michigan:** Opportunities for Chemical Technicians will be only as fast as the average for all occupations through 1995. Most opportunities will be due to replacement needs. (MOISCRIP T #140, 1991)

2. Engineering Technician

**Description.** Engineering Technicians assist professional engineers. In particular, Engineering Technicians prepare and review plans and specifications for construction of water distribution systems, swimming pools, purification plants and waste water treatment facilities. They work on projects dealing with noise, air, or water pollution control.

In addition, Engineering Technicians may review construction details, inspect sites; estimate quantities of materials needed for a project, cost of repairs, and maintenance; conduct stream surveys and collect water samples; or inspect public water supplies and investigate environmental crises.

**Employers.** Many different employers hire Engineering Technicians. Employers include government pollution control agencies, consulting firms, architectural firms, municipal treatment plants, and private industry.

**Outlook. Nationally:** Jobs should be available for Engineering Technicians. Some of these jobs are temporary; they are created for meeting production deadlines. (Shapiro, pp. 161-162)

In sum, employment projections for jobs of Chemical Laboratory Technician and Engineering Technician are qualified and tentative (See Table 3). A survey of potential employers may be a more exact and effective way to determine current career opportunities in the field of Environmental Site Analysis.

**Table 3: Employment Outlook for Careers Related to the Environmental Site Analysis Option.**

OPTION 3: ENVIRONMENTAL SITE ANALYSIS	
<u>Career</u>	<u>Outlook</u>
Chemical Laboratory Technician	Nat: above ave. growth through 2000 possible MI: ave. growth through 1995
Engineering Technician	Nat: jobs should be available, some temporary

*Option #4: Waste Management*

Although the news media currently gives much publicity to waste management issues (e.g., use of incinerators, scarce landfill sites, need for recycling) and environmentalists predict growing need for environmental professionals in the waste management field (CEIP Fund, 1990, p. 86), neither MOIS nor other sources (e.g., Classified Marketplace) show evidence of a demand for graduates of two-year programs.

### 1. Recycling Coordinator

**Description.** Recycling Coordinators are in charge of recycling programs for a private company or a governmental unit (e.g., municipality or county). They coordinate curbside and community recycling programs or commercial recycling projects.

**Employers.** Recycling companies and governmental units (cities or counties) may hire a recycling coordinator.

### 2. Waste Management Planning Coordinator

**Description.** Waste management coordinators may do long range planning, assist with grant proposals, provide organizations with technical assistance, and facilitate the siting of recycling and waste facilities.

### 3. Waste Management Technician

**Description.** Waste Management Technicians operate sampling, monitoring and other data-gathering equipment that determine the effects of waste disposal on the environment and environmental health.

**Outlook. Nationally:** A national environmental health committee predicts a surplus of technicians through 1992 (Levine Associates, 1988)

### 4. Wastewater Treatment Plant Operator/Water Treatment Plant Operator Specialist)

**Description.** Wastewater Treatment Plant Operators operate and maintain wastewater treatment plants. Operators control the flow and processing of wastewater, and purify water from the plant before it enters rivers, streams or city mains.

**Employers.** City and state treatment plants, state environmental health agencies, private industry, Federal government, and the state of Michigan are likely employers of Water Treatment Plant Operators.

**Outlook. Michigan:** Private industry offers some career opportunities for Plant Operator Specialists (MOISCRIPPT #217). The Federal government offers a few opportunities as well. (Michigan Department of Civil Service)

### 5. Water Quality Technician

**Description.** Water Quality Technicians perform a variety of water quality monitoring and control activities to protect water resources for environmental and recreational purposes. Specifically, these technicians sample and perform chemical tests of lakes, streams, and wastewater treatment systems and their surrounding environments.

**Employers.** State government is the major employer of Water Quality Technicians.

**Outlook. Nationally:** Employers will demand an increasing number of opportunities for Water Quality Technicians through 1992. (Michigan Department of Civil Service; Levine Associates, p. 65)

## 6. Water Treatment Laboratory Technician/Wastewater Treatment Laboratory Technician

**Description.** Water Treatment Laboratory Technicians monitor water characteristics. They perform routine chemical, biochemical and physical analyses of samples taken from streams, raw and treated water, sludge and other byproducts of sewage treatment processes.

**Employers.** Community water treatment plants are the sole employers of Water Treatment Laboratory Technicians.

**Outlook.** *Nationally:* Anticipated growth of new treatment plants and expansion of existing facilities will cause a continuing demand for Water Treatment Laboratory Technicians. (Shapiro, pp. 150-151)

## 7. Water Treatment Plant Operator

**Description.** Water Treatment Plant Operators control equipment that removes impurities from raw water and produces clear drinkable water. They also monitor controls that regulate passage of water through filter beds and other processes. In addition, Water Treatment Plant Operators may keep records of tests and water samples, as well as handle complaints.

**Employers.** Community wastewater treatment plants are the major employers of Water Treatment Plant Operators.

**Outlook.** *Nationally:* Most occupational growth for Water Treatment Plant Operators will occur by the early 1990s, but then the growth rate will diminish due to an expected slowdown in the construction of new plants. *Michigan:* The growth will be as fast as the average for all occupations through 1995. Employers will offer an average of 60 openings annually (20 because of growth; 40 because of needed replacements). (Shapiro, pp. 148-149; MOISCRIP #217; Levine Associates, p. 65)

In sum, forecasters predict growth at the national level in waste management opportunities and for the environmental field in general. This growth may or may not apply to job opportunities at the technician level. Michigan offers few opportunities now and will offer only few in the near future. Although Water Quality Technicians are in demand nationally, the most promising career in waste management in Michigan is that of Waste Treatment Plant Operator (See Table 4).

**Table 4: Employment Outlook for Careers Related to the Waste Management Option.**

<b>OPTION 4: WASTE MANAGEMENT</b>	
<u>Career</u>	<u>Outlook</u>
Recycling Coordinator	NA
Waste Management Planning Coordinator	Nat: Surplus through 1992
Wastewater Treatment Plant Operator	Nat: NA MI: not many jobs available
Water Quality Technician	Nat: increased demand through 1992
Water Treatment Laboratory/ Wastewater Treatment Laboratory Technician	Nat: continued demand
Water Treatment Plant Operator	Nat: growth in early 90s, then a slowdown MI: average growth through 1995

**Option #5: Environmental Health**

Although concerns for environmental health are increasing locally as well as nationally, legislation and regulation have not yet resulted in increased demands for environmental health specialists in Southeastern Michigan.

**1. Asbestos and Lead Removal Technicians**

**Description.** Asbestos and Lead Removal Technicians work with contractors to alleviate lead or asbestos in buildings.

**Employers.** Contractors specializing in lead and asbestos problems hire Asbestos and Lead Removal Technicians.

**Outlook.** *Michigan:* Asbestos and Lead Removal Technician careers will last twenty to thirty years only. Few job opportunities are available. (Oakland County Department of Health)

**2. Environmental Health Technician**

**Description.** Environmental Health Technicians operate sampling, monitoring and data gathering equipment for health control and prevention.

**Employers.** Federal, state, and county government are the most likely employers of Environmental Health Technicians.

**Outlook.** *Nationally:* The nation will host a surplus of health technicians through 1992. *Southeastern Michigan:* Most government programs will hire no new people. The need for Environmental Health Technicians fluctuates greatly, but currently no shortages exist. Oakland County typically hires only one or two Health Technicians per year at most. (Levine Associates, pp. 68-70; Oakland County Department of Health)

### 3. Radiation (Radon) Laboratory Technician

**Description.** Radiation Laboratory Technicians analyze samples of air for radon levels

**Employers.** Radiological health laboratories hire Radiation Laboratory Technicians.

**Outlook.** *Nationally:* Job opportunities for Radiation Technicians will be best in the public sector. (Levine Associates)

### 4. Radon Technician

**Description.** Radon Technicians work with contractors to alleviate radon problems in buildings.

**Employers.** Contractors specializing in radon problems hire Radon Technicians

**Outlook.** *Nationally:* The supply of Radon Technicians is inadequate to meet present needs. *Michigan:* Job opportunities are few. Radon Technicians will not have long term careers. (Oakland County Department of Health; Levine Associates, pp. 69-70)

In sum, the environmental health field experiences passing demands for technicians due to the rise and fall of emerging environmental health problems and their solutions. For example, today's jobs due to hazardous presences of asbestos and radon may change to attention to other health threats in days ahead. Job opportunities due to rising and falling environmental health concerns are short-lived and point to a need for technicians with job flexibility and a broad background of knowledge and skills. Employment opportunities in Michigan in the field of environmental health are limited. Some jobs are temporary or transitional. (See Table 5)

Table 5: Employment Outlook for Careers Related to the Environmental Health Option.

OPTION 5: ENVIRONMENTAL HEALTH	
<u>Career</u>	<u>Outlook</u>
Asbestos and Lead Removal Technician	MI: few jobs (20-30 year career only)
Environmental Health Technician	Nat: surplus of technicians through 1992 SE MI: no shortage of technicians
Radiation Lab Technician	Nat: best opportunities in public sector
Radon Technician	Nat: shortage of technicians MI: few jobs (short term career)

## Option #6: Pollution Control

A recent front page of The Detroit News and Free Press (Saturday, August 10, 1991) featured three "Burning Issues", namely;

1. If Michigan rejects future incinerators, alternative plans will include more waste reduction and recycling.
2. Landfills are filling up, and people don't want new ones built in their communities. Recycling is only a partial answer.
3. Society must generate less trash. This means "unpackaging" or selling more products in bulk.

Frequent articles such as this one increase awareness of the need for pollution control, however, this awareness has translated into more opportunities for Environmental Professionals rather than Environmental Technicians.

### 1. Air Pollution Control Technician/Air Technician

**Description.** Air Pollution Control Technicians keep watch on pollution sources. In particular, they inspect smoke control equipment in factories, or tests engine exhausts from motor vehicles. They may operate a van with built-in electronic instruments to gather information on air pollution in traffic. Air Technicians also collect samples of outdoor air or pollutants, such as fumes or dust in the air, do routine tests on samples, record the amount of pollutants, and check and calibrate instruments. In addition, Air Technicians investigate air pollution complaints.

**Employers.** Many different types of institutions employ Air Technicians. Employers include city, county, state and Federal governments; departments of health, environment, transportation or traffic; and private engineering consultant firms.

**Outlook.** Nationally: A slight increase in demand for Air Technicians is due to new areas of concern; air toxins are creating significant work force needs. (Shapiro, pp. 156-157; Levine Associates, pp. 45,64)

### 2. Field Technician/Environmental Sampling Technician

**Description.** Field Technicians collect air, water, industrial waste and/or sewage samples.

**Employers.** The employers for Field Technicians are the same as for Chemical Laboratory Technicians.

**Outlook:** Michigan: Employers are currently advertising for Field Technicians. (Classified Marketplace, The Detroit News and Free Press)

### 3. Pollution Control Technician

**Description.** Same as Chemical Laboratory Technician

### 4. Water Pollution Control Technician

**Description.** Water Pollution Control Technicians assist professionals in data collection and verification for water pollution control projects, collect water samples, and sometimes conduct physical and chemical field tests to identify the composition of samples.

**Employer.** Private industry and consulting firms are the primary employers of Water Pollution Control Technicians.

**Outlook.** *Nationally:* Employers will increase their demand for Water Pollution Control Technicians through 1992. (Shapiro, pp. 151-152; Levine Associates, p. 47)

In sum, sources in the field of pollution control predict at least some demand for Pollution Control Technicians nationally and in Michigan. (See Table 6)

**Table 6: Employment Outlook for Careers Related to the Pollution Control Option.**

<u>OPTION 6: POLLUTION CONTROL</u>	
<u>Career</u>	<u>Outlook</u>
Air Pollution Control/Air Technician	Nat: some demand; continuing need
Field/Environmental Sampling Technician	MI: some demand
Water Pollution Control Technician	Nat: increased demand through 1992

In sum, the most promising option is Option 2, Pre-environmental Science. The limited and inconclusive nature of information for some careers may indicate either that for some options the jobs just aren't there, or for others that hidden pockets of opportunities haven't yet been discovered. (See the final summary for an abstract of the more promising careers for each option).

**ENVIRONMENTAL STUDIES/ENERGY MANAGEMENT PROGRAMS IN MICHIGAN**

Twenty-one colleges, institutes and universities in Michigan offer Environmental Studies/Energy Management programs. Although data from these institutions is incomplete, available data shows that very few students graduate from these programs in relation to the number of students enrolled in them.

**Colleges and Universities that Offer Two-Year and Four-Year Programs**

Twelve institutions offer two-year programs, and nine institutions offer four-year programs in Environmental Studies/Environmental Management:

Two year programs

- Bay De Noc
- Careerworks, Inc.
- Grand Rapids Community College
- Lake Superior State University
- Lansing Community College
- Macomb Community College
- Mid Michigan Community College
- Mott Community College
- Northern Michigan University
- Oakland Community College
- RETS Institute of Technology
- Schoolcraft College

Four year programs

- Eastern Michigan University
- Ferris State University
- Jordan College
- Jordan Energy Institute
- Michigan Technological University
- Oakland University
- University of Michigan, Ann Arbor
- Wayne State University
- Western Michigan University



Seven program options in the two-year and four-year programs correlate with the program options proposed for Oakland Community College in Environmental Studies/Environmental Management. (See Table 7 for list of related programs and the number of Michigan institutions offering these programs) (Malitz, 1987-1988).

**Table 7: Environmental Studies/Environmental Management Programs at Michigan Educational Institutions.**

<u>Environmental Programs at Michigan Colleges, Institutes and Universities</u>	<u>Number of Programs</u>	
	<u>2 yr</u>	<u>4yr</u>
Air Pollution Control Technologies	NA	NA
Energy Conservation and Use Technology	4	5
Environmental Control Technologies. Other	6	2
Environmental Health Engineering	0	4
Sanitation Technology	1	1
Solar Heat and Cooling Technologies	1	0
Waste and Wastewater Technologies	5	0
<b>TOTAL NUMBERS OF PROGRAMS</b>	<b>17</b>	<b>12</b>

Two-year institutions offer 17 programs while four-year institutions offer 12 programs. The majority of the two-year programs focus on Environmental Control Technologies, Waste and Wastewater Technologies, and Energy Conservation and Use Technology. The majority of four-year programs focus on Energy Conservation and Use Technology, and Environmental Health Engineering.

#### Enrollments and Graduates (1986-1990)

The Michigan Department of Education reports enrollments and numbers of graduates from the environmental programs over the last five years, 1986 through 1990. (See Table 8; See Appendix B)

Table 8: Enrollments and Graduates of Michigan Two-Year and Four-Year Environmental Programs (1986-1990)

<u>Environmental Programs in Michigan</u>					
<u>Program</u>	<u>Yrs*</u>	<u>Enrollments</u>		<u>Graduates</u>	
		<u>1986-90</u>	<u>Ave</u>	<u>1986-90</u>	<u>Ave</u>
Air Pollution	2	NA	-	NA	-
Control Technology	4	NA	-	NA	-
Energy Conservation	2	137	27	1	0
and Use Technology	4	NA	-	2	0
Environmental Control	2	319	64	1	0
Technology	4	NA	-	4	0
Environmental Health	2	None	-	None	-
Engineering	4	NA	-	3	1
Sanitation	2	28	6	0	0
Technology	4	NA	-	0	0
Solar Heat and Cooling	2	37	7	NA	-
Technology	4	None	-	None	-
Water and Wastewater	2	350	70	6	1
Technology	4	None	-	None	0

\*length of program

Between 1986 and 1990 the total enrollment for five environmental programs that award associates degrees was 871. The average enrollment of these programs per year was 174. The number of graduates fails to measure up to enrollment figures. The total number of graduates from four of the two-year programs is only 8 and the total graduates from three of the four-year programs was 9.

In sum, the ratio of graduates in relation to student enrollment in the four two-year environmental programs (for which data is available for both enrollments and graduates for the five years) is 1:105. In other words, fewer than one percent of students enrolled in environmental associates degree programs have graduated from the programs. Data is not available to explain why students fail to continue in the programs.

#### INTERVIEWS OF POTENTIAL EMPLOYERS

Employers from different companies offered information regarding possible employment opportunities for persons with Associates' Degrees in Environmental Studies/Energy Management. Although data in itself is inconclusive, corroborated with other information, results of this limited study may support other information about environmental careers or employment outlooks and, as a result, the planning of Environmental Studies/Energy Management programs.

## Procedures

As a trial or pilot study the interviewer selected environmental/energy management enterprises (See Appendix B) from the following sources:

1. Environmental Specialists (Envirotherm)
2. Yellow Pages
3. Association for Energy Engineers Mailing List
4. Independent Energy Industry Directory, 1991
5. Classified Ad, Detroit News, Sunday, September 2, 1991

Fifteen respondents were questioned regarding hiring practices and employment outlook, in particular:

- available positions for persons with Associates Degrees
- titles of positions available
- job descriptions for the positions
- entry level salaries
- the number of environmental/energy technicians employed
- outlook for employment in the environmental/energy field
- reasons for hiring more personnel
- whether or not the company is currently hiring
- where the company advertises job openings
- whether or not the company anticipates hiring more personnel in the next five years.

## Results

Ten of fifteen respondents, 67 percent, reported that positions are available with their companies for persons with Associates Degrees. The respondents identified and described briefly nine existing positions in their respective companies:

<u>Position Title</u>	<u>Job Description</u>
Construction Site Analyst	NA
Electronics Technician	Test electronic operation of photovoltaics
Engineering Technician	Engineering assistant
Environmental Specialist	NA
Environmental Technologist	Enter data, operate air quality equipment
Field Technician	Collect samples, extract soil borings, conduct site analyses
Meter Reader	Report gas and electric usage
Pipeline Mechanic	Repair gas pipelines

Note that in this limited study respondents reported four new position titles not identified earlier, namely, Construction Site Analyst, Electronics Technician, Meter Reader, and Pipeline Mechanic. The implications are that either the new position titles do not relate to preparations for the careers the program provides, and/or that the emergence of new position titles is another indicator that the field of environmental studies/energy management is expanding and its parameters are not yet defined.

Entry level starting salaries for the nine position respondents identified range from \$18,500 to \$30,000. Seventy-eight percent of the employers offer entry level salaries of \$18,500 to \$25,000, and twenty-two percent of employers offer entry level salaries of \$26,000 to \$30,000.

The number of environmental/energy persons that companies represented in the study employ varies greatly. The number of environmental/energy employees, ranging from one to ninety, reflects the size variations and geographical extent of the companies. Forty percent (4) of the companies employ one to nine environmental/energy persons; fifty percent (5) of the companies employ ten to fifty environmental persons; and ten percent (1) of the companies employ ninety environmental/energy persons.

Respondents made a range of predictions for environmental technology/energy management as a field to enter. In sum, 57 percent (8) responses were positive, either "excellent", "very good" or "good", and, on the negative side, 43 percent (6) of the responses were negative, either "fair", "tough", "disappointing", "poor" or "very poor".

Most respondents qualified or offered reasons to support their predictions. The following percentages refer to the number of persons who predicted career outlooks within the range of "Excellent" to "Very Poor":

- Excellent (21%) - 'Any type of career in the environmental field is very promising'
- Very good (21%) - 'but there is increasing competition for qualified applicants'
- 'the more specialized an individual is, the more opportunities they will have'
- 'very good for B.S. plus'
- Good (14%) - 'good considering the current demands for people to be more environmentally responsible'
- 'it is good, steady work'
- Fair (7%) - 'fair for persons with Associates Degree, with plans to continue education, possible part time employment'
- Tough (14%) - 'tough because of marketing conditions and increasing competition among environmental companies. In other words, lost bids mean lost jobs'
- 'Energy management is a tough field to enter due to lack of opportunity, but is a very important field. You will find that private companies hire more energy managers than municipalities.'
- Disappointing (7%) - 'A person entering the solar energy field at this time may be disappointed. A person needs to make a conscious decision and be willing to make sacrifices for the environment. There does seem to be an upsurge in interest in Solar Energy since the Gulf War. The attitudes of businesses are changing. In the field of Energy Management there will be more opportunity as businesses turn towards conservation and people try to do more for the environment.'
- Poor (7%) - 'If one has an Associates Degree only'
- Very Poor (7%) - 'At this time'

Of the responding companies who employ Environmental Technicians/Energy Managers 66 percent of them are currently looking for employees. Their reasons for hiring include the following:

- expansion of the organization, increased business volume (5)
- turnover, people promoted and advancing with the company (1)
- greater state and Federal requirements (1)

Seven of the companies indicated that they are looking for prospective Environmental Technician/Energy Management employees with knowledge and/or abilities to perform the following tasks:

1. Construct surveys (3)
2. Collect samples (2)
3. Conduct field tests (2)
4. Conduct lab tests (1)
5. Analyze sites (1)
6. Operate lab equipment (1)
7. Monitor test equipment (1)
8. Write technical reports (1)
9. Maintain equipment (1)
10. Know building construction and building systems (1)
11. None or some background in building codes or construction (The company likes to train its new hires.) (1)

All these tasks, except those related to building construction, are typical of task descriptions for technician careers.

#### **SUMMARY**

Career opportunities related to the six program options vary. The opportunities are significantly more apparent and ample for the person who would complete the Pre-Environmental Science Option plus a complementary program at a co-operating four-year college or university to become an Environmental Professional than for the person who completes any of the other five options to become (in most cases) an Environmental Technician.

An abstract of the more promising of these career outlooks within each option follows:

*Energy and Resource Management* - Information is limited. Although the nation will experience average growth in opportunities for Energy Technicians, Michigan will experience a shortage of these technicians through 1995.

*Pre-Environmental Science* - Environmental Professionals are experiencing a great demand for their services. This demand will increase into the next century for qualified Environmental Generalists and Environmental Specialists.

*Environmental Site Analysis* - Nationally employment opportunities for Chemical Laboratory Technicians may experience above average growth through 2000. In Michigan growth will be average.

*Waste Management* - The nation is demanding more Water Quality Technicians. The most promising waste management career in Michigan, however, is that of Waste Treatment Plant Operator.

*Environmental Health* - Currently the number of Radon Technicians is not sufficient to meet the nation's demands. Employment opportunities in Michigan in the field of environmental health are few. Some of these jobs are temporary or transitional.

*Pollution Control* - Sources in the field of pollution control predict at least some demand for Pollution Control Technicians nationally and in Michigan. The nation's demand for Water Pollution Control Technicians is increasing.

Within the last five years 871 students have enrolled in postsecondary environmental programs similar to the ones proposed for OCC. However, only nine of the students who enrolled have graduated from the programs.

Results of employer interviews of firms who would hire Environmental Technicians reveal that 57 per cent of their employment outlooks were positive. Almost two-thirds of the companies are currently looking for new Environmental/Energy Management employees.

**APPENDIX A: EMPLOYERS INTERVIEWED**

### LIST OF EMPLOYERS INTERVIEWED

1. **AATEC Publications.** (Book Publisher). Publisher of Solar Energy books.
2. **ABB Environmental.** (Environmental Engineering). Environmental engineering, site assessments, air quality monitoring, currently employs 25 technicians.
3. **American Natural Resources.** (Transportation Company, Pipeline). Large national natural gas pipeline company. 1,500-2,000 employees.
4. **Applied Science and Technology.** (Environmental Engineering, Occupational Health and Safety Consultants). Site assessments, asbestos monitoring and removal, water quality testing.
5. **ATEC.** (Environmental Engineering, Environmental Consultants) National company with branches in 50 states, mostly Northeastern and Southeastern.
6. **City of Ann Arbor.** (Energy Management/Government). Energy management department.
7. **CMS Generation.** (Transportation, Pipeline). Michigan Gas Company. 1,500-2,000 employees.
8. **Consumers Power.** (Utility). Large Michigan gas company.
9. **Detroit Edison.** (Utility). Large Michigan electric company.
10. **Energy Conversion Devices.** (Solar, Electrical Energy). Medium sized company, hires many O.C.C. graduates.
11. **ERM Environmental.** (Environmental Engineering, Environmental Consultants). Provides remedial analyses of work sites, and environmental analyses for developers; employs fifty full-time technicians nationally.
12. **Great Lakes Environmental.** (Hazardous Waste Management). The company has branches in Ohio, Indiana, Illinois, and Michigan
13. **Great Lakes Gas Transportation Corporation.** (Transportation, Pipeline). Natural gas transportation throughout the Midwest, fewer than 250 employees
14. **Industrial Environmental Consultants.** (Environmental Engineering, Occupational Health and Safety). Asbestos testing and monitoring firm with three branches in Michigan, and one in Chicago.
15. **NAVE Environmental Service.** (Environmental Engineering, Occupational Health and Safety, expanding into Hazardous Waste Management). Asbestos removal monitoring, expanding into hazardous waste hauling and oil recycling.
16. **NTH Consultants.** (Environmental Engineering, Environmental Consultants). The company provides consulting for developing and remedial work projects, construction projects and landfills, employs ten full time technicians, three seasonal technicians, plus field engineers.

### COMPANIES/ENTERPRISES THAT DID NOT RESPOND--

AC Rochester G.M.C.	A&C Intercom
Applied Science and Technology	Audubon Society
Citizens Gas & Fuel	Clayton Environmental
Dell Engineering	General Motors, Energy Section
Groundwater Technology	Michigan Audubon Society
Michigan Consolidated Gas Company	Michigan Gas Utilities
Midland Cogenerational Venture	Petro Chemical Processing
RMT Technologies	SE Michigan Gas Enterprises
Superior Environmental	



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## ENVIRONMENTAL SCIENCE CONSORTIUM MEMBER LIST

Marty Orlowski  
Director - Institutional Planning & Analysis  
Oakland Community College  
Orchard Ridge Campus  
27055 Orchard Lake Road  
Farmington Hills, MI 48334-4579  
(313) 471-7746  
(313) 471-7544 FAX

Dr. David Doidge  
Dean, Academic Services  
Oakland Community College  
27055 Orchard Lake Rd.  
Farmington Hills, MI 48334  
(313) 471-7707  
(313) 471-7544 FAX

Kay Palmer  
Research Assistant  
Office of Institutional Planning & Analysis  
Oakland Community College  
Orchard Ridge Campus  
27055 Orchard Lake Road  
Farmington Hills, MI 48334-4579  
(313) 471-7746  
(313) 471-7544 FAX

Cathy Augustine  
Primary Researcher  
Office of Institutional Planning & Analysis  
Oakland Community College  
Orchard Ridge Campus  
27055 Orchard Lake Road  
Farmington Hills, MI 48334-4579  
(313) 471-7746  
(313) 471-7544 FAX

Denise Sigworth  
Director - Grants and Institutional Research  
Schoolcraft College  
18600 Haggerty Road  
Livonia MI 48152-2696  
(313) 462-4454  
(313) 462-4470 FAX

Midge Carleton  
Assistant Dean Allied Health  
Schoolcraft College  
18600 Haggerty Road  
Livonia MI 48152-2696  
(313) 462-4528  
(313) 462-4543 FAX

Till Peters  
Dean of Occupational Education  
Grand Rapids Junior College  
143 Bostwick Ave NE  
Grand Rapids MI 49503  
(616) 771-3920  
(616) 771-3907 FAX

Rebecca Wieland  
Assistant Dean - Occupational Programs  
Delta College  
University Center, MI 48710  
(517) 686-9472  
(517) 686-8736 FAX

Robert Welch  
Faculty Advisor/Instructor  
Lansing Community College  
419 North Capitol Avenue  
Lansing MI 48901-7211  
(517) 483-9675  
(517) 483-9619 FAX

Larry Kodoski  
Faculty  
Auburn Hills Campus  
2900 Featherstone Road  
Auburn Hills MI 48326-2845  
(313) 340-6818

Eldon Enger  
Professor of Biology  
Delta College  
University Center MI 48710  
(517) 686-9244

Janet Dettloff  
Department Head - Life & Physical Sciences  
Wayne County Community College  
801 Fort Avenue, Detroit MI 48226  
(313) 496-2740  
(313) 496-0451 FAX

Donald Olson  
Dean of Vocational & Career Education  
Wayne County Community College  
801 Fort Avenue, Detroit MI 48226  
(313) 496-2859  
(313) 496-0451 FAX

Dick Cookman  
Faculty  
Northwestern Michigan College  
1701 E Front Street, Traverse City  
MI 49684  
(616) 922-1264

Dr. John Cooper  
Dean of Career & Occupational Education  
Kellogg Community College  
450 North Avenue  
Battle Creek  
MI 49017-3397  
(616) 965-3931 x2357  
(616)965-4133 FAX

Charles Dee  
Dean of Instruction  
Mid Michigan Community College  
1375 South Clare Avenue  
Harrison MI 48625-9447  
(517) 386-7792



OAKLAND COMMUNITY COLLEGE

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November 25, 1992

James H. Folkening  
Supervisor  
Community College Services Unit  
Michigan Department of Education  
P. O. Box 30008  
Lansing, Michigan 48909

Dear Jim,

On September 29, 1992, the Environmental Studies Research Consortium held its first meeting at Oakland Community College (Orchard Ridge Campus). This meeting resulted in the identification of two occupational areas (Water/Waster Water Technology and Hazardous Materials Technology) that would be the focus of the consortium's research.

The initial grant (7021-3) was funded for \$6,226.00. This funding supported Oakland Community College and Schoolcraft College's research efforts which were to be focused in the Southeast Michigan region. As the result of your correspondence (September 22, 1992) to all twenty-nine Michigan community colleges the consortium has grown to include a total of eight (8) colleges. They include:

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

In order for the consortium's research to be of value to all members, we segmented the state into six regions which includes each consortium member's service area. Consequently, the addition of six colleges (five regions) to the original project design, has resulted in increased costs for the research.

The Environmental Studies Research Consortium is requesting an additional \$2,650 to complete its research. Additional costs primarily center on data collection in each region as well as data processing (coding, data entry). Furthermore, analysis and interpretation is made more complicated given the unique characteristics of each region.

James H. Folkening  
November 25, 1992  
Page 2

Attached you will find a detailed summary of the additional costs associated with the consortium's research. Insufficient funding would cause the consortium to reconsider researching one of the two occupational areas which are planned for this project.

We look forward to your prompt response. If you should have any questions, please do not hesitate to contact me at (313) 471-7746.

Sincerely,



Martin A. Orlowski, Director,  
Institutional Planning & Analysis

pc: D. Sigworth

enc

/s

ENVIRONMENTAL STUDIES RESEARCH CONSORTIUM  
ADDITIONAL FUNDING REQUEST

Phone calls	400.00
Coding	250.00
Data Entry	175.00
Analysis	400.00
Support Staff	350.00
Report Writing	550.00
Report Document (state wide distribution)	350.00
Miscellaneous	175.00
	=====
TOTAL	\$2,650.00

STATE OF MICHIGAN

DEPARTMENT OF EDUCATION

P.O. Box 30008  
Lansing, Michigan 48909

September 23, 1992

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Dr. Patsy Fulton  
Chancellor  
Oakland Community College  
2480 Opdyke Road  
Bloomfield Hills, Michigan 48304-2266

SUBJECT: Study on the Training Needs for an Environmental Science/Studies Curriculum

Dear Chancellor Fulton:

On June 10, 1992 the State Board of Education approved the expenditure of federal vocational education funds for program planning grants when two or more colleges identify a topical area as an emerging occupation and a unique study is to be conducted for the benefit of community college systems. Oakland Community College and Schoolcraft College have submitted a proposal to conduct a review of the occupational education and training needs of the environmental science/studies industry in southeastern Michigan.

As fiscal agent for this project, Oakland Community College has been awarded a grant in the amount of \$6,226 to cover the budget as outlined in the July 2, 1992 letter from Ms. Denise Sigworth, Director, Grants and Institutional Research, Schoolcraft College. This grant award, project number 7021-3, represents a portion of the total budget approved under the provisions of Public Law 101-392, the Carl D. Perkins Vocational and Applied Technology Act. The Code for Federal Domestic Assistance (CFDA) number for this grant is 84.048A.

The Final Expenditure Report will be sent to your business office after June 30, 1993 for completion. In addition, a final narrative report or the survey report is due to the Community College Services Unit no later than August 15, 1993.

Please direct questions regarding this grant award to Mr. James H. Folkening or Mr. Jerry L. Forrest, Community College Services Unit, (517) 373-3361.

Sincerely,

Robert E. Schiller

cc: Administrative Secretary,  
State Board of Education

C. Danford Austin

David Doidge

Gary D. Hawks

bcc: Richard W. McDowell

Martin Orlowski

Denise 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 per 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	\$461.20			
TOTAL	\$6226.20			

*Approved*  
*[Signature]*  
9/16/92



Survey Number\_\_\_\_\_

**WATER/WASTEWATER TREATMENT  
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**

**The programs we are considering may be two year degree granting programs, one year certificate granting programs or continuing education programs for those currently working in the field. We are interested in information regarding water and wastewater treatment, be it sewage treatment, industrial treatment, groundwater treatment or any other related areas. Please feel free to expand on our questions with your own thoughts and opinions.**

5. Are you currently hiring entry level water or wastewater technicians or operators?

1 \_\_\_\_\_ Yes

0 \_\_\_\_\_ No (Skip to 7)

6. What is the primary reason for hiring these employees?

	Yes	No
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: _____		

7. What is the minimum **educational** qualification required by your organization for entry level personnel in Water and Wastewater Treatment?

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

8. Do you require your operators or technicians to be certified?

	Yes	No
	1	0

Please explain. (Try to obtain the specific level and name of the certificate)

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14. Please rate how important it is for entry level technicians or operators 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>
a. Algebra/Math . . . . .	3	2	1
b. Applied Hydraulics . . . . .	3	2	1
c. Chemistry . . . . .	3	2	1
d. Microbiology . . . . .	3	2	1
e. Utility Equipment Maintenance . . . . .	3	2	1
f. Utility Electrical Maintenance . . . . .	3	2	1
g. Laboratory Procedures . . . . .	3	2	1
h. Physical Geology and Geography . . . . .	3	2	1
i. Hydrogeology/Ground Water . . . . .	3	2	1
j. Federal and State Environmental Laws and Regulations . . . . .	3	2	1

15. Are there other skills you would like your entry level employees to have? Please explain. \_\_\_\_\_

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

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Updated:11/24/92

WATER/WASTE WATER TECHNOLOGY NEEDS ASSESSMENT  
EMPLOYER SURVEY  
CODE BOOK

<u>Variable</u>	<u>Column</u>	<u>Description/Codes</u>
ID	1-3	Survey ID number. 100-199=South-East Michigan (Detroit) 200-299=South-Central Michigan (Lansing) 300-399=Lower-Western Michigan (Battle Creek) 400-499=Mid-Western Michigan (Grand Rapids) 500-599=North-Western Michigan (Traverse City) 600-699=Mid-Central Michigan (Bay City)
		1. Which of these functions are performed by your organization?
SEWAGE	4	a) Sewage Treatment 1=Yes 0=No 9=Unknown/No response
INDUSTRI	5	b) Industrial Wastewater Treatment (Same as SEWAGE)
STORMWAT	6	c) Stormwater Runoff Control (Same as SEWAGE)
MUNICIPA	7	d) Municipal Water Treatment (Same as SEWAGE)
REMIEDIAT	8	e) Water Remediation (Same as SEWAGE)
QUALITY	9	f) Water Quality Testing (Same as SEWAGE)
SOIL	10	g) Soil Testing (Same as SEWAGE)
OTHER	11	h) Other (Same as SEWAGE)
		2. How many operators and technicians do you have working in these areas?
PART	12-14	a) Part-time (30 hours or less per week) Actual number 999 No response
FULL	15-17	b) Full-time (more than 30 hours per week) Actual number 999 No response

3. Among the technicians and operators you employ full or part time, what are examples of their job titles and salary ranges?

TITLE1	18	a. Trainee 1=Yes 0=No 9=Unknown/No Response
WAGE1	19-23	b. Trainee annual salary. Actual number 99999=Unknown/No Response
TITLE2	24	c. Mechanic 1=Yes 0=No 9=Unknown/No Response
WAGE2	25-29	d. Mechanic annual salary. Actual number 99999=Unknown/No Response
TITLE3	30	e. Operator 1=Yes 0=No
WAGE3	31-35	f. Operator annual salary Actual number 99999=Unknown/No Response
TITLE4	36	g. Technician 1=Yes 0=No 9=Unknown/No Response
WAGE4	37-41	h. Technician annual salary Actual number 99999=Unknown/No Response
TITLE5	42	i. Field Engineer 1=Yes 0=No 9=Unknown/No Response
WAGE5	43-47	j. Field Engineer annual salary Actual number 99999=Unknown/No Response
HIRING	48	5. Are you currently hiring entry level water/wastewater technicians or operators? 1=Yes 0=No 9=Unknown/No Response

6. What is the primary reason for hiring these employees?

EXPAND	49	a) Expansion of your operations 1=Yes 0=No 8=Does not apply 9=Unknown/No Response
TURNOVER	50	b) Employee turnover (Same as EXPAND)
ADDITION	51	c) Additional work needed to meet regulations or legislation. (Same as EXPAND)
OTHERB	52	d) Other reasons. (Same as EXPAND)
		7. What is the minimum educational qualification required by your organization for entry level personnel in Water/Waste water Treatment?
NONE	53	a) No specific educational requirement 1=Yes 0=No 9=Unknown/No Response
HIGHSCH	54	b) High School diploma or equivalent (Same as NONE)
ASSOC	55	c) Associate degree (Same as NONE)
BACHELOR	56	d) Bachelor degree (Same as NONE)
CERTIF	57	e) Certificate (Same as NONE)
OTHERC	58	f) Other (Same as NONE)
REQUIRE	59	8. Do you require your operators or technicians to be certified? 1=Yes 0=No 9=Unknown/No Response
		9. Please consider the following list of skills and qualifications you as an employer would evaluate when hiring water or wastewater employees.
TEAM	60	a) Ability to work as a team member 3=Very important 2=Somewhat important 1=Not important 9=Unknown/No Response
ORGANIZE	61	b) Organizational skills (Same as TEAM)
INITIATE	62	c) Ability to use individual initiative

		(Same as TEAM)
WRITING	63	d) Writing skills (Same as TEAM)
MATH	64	e) Mathematical skills (Same as TEAM)
SPEAKING	65	f) Good speaking skills (Same as TEAM)
PROBLEM	66	g) Problem solving skills (Same as TEAM)
COMPUTER	67	h) Computer skills (Same as TEAM)
FINDING	68	11. Do you experience any difficulty finding well qualified entry level personnel? 1=Yes 0=No 9=Unknown/No Response
		14. Please rate the importance of the following skills for entry level technicians.
ALGEBRA	69	a) Algebra/Math 3=Very Important 2=Somewhat Important 1=Not Important 9=Unknown/No Response
HYDRAUL	70	b) Applied Hydraulics (Same as ALGEBRA)
CHEMIST	71	c) Chemistry (Same as ALGEBRA)
MICROBIO	72	d) Microbiology (Same as ALGEBRA)
EQUIPMEN	73	e) Utility Equipment Maintenance (Same as ALGEBRA)
ELECTRIC	74	f) Utility Electrical Maintenance (Same as ALGEBRA)
LABORAT	75	g) Laboratory Procedures (Same as ALGEBRA)
GEOLOGY	76	h) Physical Geology and Geography (Same as ALGEBRA)
HYDROGEO	77	i) Hydrogeology/Ground Water (Same as ALGEBRA)

REGULATE	78	j) Federal and State Environmental Laws and Regulations (Same as ALGEBRA)
		17. Does your organization provide any formal in-house or external water or wastewater training for employees?
INHOUSE	79	In-House training 1=Yes 0=No 9=Unknown/No Response
EXTERNAL	80	External training 1=Yes 0=No 9=Unknown/No Response
		18. Would your organization consider offering internships (either paid or non-paid) for students in a water or wastewater treatment program?
PAIDINTE	81	PAID? 1=Yes 0=No 7=Uncertain 9=Unknown/No Response
UNPAIDIN	82	UNPAID? 1=Yes 0=No 7=Uncertain 9=Unknown/No Response
WILLING	83	19. Would you be willing to help in the design and development of a Water or Wastewater Treatment program? 1=Yes 0=No 9=Unknown/No Response



Marty: looks good to me. Dave.

## EMERGING TECHNOLOGIES CONSORTIUM

### 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 Association Degree program for the two schools.

*Associate*

**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 20 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 <sup>are</sup> prefer to jointly 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 <sup>is</sup> 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 <sup>ed</sup> review the potential for a Waste Management program. In addition, faculty from the sciences are interesting in developing an articulated pre-environmental sciences program with 4 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

Do you want to include  
the specific fund -  
"Emerging Technologies/  
Consortium"

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 6 month time period.

**Methodology:** A literature search will be conducted which documents all recent developments in environmental science. Included will be 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.

*Federal and state  
legislation?*

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.

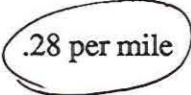
The survey results will be analyzed using a PC based statistical program. The final report will highlight the key areas of the assessment. All throughout the process, the focus group will review drafts, provide input and link information to workplace training needs.

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.

<b>Objectives</b>	<b>Timelines</b>	<b>Person(s) Responsible</b>
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				Supporting materials
Literature Search	\$400.00			Examination and collection of reference material
Travel	\$125.00			Mileage
Phone	\$450.00			Employer and expert interviews
Copying	\$150.00			Supporting material, final report
Sub-total:	\$5765.00			
8% Indirect	\$461.20			
TOTAL	\$6226.20			

State rate is 23¢



OAKLAND COMMUNITY COLLEGE

ORCHARD RIDGE CAMPUS • 27055 ORCHARD LAKE RD. • FARMINGTON HILLS, MICHIGAN 48018 • 313-471-7500

October 2, 1992

Dear Environmental Science Emerging Technologies Consortium Members,

As a follow-up to our September 29, 1992 meeting, I have prepared the enclosed summary of our discussions. This first meeting was very productive in establishing clear direction in terms of beginning to identify possible environmental science programs which might be developed at our institutions.

I have also included a list of all consortium members along with their institution, phone number, and fax number. If you should have any questions throughout the research process, please do not hesitate to call me at (313) 471-7746.

Sincerely,

A handwritten signature in blue ink that reads "Martin A. Orlowski".

Martin A. Orlowski,  
Director  
Institutional Planning & Analysis

Enc. Meeting Summary  
Consortium Membership List

pc: J. Forest  
D. Jaksen

/s

ENVIRONMENTAL SCIENCE EMERGING TECHNOLOGY CONSORTIUM  
September 29, 1992 Meeting Summary

1. The status of Environmental Science programs at each college was discussed. As a result of this discussion it became apparent that considerable diversity exists between colleges in terms of developing and implementing Environmental Science programs. This further highlighted the evolving nature of the field.
2. It was decided that two specific areas would be assessed under the current grant; Water/Waste Water and Hazardous Waste (solid).
3. Information gained in the current research would begin to identify other potential curriculum for development including: pre-environmental science, soil testing etc.
4. The process for conducting the needs assessment was outlined and included the following steps:
  - Literature review
  - Examination of existing college and university programs
  - Employer survey by region
  - Employer focus group
  - In depth interviews with local, regional and national experts
5. Additional grant funding will be sought in order to compensate for the geographic diversity of consortium member institutions. This will enhance the validity and reliability of employer information which is regionally based.
6. Consortium members will be kept informed through Fax and phone conversations in order to reduce costs associated with travel.
7. Consortium members expressed interest in investigating possible articulation agreements with four year colleges and universities.
8. In order to ensure a broad based approach to the research process each consortium member will provide to the primary researcher by October 14, 1992 the following information:
  - List of experts including names, phone numbers, and addresses.
  - List likely employers including contact people and phone numbers.
  - List of colleges and universities that have similar or related programs.
  - Copies of recent studies that describe community/employer needs.

## ENVIRONMENTAL SCIENCE CONSORTIUM MEMBER LIST

Marty Orłowski  
Director - Institutional Planning & Analysis  
Oakland Community College  
Orchard Ridge Campus  
27055 Orchard Lake Road  
Farmington Hills, MI 48334-4579  
(313) 471-7746  
(313) 471-7544 FAX

Kay Palmer  
Research Assistant  
Office of Institutional Planning & Analysis  
Oakland Community College  
Orchard Ridge Campus  
27055 Orchard Lake Road  
Farmington Hills, MI 48334-4579  
(313) 471-7746  
(313) 471-7544 FAX

Cathy Augustine  
Primary Researcher  
Office of Institutional Planning & Analysis  
Oakland Community College  
Orchard Ridge Campus  
27055 Orchard Lake Road  
Farmington Hills, MI 48334-4579  
(313) 471-7746  
(313) 471-7544 FAX

Denise Sigworth  
Director - Grants and Institutional Research  
Schoolcraft College  
18600 Haggerty Road  
Livonia MI 48152-2696  
(313) 462-4454  
(313) 462-4470 FAX

Midge Carleton  
Assistant Dean Allied Health  
Schoolcraft College  
18600 Haggerty Road  
Livonia MI 48152-2696  
(313) 462-4528  
(313) 462-4543 FAX

Till Peters  
Dean of Occupational Education  
Grand Rapids Junior College  
143 Bostwick Ave NE  
Grand Rapids MI 49503  
(616) 771-3920  
(313) 771-3907 FAX

Rebecca Wieland  
Assistant Dean - Occupational Programs  
Delta College  
University Center, MI 48710  
(517) 686-9472  
(517) 686-8736 FAX

Robert Welch  
Faculty Advisor/Instructor  
Lansing Community College  
419 North Capitol Avenue  
Lansing MI 48901-7211  
(517) 483-9675  
(517) 483-9619 FAX

Larry Kodoski  
Faculty  
Auburn Hills Campus  
2900 Featherstone Road  
Auburn Hills MI 48326-2845  
(313) 340-6818

Eldon Enger  
Professor of Biology  
Delta College  
University Center MI 48710  
(517) 686-9244

Janet Dettloff  
Department Head - Life & Physical Sciences  
Wayne County Community College  
801 Fort Avenue, Detroit MI 48226  
(313) 496-2740  
(313) 496-0451 FAX

Donald Olson  
Dean of Vocational & Career Education  
Wayne County Community College  
801 Fort Avenue, Detroit MI 48226  
(313) 496-2859  
(313) 496-0451 FAX

Dick Cookman  
Faculty  
Northwestern Michigan College  
1701 E Front Street, Traverse City  
MI 49684  
(616) 922-1264



## ENVIRONMENTAL STUDIES

### POTENTIAL EMPLOYERS:

Public Health Departments  
Water & Sanitation Departments  
EPA's  
Agriculture & Fisheries Departments  
Labor Departments  
Nuclear Energy Agencies  
Industrial Organizations  
Consulting Firms  
Professional Associations  
Universities

*Key - these notes are general, first impressions - I don't know if they'll help you at all - maybe just to let you know where I'm coming from CA*

### POSITIONS NOT REQUIRING A B.S. OR B.A.:

Operators - these positions usually encompass running the machinery connected to the plant; they can be further broken down into specific classifications.

*This is not necessarily exclusive*

Technicians

### EXAMPLES OF "ENVIRONMENTAL" TECHNICIANS:

Wastewater personnel technician  
Water supply Personnel Technician  
Water Pollution Control Technician  
Waste Management Technician  
Hazardous Waste Technician  
Air Pollution Control Technician  
Forestry Technician  
Radiation Technician  
  
Health Technician  
  
Industrial Technician  
  
Laboratory Technician  
  
Field/Environmental Sampling Technician

Biology technician  
Chemical Technician  
Engineering Technician

*These 3 can be placed in these fields*

Some of these inferences are not documented in these notes - but I do have the references

FURTHER INFO ON TECHS:

- significant work force need for Air Pollution Control Techs
- the definition of technician could be "assistant;" therefore it may be useful to look at how many chemists or biologists or engineers are in the area to get a sense for how many technicians are needed.
- There are technician positions which are filled by people holding baccalaureate degrees; how common is that in the area? Are there certain positions which are immune to this?
- How far can a technician advance without further education?
- What is the percentage of technicians who plan to go on, and should this affect out study? In other words, should we not institute a program because "eventually" there is a general desire for higher education? Should we be in the business to accurately predict whether or not a student returns to school?
- Most engineering technicians go on to an engineering degree(OU)

PRE-ENVIRONMENTAL SCIENCE

- Definition: a program designed for transfer students who anticipate becoming an "environmental professional" by means of a B.A. or B.S. degree.
- Look at possible joint programs with area four year colleges and universities.
- According to one survey (p. 225 JEH) "54.9% of posted jobs required a bachelor's degree."
- At this point, I am mainly reading that most environmentalists do have the B.S. or B.A.

RETRAINING PROGRAMS

- There may be a need for retraining in the hazardous waste field
- Ditto for retraining at all the degree levels, updating skills of those currently in technical positions

There is according to lit.

CREDENTIALING/CERTIFICATION FOR:

- Pesticide Application
- Hazardous Waste
- Air Pollution Industrial Hygiene
- Asbestos Removal
- Radiation Monitoring
- Infection Control
- Safety
- Sanitation

I don't know much about this process

Is this an area which OCC could become involved?

## QUESTIONS TO KEEP IN MIND

What recent legislation, both federal and state, have been passed which could affect the industry?

How has the economy affected the industry lately?

Isn't Detroit's water treatment plant a "state of the art" facility?  
What employment implications does this have?

Does Michigan have fish hatcheries? Foresters?

Is synthetic fuel production a large scale industry now in the U.S.  
as it was predicted to be?

What category do these titles fall under, and what is their degree level:

Environmental auditor  
Environmental Manager  
Field Staff  
Permit Specialist

*These were all mentioned in classified Ads w/o B.A./B.S. requirements*

If I had to choose three areas to concentrate on, they would be 1) pre- environmental studies program for transfer students, 2) environmental technician programs, and 3) retraining and certification programs. There are a lot of specializations to consider when looking at technicians. I would guess that there are certain things a technician needs to know, i.e. measurement procedures, the working of a laboratory and it's equipment, sampling procedures.... The basics of being a technician combined with the environmental standards and regulations affecting this area, state, and country could make up the core program. From there, students could decide if they want to focus on chemistry, engineering or biology; or perhaps have a sampling of them all or focus on two of the three. Students could also be introduced to various specific focuses such as water treatment, air pollutions, hazardous waste.... From what I have gathered so far, the positions are looking for someone who is a "technician" and not necessarily a "water treatment technician". Of course I could be completely wrong - these are just first impressions.