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ABSTRACT

This workshop identified and defined environmental technology occupations, particularly at the technician level. The resulting report aims to enhance counselor, teacher, and student awareness of environmental careers at the technician level, and ultimately to address the environmental workforce needs of business, industry, and government by providing educators with the information necessary to develop relevant curriculum that prepares students for environmental technology careers. Following an introduction to the ATEEC workshop, the report includes: (1) a chart defining environmental technology; (2) a list of occupational categories, with position titles and broad job function descriptions for the divisions of air, field services, information management systems, laboratory services, natural resources management, pollution prevention, regulatory affairs (government and industry), remediation, safety and health, solid and hazardous waste, and water/wastewater; and (3) issues and trends, which consists of participant responses to the following three questions: (1) What is the most important contribution community colleges can make to the environmental technology field?; (2) What are the emerging trends in the environmental technology field, particularly at the technician level?; and (3) What types of certification do business and industry recommend for technician-level occupations? (AS)

Environmental Technology is a career field that utilizes the principles of science, engineering, communication, and economics to protect and enhance safety, health, and natural resources.

A technician is a person who applies appropriate scientific, technical, and communication skills and knowledge to specific task.

ENVIRONMENTAL TECHNOLOGY OCCUPATIONAL CATEGORIES AIR, Air Sampling & Monitoring Technician, Air Pollution Auditor, Air Quality Technician, **FIELD SERVICES** Driller, Field Sampling Technician, Geology Technician, Land Survey Tech., Mobile Lab Tech., Environmental Property Assessor, **INFORMATION MANAGEMENT SYSTEMS**, Cartography / Mapping Technician, Cost Recovery / Investment Recovery Technician, Environmental Marketing Specialist, Environmental Web Crawler, GIS Technician, Regulatory Compliance Information Technician Exchange Specialist, **LABORATORY SERVICES**, Biological / Microbiological Lab Technician, Chem / Analytical Lab Technician, Geotechnical Properties Tech., Hazardous Materials Analyst, Sample Prep Tech., Soil Analyst, Solid Waste Analyst, Wastewater Analyst, Water Analyst, **NATURAL RESOURCES MANAGEMENT**, Aquatic Ecologist, Aquatic/Terrestrial Habitat Restoration Technician, Botany Technician, Ecologist Technician, Fire Management Tech., Fisheries Technician Forestry Technician, Geological Technician, Hydrology Technician, Range Technician Rare/ Endangered Species Specialist, Recreation Technician, Soil Conservation Tech. Terrestrial Ecologist, Wetlands Technician, Wildlife Technician, **POLLUTION PREVENTION**, Energy & Conservation Technician, Facility Environmental Technician, Industrial Ecology Technician, Process Environmental Technician, Waste Minimization Technician, Procurement Tech. Waste / Materials, **REGULATORY AFFAIRS**, Environmental Compliance Tech., Legislative Research Technician, Permit Review Assistant, **REMEDIATION**, Asbestos Abatement Worker / Supervisor / Inspector, Decontamination Technician, Lead-Based Paint Abatement Worker / Supervisor / Inspector, Leaking Underground Storage Tank (LUST) Remover, Remediation Tech., Emergency Spill Response Tech., Radon Inspector, **SAFETY & HEALTH**, Emergency Respirator Technician, Haz Mat Technician, Health Physics Technician, Health & Safety Technician, Industrial Hygiene Technician, **SOLID & HAZARDOUS WASTE**, Hazardous Waste Technician, Infectious Waste Technician, Recycling Tech. Solid Waste Tech., Solid Waste Landfill Tech., TSDF Technician Waste Transport. Technician, **WATER & WASTEWATER**, Biosolids Management Technician, Ground Water Tech., Industrial Waste Treatment Tech., On-site Wastewater Systems Technician, Surface Water Tech., Wastewater Treatment Operator, Water Supply Tech., Drinking Water Tech.

Air, Field Services, Information Management Systems, Laboratory Services, Natural Resources Management, Regulatory Affairs, Remediation, Safety & Health, Solid & Hazardous Waste, Water & Wastewater

DEFINING ENVIRONMENTAL TECHNOLOGY

A report from a workshop sponsored by the Advanced Technological Education Program of the National Science Foundation and by the Advanced Technology Environmental Education Center.

This material is based upon work supported by the National Science Foundation under Grant No. DUE-9454638

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Hazardous Materials Training & Research Institute

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Eastern Iowa Community College District

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Kirkwood Community College

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Partnership for Environmental Technology Education

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University of Northern Iowa

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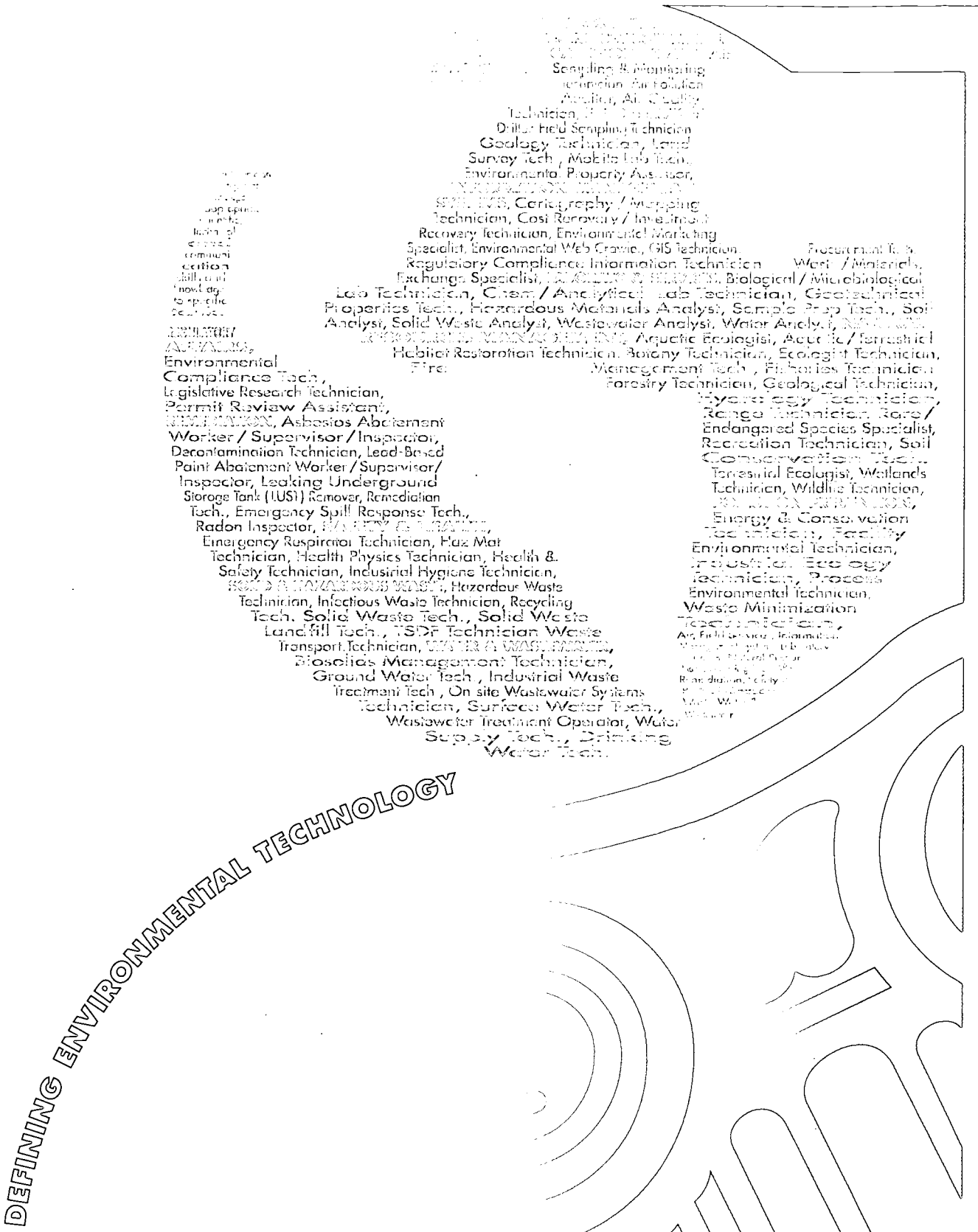

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INTRODUCTION

The Advanced Technology Environmental Education Center (ATEEC) conducted a workshop to identify and define environmental technology occupations, particularly at the technician level. This workshop, entitled *Defining Environmental Technology,* was held March 13 - 15, 1996 in St. Louis, Missouri.

The decision to conduct the workshop grew out of recommendations made at an NSF-sponsored forum held March 2-4, 1995 in Washington, D.C. In the forum report, *Partnering to Build a Quality Workforce: Critical Issues in Environmental Technology Education at Two-Year Colleges,* participants recommended that two-year colleges should work collaboratively with business and industry, government, and professional organizations to:

1. Define/clarify what is meant by the "environmental technology" field;
2. Define "environmental technician" and the job categories and/or skills it would include; and
3. Identify specialty areas for environmental technicians.

Based on the recommendations made at the critical issues forum, ATEEC established the following objectives for the *Defining Environmental Technology* workshop:

- Define the environmental technology field;
- Identify the broad environmental technology occupational categories;
- Define technician; and
- Identify specific technician-level occupations and their broad job functions within each environmental technology occupational category.

To identify participants for the workshop, ATEEC requested that the Partnership for Environmental Technology Education (PETE) nominate business, industry, and government representatives who have worked for several years in the environmental technology field and who have a broad perspective of the various occupational categories and job titles included in this field. Each of the six PETE regional executive directors as well as the national PETE executive director submitted candidates' names to ATEEC. ATEEC also requested candidates' names from the director of the Northwest Center for Sustainable Resources, an NSF Center of Excellence, and from a representative of the American Chemical Society.

Of the 31 participants from across the country who attended the workshop, the majority were business, industry, and government agency representatives. Approximately one-fourth of the participants were two-year college environmental technology instructors and administrators. ATEEC strove for representation from each region of the country, from each environmental technology area, and from several types of industries that would employ "environmental technicians."

The audience for this report includes: (1) counselors, faculty, and administrators of academic institutions at all levels, but particularly in two-year colleges and high schools; (2) employers of technicians, such as companies and government agencies; (3) leaders of professional societies; and (4) federal, state, and local government officials who have responsibility for the quality and quantity of the

nation's technical workforce.

A primary purpose of the report is to enhance counselor, teacher, and student awareness of environmental careers at the technician level. Ultimately, the report should contribute to addressing the environmental workforce needs of business, industry, and government by providing educators with information needed to develop relevant curriculum that prepares students for environmental technology careers.

The final report is also being used to provide direction for ATEEC, which is one of a selected few Centers of Excellence funded through a grant from the National Science Foundation (NSF). The grant, which is administered by the Hazardous Materials Training & Research Institute (HMTRI), brings together institutions from throughout the nation to promote and assist environmental technology credit programs. The ATEEC partners are HMTRI, the Partnership for Environmental Technology Education (PETE), the University of Northern Iowa, and NSF.

ATEEC has three primary goals: first, to nationally validate environmental curriculum as well as the basic mathematics and science core underlying such programs; second, to establish comprehensive programs of professional development for educators; third, to build an electronic clearinghouse to serve as a national center of environmental education information and as a hub for networking environmental educators, business and industry, federal agencies, and professional societies.

THE WORKSHOP

Prior to the actual workshop, participants received articles and working papers regarding the role of technicians in the workforce. These background materials were intended to spur the participants' thoughts on the types of work performed by technicians in the environmental technology field and implications for educating the workforce.

To kick off the workshop, a reception was held on Wednesday evening at the Hyatt Regency-Union Station. Ellen Kabat, Director of ATEEC, welcomed the participants and presented the mission and goals of ATEEC. Cynthia Lake, an instructional designer for ATEEC, discussed the workshop objectives. Steve Power, the Lead Facilitator, discussed the group processes to be used in order to accomplish the workshop objectives.

On Thursday the participants were divided into small groups and, with guidance from a facilitator and recorder, formulated responses for each of the following workshop objectives: 1) define the environmental technology field; 2) identify the broad environmental technology occupational categories; and 3) define technician. For each of the objectives, the small groups were given approximately one hour to write their group's response. Then the small groups were brought together to share their responses and meld them.

On Friday the participants were assigned to one of the eleven occupational categories that were identified the previous day. Each group identified technician-level occupational titles and broad job functions within their occupational category. Then the eleven groups were brought back together and each group presented the technician-level occupations and the broad job functions that they had identified.

In light of the occupational categories, technician-level occupational titles, and broad job functions that the groups had developed, the participants were asked to review and critique the "environmental technology" and "technician" definitions that had been

developed on Thursday. Steve Power, the Lead Facilitator, solicited input from the participants and guided them in revising the definitions.

After the definitions were revised, the participants were asked to address the following questions:

1. What is the most important contribution community colleges can make to the environmental technology field?

2. What are the emerging trends in the environmental technology field, particularly at the technician level?

3. What types of certification do business and industry recommend for technician-level occupations?

The participants' responses to the above-listed questions are provided in the *Issues and Trends* section.

Cynthia Lake developed a draft copy of the workshop results and sent it to the participants for their review and comments. Each participant had the opportunity to submit revisions and write alternate recommendations to any part of the final report.

The next section of this document provides the results of the workshop. The chart on pages 6 and 7 presents a snapshot of the environmental technology field. Included on the chart are the definition of *environmental technology* and *technician* as well as representative technician-level occupational titles for each of the eleven occupational categories.

Following the chart are the broad job functions for each of the occupational categories. Job functions common across most of the occupational categories include the following:

- Calibrate, operate, troubleshoot, repair, and maintain equipment.
- Select and use proper personal protective equipment (PPE).
- Follow standard operating procedures (SOPs).
- Follow established quality control procedures.
- Follow chain-of-custody procedures.
- Follow and apply local, state, and federal environmental regulations.
- Collect samples.
- Label, preserve, and store samples.
- Decontaminate sampling equipment.
- Utilize computers and software.
- Collect data.
- Maintain accurate records.
- Perform literature searches.
- Prepare reports.
- Initiate emergency response actions.

This project was supported, in part, by the Advanced Technological Education Program at the National Science Foundation. The opinions expressed in this report are those of the workshop participants and external reviewers, and do not necessarily represent NSF policy.

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A technician is a person who applies appropriate scientific, technical, and communication skills and knowledge to specific task.

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REGULATORY AFFAIRS, Environmental Compliance Tech., Legislative Research Technician, Permit Review Assistant, **REMEDIATION**, Asbestos Abatement Worker / Supervisor / Inspector, Decontamination Technician, Lead-Based Paint Abatement Worker / Supervisor / Inspector, Leaking Underground Storage Tank (LUST) Remover, Remediation Tech., Emergency Spill Response Tech., Radon Inspector, **SAFETY & HEALTH**, Emergency Respirator Technician, Haz Mat Technician, Health Physics Technician, Health & Safety Technician, Industrial Hygiene Technician, **SOLID & HAZARDOUS WASTE**, Hazardous Waste Technician, Infectious Waste Technician, Recycling Tech. Solid Waste Tech., Solid Waste Landfill Tech., TSDF Technician Waste Transport. Technician, **WATER & WASTEWATER**, Biosolids Management Technician, Ground Water Tech., Industrial Waste Treatment Tech., On-site Wastewater Systems Technician, Surface Water Tech., Wastewater Treatment Operator, Water Supply Tech., Drinking Water Tech.

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What is *Environmental Technology*?

Environmental technology is a career field that utilizes the principles of science, engineering, communication, and economics to protect and enhance safety, health, and natural resources.

What is a *Technician*?

A technician is a person who applies scientific, technical, and communication skills and knowledge to specific tasks.

DEFINING *Enviro*

ENVIRONMENTAL TECHNOLOGY OCCUPATIONAL CATEGORIES

AIR	FIELD SERVICES	INFORMATION MANAGEMENT SYSTEMS	LABORATORY SERVICES	NATURAL RESOURCES MANAGEMENT
TECHNICIAN-LEVEL OCCUPATIONAL TITLES				
Air Sampling and Monitoring Technician	Driller	Cartography/Mapping Technician	Biological/ Microbiological Lab Technician	Aquatic Ecologist
Air Pollution Auditor	Field Sampling Technician	Cost Recovery/ Investment Recovery Technician	Chem/Analytical Lab Technician	Aquatic/Terrestrial Habitat Restoration Technician
Air Quality Technician	Geology Technician	Environmental Marketing Specialist	Geotechnical Properties Tech.	Botany Technician
	Land Survey Tech.	Environmental Web Crawler	Hazardous Materials Analyst	Ecologist Technician
	Mobile Lab Technician	GIS Technician	Sample Prep Tech.	Fire Management Tech
	Environmental Property Assessor	Procurement Technician	Soil Analyst	Fisheries Technician
		Regulatory Compliance Information Technician	Solid Waste Analyst	Forestry Technician
		Waste/Materials Exchange Specialist	Wastewater Analyst	Geological Technician
			Water Analyst	Hydrology Technician
				Range Technician
				Rare/Endangered Species Specialist
				Recreation Technician
				Soil Conservation Tech
				Terrestrial Ecologist
				Wetlands Technician
				Wildlife Technician

A technician is a person who applies appropriate scientific, technical,

nmental Technology

POLLUTION PREVENTION	REGULATORY AFFAIRS Government & Industry	REMEDIATION	SAFETY & HEALTH	SOLID & HAZARDOUS WASTE	WATER & WASTEWATER
Energy and Conservation Tech.	Environmental Compliance Tech.	Asbestos Abatement Worker/Supervisor/Inspector	Emergency Response Technician	Hazardous Waste Technician	Biosolids Management Technician
Facility Environmental Technician	Legislative Research Technician	Decontamination Technician	Haz Mat Technician	Infectious Waste Technician	Ground Water Tech.
Industrial Ecology Technician	Permit Review Assistant	Lead-Based Paint Abatement Worker/ Supervisor/Inspector	Health Physics Technician	Recycling Technician	Industrial Waste Treatment Tech.
Process Environmental Technician		Leaking Underground Storage Tank (LUST) Remover	Health and Safety Technician	Solid Waste Tech.	On-site Wastewater Systems Technician
Waste Minimization Technician		Remediation Tech.	Industrial Hygiene Technician	Solid Waste Landfill Technician	Surface Water Tech.
		Emergency Spill Response Technician		TSDF Technician	Wastewater Treatment Operator
		Radon Inspector		Waste Transportation Technician	Water Supply Tech.
					Drinking Water Tech.

OCCUPATIONAL CATEGORIES

AIR

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Air Sampling and Monitoring Technician	• Collect meteorological data. • Collect air samples. • Label, preserve, and store samples. • Calibrate, operate, troubleshoot, repair, and maintain air sampling and monitoring equipment. • Decontaminate sampling equipment. • Follow standard operating procedures (SOPs). • Follow established quality control procedures. • Follow chain-of-custody procedures.
Air Pollution Auditor	• Select and use proper personal protective equipment (PPE). • Calculate sampling and monitoring results. • Calculate facility or process air emissions. • Construct process flow diagrams. • Utilize computers and software. • Input data to modeling programs. • Conduct facility air emissions inventory. • Investigate fugitive emissions.
Air Quality Technician	• Maintain accurate records of air quality sampling and monitoring. • Prepare reports of air sampling and monitoring activities. • Prepare air monitoring reports for submission to regulatory agency. • Dispose of waste generated by air pollution control equipment. • Perform literature searches. • Follow and apply local, state and federal environmental regulations. • Evaluate and monitor health and safety conditions. • Initiate emergency response actions.

FIELD SERVICES

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Driller *Field Sampling Technician* *Geology Technician* *Land Survey Technician* *Mobile Lab Technician* *Environmental Property Assessor (for real estate transactions)*	○ Drill boreholes for environmental investigation. ○ Follow and/or modify sampling grids. ○ Interpret blueprints and maps. ○ Collect samples (i.e., air, water, soil, waste). ○ Label, preserve and store samples. ○ Follow standard operating procedures. ○ Follow chain-of-custody procedures. ○ Follow established quality control procedures. ○ Decontaminate equipment. ○ Calibrate, operate, troubleshoot, repair and maintain equipment. ○ Perform field/mobile lab analytical tests (e.g., immunoassay, colorimetric, portable instruments). ○ Maintain accurate records. ○ Properly handle investigative wastes. ○ Restore site to pre-investigative conditions. ○ Select and use proper personal protective equipment for site conditions. ○ Evaluate and monitor health and safety conditions. ○ Initiate emergency response actions. ○ Follow and apply local, state, and federal environmental regulations. ○ Assess and document field conditions (hydrologic, soil, and geologic conditions) and man-made features. ○ Collect data. ○ Photograph site conditions and activities. ○ Survey property boundaries, features and sampling locations by Global Positioning System (GPS) or rod and transit. ○ Utilize computers and software. ○ Construct maps. ○ Research site history and potential for environmental contamination. ○ Prepare written reports. ○ Confirm utility locations. ○ Interact with contractors, property owner, and concerned citizens.

INFORMATION MANAGEMENT SYSTEMS

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Cartography/Mapping Technician	• Input data into information management system. • Manage laboratory data. • Implement and review QA/QC practices.
Cost-Recovery/Investment Recovery Technician	• Search for relevant business opportunities. • Organize, document, and distribute business opportunities. • Follow-up and document successes. • Maintain employee training and performance documentation.
Environmental Marketing Specialist	• Search Web sites and Internet directories to post/advertise employer's products, processes, and services. • Contact potential Web sites for inclusion of employer's products and services. • Create marketing information and upload to Web sites. • Track Web "hits" and successes.
Environmental Web Crawler	• Determine supply and equipment needs (e.g., PPE). • Identify product vendors (e.g., electronic catalogues on Internet). • Select best product at most competitive price. • Ensure equipment and supplies meet regulatory standards and follow standard operating procedures.
GIS Technician	• Interface with clients to determine their service needs. • Take client's order. • Transmit information/client's order to client service group. • Carry out service order.
Procurement Technician	• Investigate the amount and type of waste generated. • Identify potential buyers of waste. • Interact with facilities interested in utilizing or selling waste. • Document waste exchange.
Regulatory Compliance Information Technician	• Ensure organization/employer is in compliance with regulations (i.e., follow checklist of regulatory requirements). • Update and transmit compliance information (e.g., identify information sources)
Waste/Materials Exchange Specialist	• Select, compile, and report relevant environmental strategies/technologies to management/customers. • Utilize computer software to generate project maps. • Generate geographically-referenced digital information spatially in map format and in tabular, descriptive format using computers.

LABORATORY SERVICES

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Biological/Microbiological Laboratory Technician *Chemistry/Analytical Lab Technician* *Geotechnical Properties Technician* *Hazardous Materials Analyst* *Sample Prep Technician* *Soil Analyst* *Solid Waste Analyst* *Wastewater Analyst* *Water Analyst*	○ Receive laboratory samples and ship sampling containers to customers. ○ Preserve, store and prepare samples. ○ Operate laboratory instrumentation (e.g., analytical spectrophotometer, gas chromatograph, High Performance Liquid Chromatography, etc.). ○ Calibrate, operate, troubleshoot, repair, and maintain laboratory equipment. ○ Select and use proper lab glassware. ○ Perform wet chemistry procedures. ○ Titrate, extract or digest samples. ○ Measure, weigh, composite or dilute samples. ○ Use pH and conductivity meters. ○ Operate microscope. ○ Prepare microbiological media. ○ Sterilize equipment/perform analysis using sterile technique. ○ Prepare laboratory standards and solutions. ○ Dispose of laboratory waste. ○ Generate, reduce, and record data. ○ Qualify and quantify organisms or contaminants. ○ Document laboratory procedures and results. ○ Interpret analytical data. ○ Utilize computers and software. ○ Maintain inventory of laboratory supplies. ○ Maintain good housekeeping. ○ Demonstrate lab safety. ○ Follow standard operating procedures (SOPs). ○ Follow standard methods. ○ Follow established quality control procedures. ○ Follow chain-of-custody procedures. ○ Perform literature searches. ○ Prepare compliance paperwork. ○ Maintain knowledge of current environmental regulations. ○ Instruct customers on proper sampling technique. ○ Explain laboratory results to customers.

NATURAL RESOURCES MANAGEMENT

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Aquatic Ecologist	• Inventory forest stands. • Recommend silvicultural practices. • Assist in development of fire management plans. • Assist in forest nursery programs. • Cruise timber (i.e. measure height and circumference of trees) • Scale (i.e., measure) cut logs. • Compile, verify, and analyze appraisals (i.e., check at the mill).
Aquatic/Terrestrial Habitat Restoration Technician	• Assist in laying out timber sales. • Prepare appraisal documents. • Assist in operational forestry. • Assist in preparation of fire suppression and prescribed burning plans. • Implement prescribed burning. • Manage and use pesticides and herbicides. • Propagate and plant woody and non-woody species.
Botany Technician	• Identify and control noxious weeds. • Inventory the resource (e.g., wildlife species and populations for the Wildlife Technician; plant species and vegetative communities for the Range Technician). • Assist in species breeding/propagation programs. • Assist in habitat restoration. • Perform park maintenance.
Ecologist Technician	• Develop public information programs. • Conduct environmental education programs. • Inventory, evaluate, and assist in development of resource management strategies for sites and areas with unique scenic, recreational, historical, cultural, paleontological, and other resource values.
Fire Management Technician	• Assist in development of designs for the protection, maintenance, rehabilitation, or enhancement of visual resources. • Assess environmental impact of proposed development projects. • Collect and analyze geological data. • Identify fossils and rock samples. • Collect data for use in identifying geologic structures and determine extent of formations.
Fisheries Technician	• Assist in checking geologic maps and reports. • Calculate rates of sediment production.

Forestry Technician	○ Conduct surface and groundwater inventories and studies (i.e., watershed analysis). ○ Interpret surface and groundwater inventory and study data. ○ Examine water quality and quantity from streams and aquifers. ○ Comply with local, state, and federal water pollution control acts.
Geological Technician	○ Implement urban wildlife management strategies. ○ Trap and relocate wildlife. ○ Participate in tag/release and tracking studies. ○ Rehabilitate injured wildlife for release. ○ Introduce rare/endangered species into ecosystem.
Hydrology Technician	○ Collect and analyze water samples. ○ Label, preserve, and store samples. ○ Decontaminate sampling equipment. ○ Follow standard operating procedures. ○ Follow chain-of-custody procedures. ○ Follow established quality control procedures. ○ Select and use proper personal protective equipment (PPE). ○ Interpret water quality information.
Range Technician	○ Operate boats and utilize seining, trawling, and electroshock equipment. ○ Sample and identify aquatic organisms. ○ Assist with fish hatchery management. ○ Practice techniques of aquaculture.
Rare/Endangered Species Specialist	○ Implement plans to improve aquatic habitats. ○ Stock lakes and streams with fish. ○ Implement farm pond management techniques.
Recreation Technician	○ Determine soil types and physical soil characteristics. ○ Inventory soil conservation practices (e.g., terracing, grassed waterways, zero-till, crop rotation). ○ Assess farm land for eligibility in federal programs. ○ Implement erosion control strategies. ○ Identify and delineate wetlands based on plant/animal species and hydrology. ○ Implement wetland restoration and construction activities.
Soil Conservation Technician	○ Maintain accurate records. ○ Utilize computers and software. ○ Calibrate, operate, troubleshoot, repair, and maintain equipment. ○ Prepare maps. ○ Use aerial photography.
Terrestrial Ecologist	○ Organize and analyze data. ○ Develop reports on findings. ○ Monitor compliance of plans/projects. ○ Oversee project maintenance.

Wetlands Technician	• Follow and apply local, state, and federal environmental regulations. • Assist in preparing environmental documents. • Assist in recommendations to federal, state, local, and private organizations. • Perform literature searches.

POLLUTION PREVENTION

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Energy & Conservation Technician	○ Evaluate facility processes and materials. ○ Assist with recommendation and implementation of practices to reduce or eliminate pollutants and waste. ○ Research pollution prevention alternatives to reduce compliance requirements and environmental liability. ○ Investigate nonhazardous substitutes for hazardous materials and processes. ○ Investigate efficiency of facility processes.
Facility Environmental Technician	○ Conduct cost-benefit analysis. ○ Identify facility waste streams. ○ Collect and analyze waste stream data. ○ Label, store, and dispose of facility waste. ○ Select and use proper personal protective equipment (PPE). ○ Initiate spill response actions. ○ Train employees on pollution prevention strategies. ○ Maintain knowledge of environmental regulations.
Industrial Ecology Technician	○ Apply environmental regulations to facility processes in order to maintain environmental compliance. ○ Maintain facility records for environmental compliance issues. ○ Apply for environmental permits/prepare monitoring reports for submission to regulatory authority. ○ Calibrate, operate, troubleshoot, repair, and maintain equipment.
Process Environmental Technician	○ Operate and maintain pollution control devices. ○ Determine efficiency of pollution control devices. ○ Collect data and report ambient air conditions. ○ Collect samples for lab analysis. ○ Label, preserve, and store samples. ○ Decontaminate sampling equipment. ○ Follow standard operating procedures. ○ Follow chain-of-custody procedures.
Waste Minimization Technician	○ Follow established quality control procedures. ○ Collect data for multimedia environmental audit. ○ Initiate corrective action to correct operational malfunctions. ○ Coordinate material recycling program. ○ Utilize computers and software. ○ Perform literature searches

REGULATORY AFFAIRS
GOVERNMENT & INDUSTRY

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Environmental Compliance Technician *Legislative Research Technician* *Permit Review Assistant*	• Follow and apply local, state, and federal environmental regulations. • Maintain knowledge of current environmental regulations. • Assist in development of facility procedures and policies to facilitate environmental compliance. • Maintain facility environmental monitoring, compliance, inspection, and permit records. • Conduct internal audits for facility compliance with environmental regulations. • Prepare and submit environmental monitoring reports and permit applications. • Train facility employees on environmental issues and regulations. • Interact with regulatory authorities, environmental professionals, and the public. • Review industry-submitted permit applications for accuracy and completeness prior to permit issuance. • Utilize computers and software.

REMEDIATION

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Asbestos Abatement Worker/Supervisor/Inspector	○ Collect soil, water, and air samples. ○ Label, preserve, and store samples. ○ Package samples and prepare shipping papers. ○ Follow chain-of-custody procedures. ○ Set up monitoring equipment at site. ○ Calibrate, operate, troubleshoot, repair, and maintain equipment. ○ Conduct air monitoring and sampling. ○ Analyze samples of air, water, and soil for contaminants, using field equipment. ○ Record results of tests performed. ○ Operate mobile data collection station. ○ Record site conditions.
Decontamination Technician	○ Gather site information through surveying, etc., to determine measurements for site design. ○ Record data, describe sampling protocol, and summarize field notes. ○ Interact with contractors, regulatory authorities, site owners, and the public. ○ Coordinate sampling materials and equipment. ○ Oversee/assist in the setup, utilization, and dismantling of field decontamination site.
Lead Abatement Worker/Supervisor/Inspector	○ Assist in developing simulation models to predict flow of contaminants through aquifer. ○ Assist in development of decontamination plan. ○ Assist in preparation of site safety and health plan. ○ Assist in sampling plan construction. ○ Assist in worker exposure monitoring. ○ Conduct respiratory fit testing. ○ Assist in medical surveillance program. ○ Prepare summaries or charts for review. ○ Prepare reports for regulatory agencies.
Leaking Underground Storage Tank (LUST) Remover	○ Utilize computers and software. ○ Assist in containerizing materials. ○ Perform spill clean-up procedures. ○ Package hazardous materials for shipment. ○ Properly mark and label materials and wastes. ○ Select and place placards on motor vehicles.

Remediation Technician	• Identify hazardous materials by packaging, labeling, placarding, etc. • Recognize chemical and physical properties of hazardous materials. • Recognize incompatible materials. • Segregate hazardous materials for shipment. • Respond to hazardous materials incidents and emergencies. • Complete a hazardous materials incident report. • Activate, utilize, and deactivate the incident command system. • Perform incident assessment, containment, and control procedures. • Evacuate affected areas. • Collect meteorological data. • Utilize the "buddy system." • Communicate findings to off-site personnel.
Emergency Spill Response Technician	• Abate asbestos-containing materials (floor tile, insulation, siding, etc.) • Package asbestos-containing materials for transport. • Collect samples of suspect asbestos-containing materials. • Follow and apply environmental regulations governing asbestos. • Maintain knowledge of radiation safety. • Test for lead content, using portable instruments. • Collect paint samples from indoor and outdoor surfaces. • Abate lead-based paint from indoor and outdoor surfaces. • Follow and apply environmental regulations governing lead. • Dispose of contaminated materials. • Purge tank of hazardous vapors. • Remove underground storage tanks using heavy equipment. • Utilize tools to gain access to inside of tank. • Clean inside of tank. • Transport and dispose of tank.
Radon Inspector	• Conduct leak detection procedures (e.g., tank tightness tests). • Install leak detection equipment on existing tanks. • Install and maintain remediation equipment. • Collect and assess remediation data. • Sample indoor air for radon. • Follow standard operating procedures (SOPs). • Follow established quality control procedures. • Select and use proper personal protective equipment (PPE). • Maintain certifications (e.g., HAZWOPER, lead and asbestos worker/supervisor/contractor/inspector, etc.)

SAFETY & HEALTH

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Emergency Response Technician *Hazardous Materials Technician* *Health Physics Technician*	○ Identify and evaluate workplace hazards (unsafe acts, unsafe conditions, and hazardous materials). ○ Implement control of workplace hazards through engineering practices, use of personal protective equipment, etc. ○ Monitor workplace environment (e.g., combustibles meter, sound level meter, air toxics, detector tubes, and radiation). ○ Calibrate, operate, troubleshoot, repair and maintain sampling and monitoring equipment. ○ Conduct air quality testing. ○ Assist in worker exposure monitoring. ○ Follow standard operating procedures (SOPs). ○ Follow chain-of-custody procedures. ○ Follow established quality control procedures. ○ Interpret monitoring data. ○ Select facility equipment and materials based on health and safety concerns. ○ Determine process materials and wastes which are hazardous/investigate nonhazardous substitutions. ○ Manage workplace hazardous materials (shipping and receiving/labeling and placarding). ○ Implement established procedures for material handling and storage. ○ Maintain Materials Safety Data Sheets (MSDS file) and interpret MSDS information. ○ Utilize computers and software. ○ Implement unit's Hazard Communication program. ○ Conduct internal workplace inspections (storage areas, production areas). ○ Develop facility contingency plan. ○ Initiate emergency response actions. ○ Maintain compliance with occupational safety and health standards (OSHA). ○ Assist in sampling plan construction. ○ Assist in preparation of site safety and health plan. ○ Interact with regulatory authorities, public safety officials, the media, and concerned citizens. ○ Instruct co-workers on safety and health issues. ○ Participate in safety meetings and/or safety committees. ○ Administer first aid/CPR.

Health and Safety Technician	• Maintain records (e.g., HazCom Standard, hazardous waste, illness and injury, preventative maintenance). • Assist in oversight of unit's medical monitoring program. • Purchase health and safety equipment that meets regulatory and safety standards. • Select personal protective equipment (PPE) for workplace tasks. • Maintain and inspect personal protective equipment (PPE). • Conduct respirator fit testing. • Practice proper confined-space entry technique. • Respond to hazardous materials incidents and releases. • Evacuate area of incident or release. • Assess meteorological conditions.
Industrial Hygiene Technician	• Utilize field sampling and monitoring equipment. • Utilize hazardous materials identification system. • Understand chemical properties of hazardous materials. • Identify area of contamination and contaminants of concern. • Contain and/or clean up hazardous material spills. • Assist in the set-up, utilization, and dismanteling of field decontamination facility. • Dispose of hazardous materials.

SOLID & HAZARDOUS WASTE

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Hazardous Waste Technician *Infectious Waste Technician* *Recycling Technician* *Solid Waste Technician* *Solid Waste Landfill Technician* *Treatment, Storage, & Disposal Facility (TSDF) Technician*	○ Reduce waste generation at facility. ○ Conduct internal workplace inspections (i.e., proper waste storage, labeling, housekeeping). ○ Follow and apply local, state, and federal environmental regulations. ○ Clean up spills. ○ Separate waste streams. ○ Sample waste streams/containers. ○ Label, preserve, and store samples. ○ Decontaminate sampling equipment. ○ Characterize waste as hazardous or non-hazardous. ○ Determine if waste meets criteria for disposal in landfill. ○ Label waste containers. ○ Transfer and store containers of waste. ○ Maintain good housekeeping in waste storage areas. ○ Package waste for shipment. ○ Prepare shipping manifests. ○ Comply with solid waste disposal regulations. ○ Maintain records of waste storage, shipping, and disposal methods. ○ Transport solid waste. ○ Comply with Department of Transportation (DOT) regulations for solid and hazardous waste transport. ○ Inform public of solid waste disposal alternatives. ○ Collect recyclables. ○ Collect special wastes (hazardous home waste). ○ Coordinate waste exchange programs. ○ Receive and sort solid waste. ○ Operate heavy equipment. ○ Operate waste treatment equipment (e.g., incinerator). ○ Treat waste (i.e., incinerate, neutralize, separate). ○ Collect samples from landfill leachate system. ○ Collect samples from landfill gas recovery systems. ○ Collect groundwater samples from monitoring wells. ○ Calibrate, operate, troubleshoot, repair, and maintain equipment. ○ Utilize computers and software. ○ Select and use proper personal protective equipment (PPE). ○ Follow standard operating procedures (SOPs).

Waste Transportation Technician	• Follow chain-of-custody procedures. • Follow established quality control procedures. • Prepare reports. • Maintain records. • Maintain certification (e.g., HAZWOPER)

WATER & WASTEWATER

OCCUPATIONAL TITLES	BROAD JOB FUNCTIONS
Biosolids Management Technician *Ground Water Technician* *Industrial Waste Treatment Technician* *On-site Wastewater Systems Technician*	○ Collect surface water/ground water/wastewater/drinking water samples. ○ Label, preserve, and store samples. ○ Decontaminate sampling equipment. ○ Calibrate, operate, troubleshoot, repair, and maintain equipment. ○ Follow standard operating procedures (SOPs). ○ Follow chain-of-custody procedures. ○ Follow established quality control procedures. ○ Utilize computers and software. ○ Comply with OSHA regulations. ○ Follow and apply local, state, and federal environmental regulations. ○ Assess stormwater runoff characteristics. ○ Assist in preparation of a facility stormwater pollution prevention plan. ○ Investigate erosion problems and assist in implementation of solutions. ○ Measure stream flow characteristics. ○ Conduct lake studies (temperature, oxygen, algae, turbidity, etc.) ○ Assist in delineation of wetlands. ○ Operate boats. ○ Assist in determining boundaries of a watershed. ○ Perform ditch and culvert inspections. ○ Assist with environmental drilling and monitoring well installation. ○ Measure groundwater levels and direction of flow. ○ Assess soil, fill, and bedrock types. ○ Collect and dispose of contaminated groundwater. ○ Monitor groundwater remediation efforts. ○ Service groundwater remediation equipment. ○ Assist with sampling plan development. ○ Select and use proper personal protective equipment. ○ Initiate emergency response actions. ○ Document site conditions in field notebook. ○ Interact with contractors, site owners, and the public. ○ Analyze drinking water samples for bacteria, nitrate, fluoride, turbidity, iron, hardness, solids, etc.

Surface Water Technician	• Operate water filtration, aeration, disinfection, and purification equipment. • Monitor purification process by reading meters, gauges, and by visual observation. • Recognize and correct system upsets by adjusting process equipment. • Make chemical additions to raw water. • Investigate problems in water distribution systems (e.g., clogged or broken pipes). • Maintain and repair piping systems. • Comply with the Safe Drinking Water Act. • Interact with the public concerning safe drinking water issues.
Wastewater Treatment Operator	• Operate industrial wastewater pretreatment equipment. • Operate publically owned treatment works (POTW) plant equipment. • Monitor flow rates and tank levels. • Read gauges, meters, and charts and interpret the data. • Handle hazardous chemicals. • Make chemical additions to wastewater treatment tanks. • Dispose of solid waste generated by wastewater treatment equipment. • Collect industrial wastewater samples for lab analysis. • Collect wastewater treatment plant samples for lab analysis. • Perform lab analysis. • Interpret results of lab analysis and adjust wastewater treatment equipment based on results. • Maintain equipment performance and lab data records. • Prepare reports for regulatory authorities. • Follow good hygiene practices. • Practice confined-space entry techniques. • Drain and clean sludge from wastewater treatment tanks. • Order chemicals and supplies for wastewater treatment plant. • Maintain wastewater treatment plant operator's license.
Water Supply Technician	
Drinking Water Technician	

What is the most important contribution community colleges can make to the environmental technology field?

Prior to wrapping up the workshop, the participants were asked to provide direction to ATEEC and community colleges by responding to the questions listed in the left-hand column. The participants' responses are presented below.

- Provide graduates/technicians who have:
  - Strong written and oral communication skills.
  - Good basic science skills.
  - Basic computer skills.
  - Practical hands-on training.
- Provide graduates/technicians who attend to details and who can quickly apply what they have learned.
- Provide customer-driven education that meets the needs of the community.
- Adapt curriculum to needs of the local economy and environment.
- Provide general continuing education training and customized training for business and industry/companies.
- Employ instructors who have both academic and industry experience.
- Provide on-going course offerings on interpreting regulations such as OSHA, DOT, and RCRA.
- Provide cost-effective education to the community.
- Provide distance-learning opportunities.
- Act as focal point for industry to meet and discuss problems.

What are the emerging trends in the environmental technology field, particularly at the technician level?

- Pollution prevention and minimization
- Non-point source pollution control
- Sustainable development
- Life-cycle assessment
- Movement away from regulations to best business/management practices
- International standards such as ISO 14000/environmental management systems
- Industrial program development to meet maximum achievable control technology (MACT), reasonably available control technology (RACT), and lowest achievable emission rate (LAER)
- Treatment standards
- Innovative treatment technology
- Cost analysis of technologies
- Information technologies initiative
- Use of computerized mapping
- In-field sample analysis
- Watershed analysis
- Permitting
- Decisions based on risk standards
- Performance partnerships
- Environmental justice
- Multimedia emergence in training and communications

What types of certification do business and industry recommend for technician-level occupations?

The recommended certifications include, but are not necessarily limited to, the following:

- Air quality inspector
- Asbestos abatement worker/supervisor/contractor
- Certified Environmental Trainer (CET)
- Certified Safety Professional (requires 4-year degree; 10 years experience)
- Environmental health technician
- Hazardous materials technician
- Hazardous Waste Operations and Emergency Response (HAZWOPER)
- Radiation technician
- Water and sewer treatment plant operator

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