

Addendums
Added
for Environmental Sustainability Specialty and
the *Environmental Scientist Certification Study
Guide

How to Prepare for the Examinations for Environmental Engineering and Environmental Science* Specialty Certifications,

2nd edition

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PREFACE

Examination candidates and prospective applicants often experience anxiety because they do not know what to expect regarding the certification process and the examinations used. This book has been prepared to assist candidates and prospective candidates for Academy specialty certification. In addition to a general explanation of the Academy's certification program, it provides detailed guidance on the written and oral examinations the Academy uses to measure a candidate's special capability. Complete understanding of this information will enable the candidate to make adequate preparations for the examinations.

This manual is the result of the collective and accumulated efforts and contributions from the members of the Academy's committees on Admissions and Development and Upgrading of Examinations, as well as those on the specialty sub-committees in Air Pollution Control, Hazardous Waste Management, General Environmental Engineering, Industrial Hygiene, Radiation Protection, Solid Waste Management, Water Supply and Wastewater, and the Oral Examination sub-committee. Thanks is due to all of those Diplomates who participated in building and improving the Academy's specialty certification program over the past years.

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1. INTRODUCTION

In an increasingly-complex technological world, it can be difficult for the lay person to identify those possessing the special expertise required to successfully address today's many different environmental problems. This challenge is simplified by the Academy's specialty certification program, which establishes the specific environmental engineering and environmental science capabilities of licensed professional engineers and scientists.

Specialty certification provides the engineer or scientist with independent, peer-based confirmation of his or her special environmental engineering or environmental science expertise, which inspires confidence in those who must retain and rely on that expertise.

In 1955, the American Academy of Environmental Engineers and Scientists® began the first engineering specialty certification program in the United States. Modeled on the decades-old, successful practice in the medical profession, the program provides independent testimony of a licensed engineer's special capabilities in the profession of environmental engineering. The certification does not confer any legal right or privilege. Rather, it supplements the legal right to practice, which is conferred by a State Board of Engineering Examiners.

Upon satisfactory completion of the Academy's certification process, an environmental engineer is granted certification in a specialty recognized by the Academy and is awarded the title "Board Certified Environmental Engineer," which may be denoted in all documents as BCEE. Proper use of the appellation is Joe D. Jones, P.E., BCEE.

In 2005, AAEES began a separate specialty certification program for environmental engineering professionals who do not possess a professional engineering license.

Upon satisfactory completion of the Academy's certification process, an environmental engineer is granted certification in a specialty recognized by the Academy and is awarded the title "Board Certified Environmental Engineering Member," which may be denoted in all documents as BCEEM. Proper use of the appellation is Joe D. Jones, BCEEM.

In 2013, using the same model, AAEES added a separate new certification for environmental scientists, which provides independent testimony to an environmental scientist's special capabilities in the profession of environmental science.

Upon satisfactory completion of the Academy's certification process, an environmental scientist is granted certification in a specialty recognized by the Academy and is awarded the title "Board Certified Environmental Scientist," which may be denoted in all documents as BCES. Proper use of the appellation is Joe D. Jones, BCES.

Once certified, an individual automatically becomes a member of the American Academy of Environmental Engineers and Scientists®.

Licensing vs. Certification

In 1993, the National Council of Examiners for Engineering and Surveying (NCEES) made available to state licensing boards a discipline-specific examination for environmental engineering. That examination is used in several states, but not all. It tests broad-based environmental engineering knowledge at the minimum level of competency to practice engineering and includes eight test items covering the following topics:

- Water supply
- Wastewater collection and treatment
- Solid waste management
- Hazardous waste management
- Air pollution control
- Health, safety and environmental protection

Generally, professional engineering licenses are issued without limitation on the fields of engineering in which a person may practice, regardless of the examination completed. Therefore, the specialist in environmental engineering needs the Academy's certification to distinguish his or her capability in one or more of the environmental engineering specialties.

Specialties Certified

Environmental Engineering

The Academy's definition of environmental engineering, as stated by its Bylaws, is:

"the application of engineering principles to im-

prove and maintain the environment for the protection of human health, for the protection of nature's beneficial ecosystems, and for the environment-related enhancement of the quality of human life."

Within this broad definition, the Academy has identified the following areas of specialization in which certificates are currently issued:

- Air Pollution Control
- Environmental Sustainability
- General Environmental Engineering¹
- Hazardous Waste Management and Site Remediation
- Industrial Hygiene
- Radiation Protection
- Sanitary Engineering²
- Solid Waste Management
- Water Supply and Wastewater Engineering

Environmental Science

The Academy's definition of environmental science, as stated by its Bylaws, is:

"the application of scientific principles to improve and maintain the environment for the protection of human health for the protection of nature's beneficial ecosystems, and environment-related enhancement of the quality of human life

Within this broad definition, the Academy has identified the following areas of specialization in which certificates are currently issued:

- Air Resources
- Environmental Biology
- Environmental Chemistry
- Environmental Microbiology
- Environmental Toxicology
- Groundwater and the Subsurface Environment
- Hazardous Waste Management & Site Remediation
- Solid Waste Management
- Surface Water Resources
- Sustainability Science

All engineers and scientists who have been certified by their professional peers as having special capabilities in one or more of the corresponding areas of environmental engineering or environmental science specializations and who have consistently maintained

the requirements for continuing that certification are listed in *Who's Who in Environmental Engineering and Science*®. The annual publication is an important tool for persons seeking qualified environmental engineering and environmental science practitioners.

Program Accreditation

The Council of Engineering and Scientific Specialty Boards (CESB) has accredited the Academy's specialty certification programs thereby providing recognition that the program conforms to CESB criteria for Professional Engineering Specialty Certification Programs. Accreditation for BCEE was first granted in January 1993 and is valid until December 31, 2016. Accreditation for BCEEM was first granted in 2005 and is valid until December 31, 2018. Accreditation for BCES was first accredited in 2014 and is valid until December 31, 2018.

CESB is an independent, voluntary body composed of organizations providing specialty certification in engineering, science, and technology, along with other organizations whose interests encompass the entire engineering profession. Founded in 1990, CESB provides basic criteria and guidelines for the establishment and operation of engineering, science, and technology specialty certification programs and recognizes those certification boards that comply with its standards. It also acts to coordinate specialty certification programs, to resolve problems encountered by member boards, and to provide the public with information about engineering, science, and technology specialty certification.

1 General Environmental Engineers possess basic knowledge in all specialties with an emphasis on public health impacts.
2 The Sanitary Engineer category was used by the Academy between 1955 and 1974 to recognize the general practice of sanitary engineering without classification as to specialty.

2. PREPARING TO BE EXAMINED

Historically, 90 percent of candidates who take the Academy's examinations pass. Failure can generally be attributed to lack of preparation for the examination process or insufficient "real-world" experience in the specialty. Many guidebooks have been written on how to take examinations, regardless of type, and the essence of such guidance is repeated here. In sum, candidates should understand the examination process, which is fully described in this book. They should be rested and familiar with the subject of the examination. Experienced persons in a specialty will have little trouble passing the Academy's examinations.

The Academy's examinations are not difficult for those whose daily work is concentrated in the specialty for which they seek certification. Two exceptions to this are: 1) the candidate whose work experience is concentrated solely in one facet of the specialty, and 2) the generalist whose work is concentrated substantially (i.e., 50 to 60 percent) in one specialty, but who also works in several other specialties. In these instances, some pre-examination study is warranted to refresh the candidate's knowledge of other aspects of the specialty or to provide greater depth in the primary specialty.

Hints For A Successful Examination

- Understand the examination and the examination process; do not make it more complicated than it actually is.
- Identify areas needing study.
- Establish a study schedule as soon as the date of examination is known.
- Study regularly, every day or every other day, in sessions no longer than one hour.
- Use the references provided in this book for each specific examination as the basis for study.

Written Examination — The written examination uses the multiple-choice format. Accordingly, you should:

- First, *carefully* read each test item to ensure that the problem is *correctly understood*; many errors occur because the test item is misinterpreted.
- Second, proceed through the examination item by item, completing those for which you are sure of the answer. If a test item is problematic, go on to the next one. After completing all items you are sure of, return to address those that are more difficult.
- Keep in mind that all questions have one BEST answer, which often can be discerned by careful analysis of the problem statement and multiple-choice answers provided.
- Look for clues in the answers like "none" or "any," which often serve to indicate that the answer is possibly correct or incorrect.
- Remember that there is no penalty for guessing.

Oral Examination — The oral examination has no "right" answers. It is an opportunity to demonstrate the engineering judgment you regularly apply in your practice of environmental engineering.

The oral examination is conducted by a team of three Diplomates in accordance with prescribed guidelines. The hour-long oral examination (one part professional practice issues and two parts technical specialty problems) is used to determine a candidate's ethical concepts, maturity, presence of mind, engineering judgment, and ability to apply engineering principles and concepts that cannot be easily measured by written examination. The oral examination is ordinarily given on the same day as the written examination.

At the time of examination, candidates are provided a copy of the test items to be presented by the panel. This allows candidates to concentrate on understanding a question before formulating an answer, without having to rely upon memory to recall the information sought.

Candidates are encouraged to carefully consider a question before answering and to present the answer clearly. Effective engineering requires clear, understandable communication, which is a key examination success.