

**Q**ualified



**E**nvironmental

**E**nvironmental



**P**rofessional

**P**rofessional



**I**ntern

## **Certification & Examination Guide for the QEP and EPI Written Exams**

**Qualified Environmental Professional (QEP) Certification  
Environmental Professional Intern (EPI) Certification Program**

*published by:*

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**Thank you for your interest in the Qualified Environmental Professional (QEP) certification and/or the Environmental Professional Intern (EPI) program. This guide provides you with the necessary information on the QEP & EPI certification programs. An application to apply for admission into either the QEP or the EPI examination process can be obtained by contacting the address on the cover or downloading from our website at [ipep@duq.edu](mailto:ipep@duq.edu). Eligibility requirements for both certifications and information on IPEP's examination process are contained within. Each applicant is encouraged to read this guide thoroughly.**

Qualified Environmental Professionals (QEPs) and Environmental Professional Interns (EPIs) agree to abide by the ethical principles set forth below:

- Practice my profession only to the extent of my personal expertise;
- Maintain my personal proficiency through continuing education and professional development;
- Comply with applicable statutes, regulations, and standards;
- Strive to protect and enhance human health and the environment;
- Conduct my professional affairs in a manner that reflects the highest moral character.

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## **Introduction**

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### **The Certifying Body - IPEP**

The Institute of Professional Environmental Practice (IPEP) is the independent, not-for-profit certifying body of the Qualified Environmental (QEP) and the Environmental Professional Intern (EPI) certifications. IPEP's mission is to improve the practice and educational standards of environmental professionals. The Institute is governed by a volunteer Board appointed by leading environmental organizations:

- The Air & Waste Management Association (A&WMA)
- The American Academy of Environmental Engineers (AAEE)
- The American Industrial Hygiene Association (AIHA)
- The National Association for Environmental Management (NAEM)
- The Solid Waste Association of North America (SWANA)
- The Water Environment Federation (WEF)

IPEP is also a member of the Council of Engineering and Scientific Specialty Boards (CESB), an independent, third party accreditation board. The QEP program is fully accredited by the CESB. IPEP publishes and distributes an annual roster listing all individuals certified as QEPs and EPIs to its members.

### **History**

The Qualified Environmental Professional (QEP) certification program evolved out of an interest among Air & Waste Management Association membership in a broad-based credential. A&WMA created a Certification Steering Committee in 1990 to research existing certifications and formulate a report on its findings and recommendations. A survey was conducted in the spring of 1992 among both A&WMA and non-A&WMA members which indicated overwhelming support among environmental professionals for a broad based, over-arching environmental credential. Following approval by the A&WMA Board of Directors, the Steering Committee incorporated to become the Institute of Professional Environmental Practice (IPEP), an independent, not-for-profit 501(c)(6), in March of 1993. The Steering Committee members became the initial Board of Trustees, and following discussions with several leading environmental organizations, representatives from those organizations also joined IPEP.

### **Why QEP?**

The QEP is the first and only credential of its kind. It is a multi-media, multi-disciplinary, board-certified credential, which requires environmental professionals to see "the big picture" and to have the skills and knowledge to solve "real world problems." The QEP credential is international. The examination contains no questions related to policies or regulations specific to any particular country. Through QEP certification, environmental professionals demonstrate the breadth and depth of their knowledge and experience. They also agree to abide by IPEP's Code of Ethics (see Page 1).

The QEP is distinguished from other certifications by its cross-disciplinary nature, its qualifying education prerequisites, its continuing education requirement for recertification, and by its rigorous application and examination process. The QEP evaluates the environmental professional by establishing a professional standard and by providing a career track for new professionals entering the field. It does not take the place of specialized certifications or registrations, but rather is a unique credential, which serves to link and coordinate environmental fields.

### **What is involved in obtaining the QEP?**

Minimum requirements to apply for admission into the QEP written exam process are a baccalaureate or equivalent degree in physical, earth or natural sciences, engineering, or mathematics and five subsequent years of professional environmental work experience, or eight subsequent years of professional environmental work experience with a degree in a discipline other than those listed above. Minimum requirements for oral examination are a baccalaureate degree and 15 subsequent years of professional environmental work experience acceptable to IPEP, and at least one reference from a QEP on the form provided in the application. The candidate must also demonstrate that a minimum of 10 of the qualifying years of work experience was in a position of responsible charge. (General definition of the term "responsible charge" refers to a leadership role or position of influence held in direct relationship to work assignments, job responsibilities, and to key roles in the projects or program assigned.)

An applicant must be approved by IPEP's Admissions Committee to be admitted in the examination process. The written examination process for the QEP consists of two parts:

- Part I      The General Environmental Science Exam  
Part II     A Specific Practice Area Exam chosen from one of the following areas:  
A. Air Quality  
B. Water Quality  
C. Waste Management  
D. Environment Science, Management, and Policy

Each part takes up to three hours to complete and consists of approximately 100 multiple-choice questions. Both exams are international in scope and contain no regulations specific to any country. The focus is on technical environmental science.

Upon notice of approval to be admitted into the QEP examination, a candidate will then submit an examination fee of US\$150.00 and contact his/her QEP Regional Coordinator to schedule the exam. Approved candidates have 12 months from notification of approval to take the exam to having to sit for the exam. The outline of that exam is contained within this guide.

Candidates who have passed both parts of the exam and who have met all of the requirements for full QEP certification will be formally confirmed as QEPs by IPEP's Board of Trustees and issued a certificate. An annual renewal fee of US\$150.00, with the first year's fee prorated, is required to maintain QEP certification. The names of all current QEPs will be published in IPEP's annual Roster.

**Summary of QEP fees:** The oral application fee is US\$100.00, and the written US\$75.00; if accepted into the exam, the oral exam fee is US\$200.00 and the written US\$150.00. Annual renewal fees are US\$150, with first year's fees prorated. All fees are subject to change without notice.

## **Are there Recertification requirements for QEP?**

Yes. A QEP is required to maintain the QEP certificate by paying an annual renewal fee of US\$150.00. Every five years the QEP must apply for recertification. Recertification requires the individual to complete a recertification application and submit documentation of ongoing professional development and involvement in the field as per IPEP's recertification guidelines. IPEP guidelines on recertification are available.

## **The Environmental Professional Intern (EPI) Program**

### **What is the EPI?**

The Environmental Professional Intern (EPI) program is an entry-level certification for environmental students and environmental professionals who are just beginning their careers, and is an optional first step towards obtaining QEP status. The EPI is an opportunity for students anticipating entering the environmental field or for graduates who have recently entered the field to demonstrate personal knowledge of general environmental science. **The EPI program offers the availability of a QEP mentor to provide the EPI with professional guidance and introduction into a network of well-respected senior environmental professionals. The EPI certification expires seven years from the date certified.**

### **What is involved in obtaining the EPI?**

The EPI is available to college or university seniors who are working towards a technical baccalaureate/masters degree in physical, earth or natural sciences, engineering, or mathematics; or an individual who has received a baccalaureate/masters degree in one of the above mentioned disciplines within the last five years and has entered, or anticipates entering, the environmental profession.

Individuals can submit an application to take the general EPI exam no sooner than the last semester/final quarter of their junior year. A completed application must be submitted to IPEP with a US\$35.00 application-processing fee.

Applicants approved to be admitted into the EPI exam process will take Part I of IPEP's standard QEP certification exam, which is the General Environmental Science written exam, no sooner than the last semester/quarter of their senior year. Approved candidates have 12 months from notification of approval to take the exam to having to sit for the exam. The outline of that exam is contained within this guide.

All policies and procedures for certification and for the administration of the EPI exam are the same as those adopted by IPEP for the QEP. The EPI exam will be administered through the same network of Regional Coordinators as QEPs or delegated to an approved proctor. IPEP's Board determines the passing scores for all of IPEP's exams.

Individuals passing the EPI exam are given the designation of "Environmental Professional Intern" (EPI). An EPI certificate is valid for a period of seven years (this period allows for the opportunity to obtain five years of environmental work experience and ample time to apply for full QEP status and to take Part II of the exam). During this time the availability of a QEP mentor is offered to each EPI on a voluntary basis. After seven years, EPI status expires.

EPIs pay a reduced IPEP Annual Renewal fee of US\$75.00 per year, with the first year's fees prorated.

EPIs may apply for full QEP certification status when they have obtained five full years of environmental work experience acceptable to IPEP. At that time, an EPI must submit a QEP application and an examination fee of US\$150.00 in order to apply to take Part II of the QEP exam, which is the specific practice area section. If the work experience as submitted on the application is not acceptable to IPEP, the examination fee will be returned with a letter explaining the deficiency.

If an EPI fails to obtain a passing score on her/his first attempt at Part II of the QEP examination, the exam can be taken once more, provided that it can be completed within the seven-year period in which the EPI certificate is valid. If the retest cannot be retaken within that valid period, or if taken and failed a second time, the candidate will be informed via formal letter that her/his EPI status has been terminated and that if she/he wishes to continue to pursue the QEP certification, she/he must complete the full QEP application and testing process again.

**Summary of EPI fees:** US\$35.00 application fee; US\$75.00 annual renewal with the first year's fees prorated. When applying for the full QEP status, an EPI's QEP application fee is waived, but the EPI must submit an examination fee of US\$150.00 to reserve an exam slot to take Part II. All fees are subject to change without notice.

## **Application & Examination Process**

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### **How long does the application process take?**

A complete information/application packet can be obtained from IPEP. An individual will need to complete and submit an application to IPEP for admission into either the QEP or the EPI certification examination process. The application requires that three references be submitted. Please read instructions carefully for all sections, and type or print legibly. You may attach a curriculum vitae or resume to your application to further support professional/ community accomplishments and contributions, **but all parts of the application must be completed in full.**

Once IPEP has received your completed application, application fee payment, and all three references, your application will be forwarded to the Admissions Committee of IPEP for review. That committee will make a recommendation, based on the information you furnish, as to whether you meet the minimum qualifications to be admitted to either the QEP or the EPI examination process. From the date that your application is found to be complete, it generally takes four to six weeks for the Admissions Committee to complete the review.

### **When and where are the examinations given?**

IPEP's written examinations are administered frequently and in numerous locations in Canada and the United States, and in limited locations throughout the world. A current list of geographic locations for the exams is maintained at IPEP's office. Exams are given on an individual and a group basis by Regional Coordinators located throughout the world. An applicant declared eligible for admission to examination, but who fails to pay the exam fee and submit to examination within 12 months of notification of eligibility, is required to file a new application and pay a new filing fee in order to continue pursuit of certification.

## **Examination Content**

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### **What subjects are covered on the examinations?**

A detailed outline of the examination content for Part I—the General Environmental Science Examination, and for Part II—Air Quality; Water Quality; Waste Management; and the Environmental Science, Management, and Policy practice area exams, is provided.

#### **Detailed Examination Content Outline of PART I: General Environmental Science**

All approved QEP applicants are required to take this section as well as **one** of the four practice area sections under Part II. Approved EPI applicants only take this section of the exam.

- 1. ENVIRONMENTAL QUALITY STANDARDS (Weight 5%)**
- 2. FATE AND TRANSPORT OF ENVIRONMENTAL CONTAMINANTS IN AIR/WATER/SOIL (Weight 5%)**
- 3. BASIC PRINCIPLES OF ENVIRONMENTAL SYSTEMS (Weight 5%)**
  - a. C, N, O, H<sub>2</sub>O, S cycles (nutrient cycles)
  - b. Ecosystem development & climax
  - c. Species diversity
  - d. Primary productivity
- 4. CHEMISTRY (Weight 8%)**
  - a. Reactions and equilibrium
  - b. Gas laws
  - c. Atoms and molecules
  - d. Degradation/breakdown (hydrolysis, oxidation, substitution -biological as well as chemical)
  - e. Organic and inorganic chemicals
  - f. Solubility
  - g. Reaction kinetics (rates)
  - h. pH
  - i. General classes of compounds (volatiles, semi-volatiles, etc.)
- 5. TOXICOLOGY (Weight 4%)**
  - a. Dose - response relations
  - b. Physiologic endpoints - neurotoxin, carcinogen, mutagen, etc.
  - c. Acute, chronic effects
  - d. Methods for setting exposure/dose limits; exposure/pathway ideas ("source-pathway-receptor")
- 6. EARTH SCIENCE/GEOLOGY (Weight 3%)**
  - a. Permeability of materials
  - b. Aquifers and aquitards
  - c. Ground water flow pathways
  - d. Flow of contaminants in soils and ground water
- 7. ECOLOGY (Weight 4%)**
  - a. Ecosystem/biome/niche
  - b. Bioaccumulation
  - c. Major ecosystem characteristics: estuaries, wetlands, streams, forests, mountains, prairies, open oceans, and lakes
  - d. Endangered species

- 8. PHYSICS (Weight 6%)**
  - a. Fluid flow - viscosity & turbulence
  - b. Thermodynamics - three laws & their meaning
  - c. Diffusion - in air and solution
  - d. Radioactivity - natural and man-made types
  
- 9. MATHEMATICS/STATISTICS (Weight 6%)**
  - a. Use of "powers of 10"
  - b. Means and measures of variation (mean, median, mode, variance, and standard deviation)
  - c. Probability/statistical distributions
  - d. English (lb., ft., etc.) units vs. metric (S.I.) units
  - e. Statistical confidence limits/decision making
  - f. Sampling requirements
  
- 10. CROSS-MEDIA IMPACTS OF POLLUTION (Weight 4%)**
  - a. Migration across boundaries
  - b. Gas phase/liquid phase transport
  
- 11. DATA MANAGEMENT (Weight 5%)**
  
- 12. POLLUTION PREVENTION AND CONTROL (Weight 10%)**
  - a. Waste reduction
  - b. Separation/substitution
  - c. Source reduction
  - d. Waste minimization
  
- 13. REQUIREMENTS FOR TRANSPORTATION OF HAZARDOUS WASTE/HAZARDOUS MATERIALS (Weight 4%)**
  
- 14. HEALTH AND SAFETY REQUIREMENTS (Weight 3%)**
  - a. PPE, properties of toxics, confined space, shoring, tagging/lockout, SHERP, training, hazard identification, and medical surveillance
  
- 15. PRINCIPLES OF WATER TREATMENT (Weight 4%)**
  - a. Coagulation, bio-reactions, chemical, physical
  
- 16. WATER QUALITY MONITORING (Weight 5%)**
  - a. Toxic pollutants
  - b. Conventional pollutants
  - c. Non-conventional pollutants
  
- 17. AIR EMISSIONS MONITORING AND INVENTORIES (Weight 9%)**
  - a. Ambient air standards
  - b. Toxics
  - c. Acid deposition
  - d. Ozone depletion
  - e. Greenhouse gases
  - f. Emission Inventories
  
- 18. ENVIRONMENTAL ECONOMICS (RISK AND COST/BENEFIT ANALYSIS) (Weight 5%)**
  
- 19. IMPORTANCE OF PUBLIC INFORMATION/COMMUNITY RELATIONS (Weight 5%)**

## **Detailed Examination Content Outline PART II: each of the four Practice Areas**

Each QEP applicant must choose to take only one of the following specific practice areas:

- A. Air Quality**
- B. Water Quality**
- C. Waste Management**
- D. Environmental Science, Management, and Policy**

EPIs do not take this section of the exam until they apply for full QEP status upon completing the requirement of a minimum of five years of professional environmental work experience.

### **Practice Area A**

#### **Detailed Examination Specifications for the practice area of Air Quality**

- 1. FUNDAMENTALS OF AIR POLLUTION METEOROLOGY (Weight 20%)**
  - a. Atmospheric & geophysical factors affecting the transport and diffusion of pollutants
  - b. Instruments used to gather meteorological data necessary for air quality modeling
  - c. Dispersion modeling, to include basic assumptions, limitations and model categories, e.g., empirical, numerical, physical and Gaussian (or distributions)
  - d. Source receptor relationship
- 2. AIR POLLUTION CONTROL (Weight 29%)**
  - a. Sources of air pollutants (mobile, stationary, fugitive)
  - b. Control of gaseous pollutants: absorption, adsorption, condensation, and incineration
  - c. Particulate control: cyclone and inertial separators, wet scrubbers, electrostatic precipitators, baghouses
  - d. Management and disposal of waste streams (multimedia)
  - e. Emission factors and estimates
  - f. Compliance planning: limits, standards, technology, and documentation
- 3. TOXIC AIR CONTAMINANT (TAC) RISK ASSESSMENT (Weight 10%)**
  - a. Emergency response - accidental releases
  - b. Toxicity, hazard, risk assessment, cancer burden, acute, chronic, etc.
  - c. Fate of contaminants
- 4. AMBIENT AIR QUALITY AND SOURCE SAMPLING AND ANALYSIS (Weight 19%)**
  - a. Site selection required for effective sampling
  - b. Health and safety precautions
  - c. Isokinetic vs. constant rate vs. proportional sampling
  - d. Optical remote sensing, continuous emission monitoring
  - e. Reference methods
  - f. Instrumentation and data acquisition systems
- 5. ATMOSPHERIC CHEMISTRY (Weight 22%)**
  - a. Radionuclides (alpha, beta, and gamma radiation)
  - b. Acid transformation, deposition, photochemistry
  - c. Global air quality issues
  - d. Ozone formation

## **Practice Area B**

### **Detailed Examination Specifications for the practice area of Water Quality**

- 1. WATER QUALITY AND SOURCE SAMPLING (Weight 35%)**
  - a. Physical: radionuclides, suspended solids, taste and odors
  - b. Chemical: organic (natural, solvents, pesticides, herbicides)
  - c. Inorganic (dissolved solids, hardness, alkalinity, nutrients, dissolved oxygen, heavy metals)
  - d. Biological: oxygen-demanding material, biochemical oxygen demand, total organic carbon, chemical oxygen demand, bacteriological
  - e. Pathogenic organisms, indicator organisms
  
- 2. WATER POLLUTION CONTROL - POINT AND NON-POINT SOURCES (Weight 35%)**
  - a. Physical: equalization, screening, sedimentation, filtration, and adsorption
  - b. Chemical: coagulation, neutralization, oxidation-reduction, ion exchange, and absorption
  - c. Biological: anaerobic or aerobic, suspended growth reactors, fixed-film reactors, oxidation ponds, sludge stabilization
  - d. Sludge management and disposal: thickening, dewatering, ultimate disposal
  - e. Pollution prevention: environmental audits, material substitution, inventory control, operation/process changes
  - f. Compliance planning: limits, standards, technology, and documentation
  
- 3. WATER CONTAMINANT RISK ASSESSMENT (Weight 15%)**
  - a. Toxicity of contaminants: aquatic bioassay, mammalian acute and chronic toxicity, impact on food chain, bioaccumulation
  - b. Environmental fate of contaminants: transformation and mobility of chemical and heavy metals in soil, water and atmosphere due to microbial action, chemical reaction or physical interaction
  - c. Emergency response to spills: containment, cleanup, health and safety, site assessment
  
- 4. HYDRAULICS AND HYDROLOGY (Weight 15%)**
  - a. In-plant hydraulics: flow measurement/control, distribution
  - b. Surface water hydrology: run-off prediction, flow in open channels
  - c. Geohydrology: ground water well yields, draw down, well pollution-protection methods

## **Practice Area C**

### **Detailed Examination Specifications for the practice area of Waste Management**

- 1. FUNDAMENTALS OF SOIL AND GROUNDWATER CONTAMINATION (Weight 17%)**
  - a. Contaminants transport and site characterization techniques
  - b. Geology, hydrogeology
  - c. Data management and interpretation
  
- 2. MUNICIPAL SOLID WASTE (Weight 22%)**
  - a. Characterization
  - b. Collection, transportation (odors, noise, emissions, traffic, and safety control)
  - c. Recycling and source separation and waste minimization
  - d. Physical, chemical, and thermal processing
  - e. Land disposal
  
- 3. HAZARDOUS WASTE MANAGEMENT (Weight 22%)**
  - a. Characterization
  - b. Hazardous waste management (storage, transportation, etc.)
  - c. Physical, chemical, biological treatment
  - d. Thermal processing and destruction

- 4. SITE REMEDIATION (Weight 15%)**
  - a. Site characterization
  - b. RI/FS
  - c. RD elements
  - d. Remedial technologies (soil vapor extraction, etc.)
  - e. Pollution prevention and waste minimization
  - f. Emergency planning and response
  - g. Land disposal
  - h. Compliance planning: limits, standards, technology, and documentation
  
- 5. RADIOACTIVE WASTE, MIXED WASTE, AND MEDICAL WASTE TREATMENT AND DISPOSAL (Weight 9%)**
  - a. Characterization
  - b. Health and safety issues
  - c. Physical, chemical biological, and thermal processing
  - d. Handling issues
  
- 6. FACILITY SITING AND RISK COMMUNICATION (Weight 15%)**
  - a. Location standards
  - b. Risk assessment
  - c. Contaminant fate and effect
  - d. Community relations

### **Practice Area D**

#### **Detailed Examination Specifications for the practice area of Environmental Science, Management, and Policy**

- 1. ENVIRONMENTAL SCIENCE FUNDAMENTALS (Weight 20%)**
  - a. Basic chemistry and physics of transport, transformation, and fate
  - b. Basic chemistry and physics of control technologies
  - c. Sampling methods and monitoring methods
  - d. Data analysis and interpretation (statistics, biostatistics and numerical calculations)
  - e. Single and multi-media behavior of biological and chemical pollutants
  - f. Fundamental science of remediation and restoration technologies
  - g. Control technology - physical, chemical, and biological processes and applications
  - h. Modeling and uncertainty analysis
  
- 2. CHARACTERIZING HUMAN HEALTH AND ECOLOGICAL CONDITIONS (Weight 18%)**
  - a. Toxicologic identification, sampling, measurement, monitoring, and mitigation
  - b. Exposure pathways (single and multi-media)
  - c. Chronic and acute exposures and health effects
  - d. Identification, diagnosis, measurement, mitigation, and monitoring of health effects produced by environmental exposures
  
- 3. IMPACT ASSESSMENT (Weight 16%)**
  - a. Ecological effects - populations, communities, biodiversity
  - b. Social and economic impacts - cost/benefit analyses, monetary/non-monetary
  - c. Hazard/risk assessment
  - d. Site, regional, programmatic - natural resource damage assessment

4. **RISK MANAGEMENT ISSUES (Weight 21%)**
  - a. Facility siting
  - b. Site assessment
  - c. Environmental auditing
  - d. Risk assessment (definitions, methods, calculations, interpretation of results)
  - e. Risk management principles and practices
  
5. **GLOBAL ISSUES (Weight 10%)**
  - a. Ozone depletion and effects - acidic deposition
  - b. Climate change - habitat loss/land use planning
  - c. Indoor air quality - energy use/planning
  - d. Sustainable development
  - e. Protecting biological resources
  
6. **ENVIRONMENTAL MANAGEMENT PRINCIPLES AND PRACTICES (Weight 8%)**
  - a. Risk communication principles and practices
  - b. Project management (costs, economics, personnel)
  - c. Liability principles and practices
  - d. Soliciting and managing public participation
  - e. Emergency response principles and practices (planning, response plans exercises, evaluation of potential emergencies, evaluation of capacity of implement emergency response plans)
  
7. **PUBLIC POLICY DEVELOPMENT AND IMPLEMENTATION (Weight 7%)**

## Examination Structure

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### What is the format of the Exam?

All questions on the QEP written examination are given in a multiple-choice format having four choices. For example, a sample question in the general area of the written examination in the Mathematics/Statistics area which tests the subjects knowledge of using the “powers of ten” would have the following format:

1. The number 0.000056 is equivalent to
  - a.  $5.6 \times 10^7$
  - b.  $5.6 \times 10^{-6}$
  - c.  $56 \times 10^6$
  - d.  $56 \times 10^{-6}$

From your knowledge of expressing numbers in powers of ten you realize that the correct answer to this question is d.

### Sample Questions

The following questions are examples of the types of questions you will be asked. **The examples provided do not represent the full range of content or difficulty levels found in the actual examinations.** They are intended to familiarize you with the types of questions that you can expect. (An answer key is provided after the sample questions.)

#### General Environmental Science Section

1. The deposits of stream-borne sediments are called
  - a. clays.
  - b. alluvium.
  - c. erosion.
  - d. silt.

2. The driving force for diffusion of a contaminant is
  - a. chemical species.
  - b. chemical gradient.
  - c. atomic number.
  - d. atomic weight.
  
3. The second law of thermodynamics says that
  - a. energy cannot be created or destroyed.
  - b. heat flows from a hotter to a colder surface.
  - c. for every action there is an opposite and equal reaction.
  - d. systems tend to gravitate toward a condition of greater order.

### **Air Quality**

4. Two primary gaseous pollutants that transform to fine particles during long-range transport are
  - a. carbon monoxide and ozone.
  - b. NO<sub>x</sub> and ozone.
  - c. NO<sub>x</sub> and SO<sub>x</sub>.
  - d. carbon dioxide and methane.
  
5. Gaussian dispersion models assume that pollutant concentrations are
  - a. normally distributed in a bell-shaped curve about the plume centerline.
  - b. higher at the leading edge of the plume and decrease exponentially toward the tail of the plume.
  - c. less than 1% of the total concentration of the plume.
  - d. inversely proportional to elevation.
  
6. A critical concern when sampling for particulate, which is not as important when sampling for gases, is
  - a. wet versus dry sampling.
  - b. sample fractionation.
  - c. isokinetic sampling.
  - d. time-averaging.

### **Water Quality**

7. The most frequently used measure of water quality in domestic wastewater is
  - a. chemical oxygen demand.
  - b. biochemical oxygen demand.
  - c. total organic carbon.
  - d. total dissolved solids.
  
8. Iron and manganese in a water supply is typically
  - a. a health issue.
  - b. a regulatory issue.
  - c. an aesthetic issue.
  - d. a corrosion issue.
  
9. The typical cause of lakes turning eutrophic is
  - a. excess nutrients.
  - b. heavy metal contamination.
  - c. severe diurnal dissolved oxygen fluctuation.
  - d. high coliform count.

### **Waste Management**

10. Transfer stations are used to control
  - a. rodents.
  - b. recyclables.
  - c. spread of disease.
  - d. cost.

11. In the hierarchy of solid waste management, incineration is considered
  - a. pollution prevention.
  - b. source reduction.
  - c. treatment.
  - d. disposal.
  
12. The single largest component of the residential solid waste stream in developed countries such as the U.S. is
  - a. plastics.
  - b. food waste.
  - c. paper products.
  - d. grass clippings/yard waste.

### Environmental Science, Management, and Policy

13. Electric power plants can cause damage to aquatic life in their vicinity because
  - a. the chemical coolant of the plant mixes with the water body.
  - b. the gaseous effluent of the plant acidifies the water body.
  - c. warm water holds less dissolved oxygen than cold water.
  - d. ethylene glycol is toxic.
  
14. Exposure assessment of contaminated sediments and soils is considerably more complex than to air or water because
  - a. sediments and soils hold contaminants longer.
  - b. contaminants are more stable in solids.
  - c. solids hold more contaminants than gases and liquids.
  - d. life forms may ingest contaminants from air, water and solids.
  
15. Regarding the greenhouse effect,
  - a. carbon dioxide is the major human-made contributor to global warming.
  - b. water vapor has little to do with this effect.
  - c. it is caused solely by man-made gases.
  - d. SO<sub>x</sub> gases are precursors.

<b>Answer Key:</b>		
1 - b	6 - c	11 - c
2 - b	7 - b	12 - c
3 - b	8 - c	13 - c
4 - c	9 - a	14 - d
5 - a	10 - d	15 - a

## Any suggestions on how to prepare for the Written Exam?

The QEP/EPI written examination covers a broad range of material. By the very nature of the QEP and EPI (multi-disciplinary and multi-media) the questions on the written examination are diverse. The candidate for QEP or EPI certification must have a general understanding of the basic concepts of many environmental areas, and how they relate to each other. The most effective use of your study time will be realized by using the examination content outline as an indicator of the knowledge you must be familiar with when you take the exam. These outlines are the key to where you should focus your energy. A good way to proceed is to look up each of the topical areas of the examination outlines in the recommended reading books given in this study guide or other similar sources. This will allow you to spend your time addressing those areas that are likely to be on the examination. The examination outline also weights each area. The greater the weight, the more this area will be tested.

For example, in the Air Quality portion of Part II of the examination, area **2. Air Pollution Control** is weighted 29% and area **3. Toxic Air Contaminant Risk Assessment** is weighted 10%. This tells you that there will be approximately three times the emphasis on Air Pollution Control as on Toxic Air Contaminant Risk Assessment on the written QEP examination. The sample questions in this study guide will familiarize you with the test material and the methods of testing.

The QEP/EPI written examination is essentially a concept examination. It has been designed to measure the breadth of your conceptual knowledge in the environmental field. Some calculations are required. However, they are minimal.

The QEP written examination consists of two parts, each of which has approximately 100 multiple-choice questions. The EPI exam consists of only one part with approximately 100 multiple-choice questions and a time limit of up to three hours. The time limit for each part of the QEP examination is three hours. The first part tests your knowledge in the General Environmental Science area. All QEP and EPI candidates are required to take this portion of the exam. The second part tests your knowledge in one of the specific practice areas: Air Quality; Water Quality; Waste Management; or Environmental Science, Management, and Policy. Only QEP candidates are permitted to take this part of the exam.

Be sure to answer all questions! The test is scored on all questions and, therefore, it is to your advantage to answer each and every question. If questions requiring a calculator seem particularly difficult to you, it is usually a good strategy to let those go until last. In this manner you make most efficient use of your time—answering everything you know first in the minimum time. Work as rapidly as you can without being careless. Again, do not waste time pondering questions that you find extremely difficult or unfamiliar. Save these questions for last. Go back and answer every question: those not answered will be counted wrong. Keep track of the time. Make a mental note of the halfway and three-quarters points of the testing period to be sure you are on schedule. Again, a good way to ensure you don't run out of time is to do the "easy" questions first.

## **Reporting to Testing Locations**

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You should take with you several sharpened #2 pencils with erasers. Candidates are permitted to take non-programmable calculators, which are silent, battery-operated, do not have paper tape printing capability, and do not have a full alphabetic keyboard. Examinees are not permitted to share calculators. Use of books, other materials, or scratch paper is prohibited, but you will be able to use the margins and any blank pages in the test booklet to work problems. The test is closed book. It is a good idea to get to the testing location at least thirty minutes before the scheduled testing time. This will permit you to develop the proper, relaxed mindset to take the examination. After you get to the testing site, present a current photo ID, sign in with the proctor, follow the proctor's instructions, and relax.

## **Score Reporting**

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Your QEP/EPI exam results will usually be forwarded to you by first class mail within sixty days of the testing date. These results are, of course, confidential. To be recommended to the IPEP Trustees for QEP certification, you must receive a passing score on both parts of the examination. To be recommended to the IPEP Trustees for EPI certification, you must receive a passing score on Part I of the examination. A candidate failing a first examination may request one re-examination within two years without having to pay an additional filing fee. The candidate only has to re-take that portion of the exam not passed. A candidate failing for the second time must wait ten months before being re-tested and must submit a new application and filing fee, along with evidence of additional professional development. A waiting period of twenty-two months is required for each subsequent failure.

## **Recommended Study Materials, Text Books, & Resource List**

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The following study materials and text books have been selected by the IPEP Exam Advisory Committee as recommended reading for candidates of IPEP's written certification examinations. **Recommendations for each practice area** (Air Quality; Water Quality; Waste Management; or Environmental Science, Management, & Policy) **are in addition to the materials listed under "General Environmental Science"**.

## **General Environmental Science**

Chemical Fate and Transport in the Environment, H. F. Hemond, E. J. Fechner, Academic Press (San Diego), 1994.

Environmental Health: New Directions, J. Shields, Princeton Scientific (Princeton, NJ), 1991.

Fundamentals of Air Pollution, 3rd Edition, R. W. Boubel, D. L. Fox, D. B. Turner, A. C. Stern, Academic Press (San Diego), 1994.

Hazardous Waste Management, M. D. LaGrega, P. L. Buckingham, J. C. Evans, McGraw-Hill, Inc. (New York), 1994.

Introduction to Environmental Engineering & Science, G. M. Masters, Prentice-Hall (Englewood Cliffs, NJ), 1991.

Risk Assessment Methods, V. T. Covello, M. W. Merkhofer, Plenum Press (New York), 1993.

## **Air Quality**

Air Pollution Engineering Manual, A. J. Buonicore, W. T. Davis, Van Nostrand Reinhold Publishing (New York), 1992.

Methods of Air Sampling and Analysis, 3rd Edition, J. P. Lodge, Jr., Lewis Publishers (Boca Raton, FL), 1989.

## **Water Quality**

Wastewater Engineering: Treatment, Disposal, and Reuse, 3rd Edition, G. Tchobanoglous and F. L. Burton, McGraw-Hill (New York), 1992.

Water Quality, G. Tchobanoglous and E. D. Schroeder, Addison-Wesley (Reading, MA), 1985.

Water Supply and Pollution Control, 5th Edition, Viessman, Jr. and Hammer, Harper Collins (New York), 1992.

## **Waste Management**

Applied Hydrogeology, 3rd Edition, C. W. Fetter, MacMillan College Publishing Company (New York), 1994.

Integrated Solid Waste Management, G. Tchobanoglous, Thiessen, Vigil, McGraw-Hill, Inc. (New York), 1993.

Hazardous Waste Site Remediation, O'Brien & Gere Engineers, Inc., Van Nostrand Reinhold (New York), 1988.

## **Environmental Science, Management, & Policy**

Environmental Auditing: Fundamentals and Techniques, 2nd Edition, J. L. Greeno, G. S. Hedstrom, M. DiBerto, Arthur D. Little, Inc. (Cambridge, MA), 1987.

Environmental Science, 4th Edition, J. Turk and A. Turk, Saunders College Publishing (Philadelphia), 1988.

Environmental Science and Engineering, 2nd Edition, J. Glynn Henry, Gary W. Heinke, Prentice Hall (Upper Saddle River, New Jersey), 1996.