育“十三五”规划教材

环境科学与工程专业英语
——阅读与写作（第2版）

English for Environmental Science and Engineering
——Reading Materials & Academic Writing (2nd Edition)

胡龙兴　编著

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内 容 提 要

本书分两部分，第一部分为环境学科专业英语阅读材料，第二部分为环境类科技(学术)论文写作。阅读材料选自原版英文资料，涉及环境学科的不同领域。在每篇阅读材料后，均配有词汇表、疑难句子注释等。科技(学术)论文写作部分聚焦环境类英语科技论文摘要和正文的写作，紧扣英语科技(学术)论文文体特征和句子结构特点。同时，又列举了大量实例，进行适当剖析和点评。写作部分具有鲜明的“理论联系实际”和“案例分析”的特点。

本书旨在作为环境学科本科生和研究生的专业英语教材，也可供有关专业科技人员、工程技术人员和管理人员作为环境类英语的学习材料。

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再版前言

本书自出版以来已有七年时间，现因实际需要进行再版。这次再版未对书中内容作大的变动，仅对书中内容进行少量删减和必要的纠错。

在本书再版之际，编者结合教学实践经验，就有关问题提出意见和建议如下：

1. 大学生的专业英语学习仍具必要性和重要性

对于大学本科生，尤其是研究生来说，专业英语学习是大学基础英语学习之后的一种特定用途的英语学习，将为学生所从事的专业工作或进一步的专业深造提供强大工具和技能。事实证明，没有经过较好的专业英语学习和训练，本科毕业生会在科研开发活动中、研究生会在其论文课题研究中遇到很大困难，会导致不能有效阅读大量英文文献、获取有用信息，也不能撰写英文学术论文，让好的学术研究结果成果化。

2. 本书的主要读者

本书编写的主要目的是作为国内环境学科本科生和研究生的专业英语教材，以帮助学生在教师的指导下，进行较系统的专业英语的阅读与写作训练。

3. 本书的使用建议

本书分环境学科专业英语阅读材料和科技论文写作讲解两部分。由于各校设置专业英语课程的课时不尽相同，教材的使用方法也各不相同。建议本科生的教学要求为：通过学习，扩大专业英语词汇量，巩固基础英语语法知识，熟悉科技英语结构及文体，能较顺利阅读专业英语文献资料，并能用英语撰写论文摘要。本书中有大量阅读材料，这部分材料的学习可采用教师课堂讲解及师生互动的教学方式与学生课外自学方式相结合，当然，课外自学有要求、有导向。本科生的英语写作能力培训可聚焦科技论文英文摘要写作，本教材在这方面有充分的安排。建议对研究生的教学要求为：补齐本科生专业英语水平不足的短板，熟悉科技英语结构及文体，能顺利阅读专业英语文献资料，并能用英语正确撰写论文摘要和撰写科技(学术)论文全文。建议研究生阅读教材中的全部阅读材料，并保证很高的阅读理解准确性。研究生应掌握论文写作规范，在教师的帮助下，进行持续、有效的写作练习。

由于环境学科的复杂性和作者水平有限，本教材仍然会有疏漏和不当之处，在此，恳请读者提出批评、意见和建议。

编者

于上海大学

前　言

环境专业英语是在大学基础英语之后，环境专业本科生和研究生学习的一门特定用途英语。为了了解和掌握国际环境领域的最新发展动态和科技发展现状及趋势，撰写和发表英文科技(学术)论文，以参与国际学术交流和使科研工作成果化，具备较高的专业英语水平是十分必要的。学好专业英语是达到此目标的有效途径。对于本科生和研究生来说，专业英语是基础英语学习之后的另一个英语学习的重要方面，从某种意义上说，专业英语的学习更具实用性和紧迫性。

环境专业英语课程的教学目的主要是使学生在专业内容方面进行英语阅读的系统训练，把学到的基础英语扩展到专业应用，熟悉专业英语的特点，提高阅读英语科技文献的能力，能借助扎实的英语能力获取有用的信息，学习专业英语的基本写作知识，初步掌握专业英语的写作技能。然而，现行的环境学科专业英语教学和教材大多注重于阅读训练，对专业英语的写作关注得不够。培养专业英语的阅读能力的一条有效途径是熟读一定量的原版资料，泛读和精读相结合，更注重精读，强调阅读理解的准确性。培养专业英语的写作能力，首先要培养意识，要懂得写作的基本规范和理论，即要懂“规矩”。然后，要尽可能多学习和模仿地道英美人的科技(专业)英语的表达方式，力戒“中文式英语”的写作。要多阅读，甚至精心研读优秀的专业学术论文，在阅读专业论文时不妨带着两个任务：(1)获取有用信息；(2)评判写作质量。

本书的编著是作者在多年承担本科生和研究生环境专业英语课程教学任务的基础上完成的，在编著过程中参阅了不少有益书籍和资料，吸收了不少同行、专家的智慧和经验。本书由上海大学环境与化学工程学院副院长、教授、博士生导师陈捷博士担任审稿人。在编著过程中得到了上海市环境科学研究院江研因研究员、复旦大学侯惠奇教授、同济大学杨海真教授、上海大学张仲燕教授等的有益指导，在此表示衷心的感谢！本书的编著还得到了上海大学重点教材建设项目的资助。

由于环境学科的复杂性和作者水平有限，本教材在材料选取、理论论述、实例解析等方面难免有疏漏和不当之处，在此，恳请读者不吝指教。

编者

于上海大学

CONTENTS

PART ONE Reading Materials

PART TWO Academic Writing

PART ONE
Reading Materials

Unit 1 General

1. Environmental Engineering and Environmental Engineer

WHAT IS ENVIRONMENTAL ENGINEERING?

Engineering may be defined as the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to economically utilize the materials and forces of nature for the benefit of mankind.

Environmental engineering in particular has been defined as that branch of engineering which is concerned with (a) the protection of human populations from the effects of adverse environmental factors; (b) the protection of environments, both local and global, from the potentially deleterious effects of human activities; and (c) the improvement of environmental quality for people's health and well being.

WHAT DO ENVIRONMENTAL ENGINEERS DO?

The common theme of environmental engineering is a basic understanding of environments, how they function, how they can be damaged, what hazards they present to people, and how people and environments can be protected from such effects. Environmental engineers not only design, operate, and manage facilities and systems for environmental protection, but they also measure environmental quality and continually seek ways to improve it at reasonable cost. Most environmental engineers work in one or more specific areas of application of their engineering knowledge and skills. They deal with atmospheric, aquatic, and terrestrial environments, as well as interactions among these environments. A modern practitioner of environmental engineering stays knowledgeable about all these areas, though most specialize in fields such as those described below.

Water and wastewater engineering is concerned with the provision of good quality water for cities and industries, the proper disposal of wastewater, and the protection and enhancement of water quality as related to many uses such as sport fishing and recreation(1). This field has been recognized as a major sub-branch of civil engineering for almost 100 years and has been largely responsible for solving the problems of water-borne disease between 1900 and 1940. Prior to 1900, water-borne diseases such as typhoid and cholera were commonplace and thousands of people died as a result of water pollution in the U. S. The advent of modern water and wastewater treatment practices has reduced the threat of water-borne disease, but there are many new and complex water quality problems. Current concerns of this branch of environmental engineering are the development of more efficient treatment processes and the removal of very low levels of toxic materials from

drinking waters and wastewaters[2]. As population growth places additional demands on water supply in more arid regions, this field will be called upon to help reclaim potable and industrial process water from wastewaters.

Air pollution control engineering is concerned with fuels, combustion processes, and cleaning of exhaust gases from combustion and with the transport and fates of these products in the atmosphere[3]. Particulate abatement procedures have been generally successful in cleaning up many cities throughout the world. Deaths due to high concentrations of gases such as sulfur oxides in the air are not nearly as common as they used to be. However, photochemical smog from automobile emissions is still a problem in many cities. There are now more automobiles than ever before and more power plants generating more electricity at a time when clean fuels are becoming scarce and expensive. Acid rain from both human and natural sources of atmospheric pollution is a newly recognized problem which poses a threat to lakes. On an even larger scale looms the possibility of climatic alterations from increased levels of carbon dioxide produced in fossil fuel combustion[4]. The continuing challenges in this field are substantial.

Solid waste engineering is concerned with finding ways for cities and industries to handle and dispose of refuse and other solid wastes[5]. In urban areas each person produces between five and eight pounds of solid wastes each day, excluding junked automobiles and appliances or industrial solid wastes. The wastes can sometimes be burned or buried, but burial may result in pollution of ground or surface waters, and burning has the potential of causing air pollution. Some cities, including St. Louis and Chicago, are now burning part of their refuse in power plants to produce electricity. Many cities recover metals, glass, and paper from refuse. However, some municipalities are still dumping most of their solid wastes at sea. A recently recognized problem is the disposal of hazardous liquid and solid wastes from industries, many of which are especially dangerous and require extreme precaution in handling. Much work remains to be done.

Industrial hygiene engineering is concerned with the protection of people from physical, chemical, and biological hazards in the work environment[6]. Machinery may be dangerous, and chemical vapors may be poisonous in any large industrial plant. The industrial hygiene engineer finds ways to make the work environment safer and to keep working people healthy.

Radiological health engineering is concerned with protecting the general public as well as those who work around nuclear installations or with radioactive materials from external and internal radiation dangers[7]. The discovery of radiation and of radioactive materials was accompanied by the discovery that too much radiation causes physiological damage. Yet society found need for X-ray machines, radioactive tracers, and nuclear power plants because their benefits to society were, and still are, considered greater than the hazards presented by properly designed and operated systems. The radiological health engineer tries to minimize these hazards.

Environmental impact assessment is concerned with evaluating, eliminating, and predicting the effects of human activities upon the environment[8]. This is a new field of practice which has developed since 1970. However, the principles of the work go back many years to sanitary engineers who studied the effects of wastes on lakes and streams and air pollution control engineers who worked out the damaging effects of smoke. As a new and developing field it can be expected to be very

important in the future.

Environmental management is concerned with the development of new and better ways to design and operate facilities and systems which will provide for protection and improvement of environmental quality and the conservation of natural resources[9]. This is also a new and developing field, and the emphasis is on conservation and environmental protection. Pollution is not so much a matter of what is done, but how it is done and of where it is done. Engineers working in this field try to help industries and government agencies to find ways of accomplishing what they want to do without causing pollution and without damaging environments in other ways.

HOW DOES ONE BECOME AN ENVIRONMENTAL ENGINEER?

The first step in becoming an environmental engineer is to obtain a bachelor of science degree in engineering from a school accredited by the Accreditation Board of Engineering and Technology (ABET). There are over 200 such engineering schools in the U. S. In the past most environmental engineers have majored in civil, mechanical, or chemical engineering as undergraduates. Recently, some engineering schools have begun to offer undergraduate programs in environmental engineering. However, most environmental engineers obtain the masters degree at some point in their careers.

The typical undergraduate curriculum is divided into approximately one-third in basic sciences, humanities, and social sciences; one-third in the engineering sciences such as solid mechanics, fluid mechanics, thermodynamics, electrical science, and materials; and one-third in design and other courses related to the area of the student's specialization. Engineering schools which do not have an undergraduate major in environmental engineering will usually offer a "concentration" in environmental engineering within the degree programs of civil engineering or other disciplines.

A number of students who become environmental engineers obtain bachelor's degrees in one of the sciences, and then proceed to a graduate program in environmental engineering. Although this is possible, in many cases such students may be required to take additional mathematics and engineering science courses before commencing their graduate work. In addition, students without an accredited undergraduate engineering degree are prohibited from obtaining professional registration as an engineer in some states.

WHERE DO ENVIRONMENTAL ENGINEERS WORK?

Environmental engineers work in consulting firms, in industrial corporations, in local, state and federal government, in private research organizations, and in small but increasing numbers with environmental activist and other public-interest groups. In addition, some environmental engineers who obtain doctoral degrees are on university faculties, although many doctoral-level environmental engineers are employed elsewhere.

The environmental engineer working in a consulting engineering firm makes studies and prepares reports, plans and specifications for a client. The clients are usually cities, states, or industries which have a specific environmental problem in need of a solution. Another area of consulting for environmental engineers is environmental sampling and monitoring. A number of

industries will hire consulting firms to obtain samples of air, water, vegetation, soil, food, and wastes and analyze them to obtain measurements of radioactivity, pesticides, and other materials present. The industries use the results to determine if they are in compliance with laws and regulations, to design treatment units, and to defend themselves in law suits.

Many larger cities and industries have a director of environmental engineering and a staff which does some of the environmental engineering work in-house as well as contracting part of the work to consultants. The in-house staff takes responsibility for managing and operating pollution control facilities, while the consultants are more involved in design. Both groups engage to some extent in environmental assessments.

Environmental engineering is a small but identifiable branch of engineering. Nearly all past graduates have been able to find employment in their chosen fields after graduation. The opportunities in the field are many and varied. There are always new challenges to be faced, not only in our modern, technological society, but also in less industrially developed societies in other parts of the world. Thus, the long term outlook for employment is very good.

Words and Expressions

1. branch of engineering 工程分支
2. be concerned with 涉及，与……有关，参与
3. effects of adverse environmental factors 不利的环境因素的影响
4. deleterious effects of human activities 人的活动的不利的影响
5. well being 幸福，福利
6. common theme 共同的主题
7. facility 设施，设备
8. at reasonable cost 以合理的成本[费用]
9. deal with 应付，对付，处理
10. atmospheric environment 大气环境
11. aquatic environment 水环境
12. terrestrial environment 陆地环境
13. be knowledgeable about 知晓，了解
14. a major sub-branch of civil engineering 土木工程的一门主要分支
15. be responsible for 引起，造成，是……的原因，对……负责
16. water-borne disease 水致疾病，以水为媒介传播的疾病
17. prior to 在……以前，早于，居先
18. typhoid 伤寒
19. cholera 霍乱
20. commonplace 平凡的；平凡的事物
21. efficient treatment processes 有效的处理工艺[过程]
22. removal of low levels of toxic materials 低含量有毒物质的去除，去除低含量的有毒物质
23. drinking water 饮用水
24. water supply 供水，水源
25. arid 干旱的，不毛的
26. reclaim 回收，再生，重新使用，收回
27. potable water 饮用水
28. exhaust gas 废气，尾气
29. particulate abatement 颗粒物去除
30. clean up 清除，净化
31. throughout the world 遍及世界各地
32. sulfur oxide 硫氧化物
33. photochemical smog 光化学烟雾
34. automobile emission 汽车排气[废气]

35. power plant 发电厂，发电站
36. clean fuel 清洁燃料
37. scarce 缺乏的，不足的，罕见的
38. acid rain 酸雨
39. pose 引起，造成，提出，使……摆好姿势
40. on a large scale 大规模
41. loom 隐隐出现[呈现]
42. climatic alteration 气候变化
43. carbon dioxide 二氧化碳
44. fossil fuel 矿物燃料，化石燃料
45. refuse 垃圾
46. solid waste 固体废物
47. junked automobile 废汽车
48. appliance 器具，设备，装置
49. burial 埋葬，埋入
50. ground water 地下水
51. surface water 地表水
52. recover metals, glass, and paper from refuse 从垃圾中回收金属，玻璃和纸
53. dump 堆，堆场；倾倒，卸料
54. disposal of hazardous liquid and solid wastes 危险液体和固体废物的处置
55. industrial hygiene engineering 工业卫生工程
56. machinery 机器，机械
57. chemical vapor 化学蒸气
58. poisonous 有毒的
59. radiological health engineering 辐射安全工程；放射性安全工程
60. the general public(the public at large)公众
61. nuclear installation 核设施，核装置
62. radioactive material 放射性物料
63. radiation 放射，辐射
64. physiological damage 生理伤害[损害]
65. X-ray machine X 射线机
66. radioactive tracer 放射性示踪剂
67. nuclear power plant 核电厂，核电站
68. sanitary engineer 卫生工程师
69. effects of wastes on lakes and streams 废物对湖泊和河流的影响
70. work out 制订出，估计出
71. be expected to be very important 预期是非常重要的
72. conservation of natural resource 自然资源的保护
73. bachelor of science degree in engineering 工学学士
74. accredit 鉴定……为合格，认可，特许，委派，任命
75. the Accreditation Board of Engineering and Technology (ABET)工程与技术鉴定[认可]委员会
76. be majored in civil, mechanical, or chemical engineering 以土木工程，机械工程或化学工程为专业
77. master degree 硕士学位
78. undergraduate curriculum 本科生课程
79. basic science 基础科学
80. humanities 人文学
81. social science 社会科学
82. solid mechanics 固体力学
83. fluid mechanics 流体力学
84. thermodynamics 热力学
85. electrical science 电气科学
86. discipline 学科
87. commence 开始，开始做
88. professional registration 职业注册
89. consulting firm 咨询公司
90. industrial corporation 工业(股份有限)公司
91. public-interest group 公益团体
92. doctoral degree 博士学位
93. university faculties 大学的系、院
94. specification 详细说明，说明书，明细表
95. client 委托人，买方，顾客
96. environmental sampling and monitoring 环境采样和监测
97. vegetation 植物，植被

98. radioactivity 放射性
99. pesticide 农药，杀虫剂
100. in compliance with 依从，按照，遵照，与……一致
101. law and regulation 法规
102. treatment unit 处理单元[设备]
103. defend themselves in law suits 在法律诉讼中为他们自己辩护
104. contract 合同，契约；签合同
105. consultant 顾问，咨询，请教者，查阅者
106. be involved in 包括在……之内，与……有关，专心地做
107. be engaged in 正从事于，正忙于，正致力于，参加
108. to some extent 在某种程度上
109. environmental assessment 环境评价
110. identifiable branch of engineering 可认同的[可识别的]工程分支
111. challenge to be faced 将面临的困难[挑战]

Notes

(1) Water and wastewater engineering is concerned with the provision of good quality water for cities and industries, the proper disposal of wastewater, and the protection and enhancement of water quality as related to many uses such as sport fishing and recreation.

水和废水工程涉及为城市和工业界提供高质量的水、适当处理废水、保护和改善与许多用途(如休闲性的垂钓和娱乐)有关的水的质量。

(2) Current concerns of this branch of environmental engineering are the development of more efficient treatment processes and the removal of very low levels of toxic materials from drinking waters and wastewaters.

目前对环境工程这一分支的关注是开发出更有效的处理工艺和从饮用水和废水中去除非常低含量的有毒物质。

(3) Air pollution control engineering is concerned with fuels, combustion processes, and cleaning of exhaust gases from combustion and with the transport and fates of these products in the atmosphere.

空气污染控制工程涉及燃料、燃烧过程及燃烧产生的废气的净化，还涉及这些燃烧产物在大气中的流通和归宿。

(4) On an even larger scale looms the possibility of climatic alterations from increased levels of carbon dioxide produced in fossil fuel combustion

在更大的规模内可以看到在化石燃料燃烧中产生的二氧化碳的量的增加导致气候变化的可能性。本句为倒装句。

(5) Solid waste engineering is concerned with finding ways for cities and industries to handle and dispose of refuse and other solid wastes.

固体废物工程涉及寻找各种方法供城市和工业界来处理和处置垃圾和其他固体废物。

(6) Industrial hygiene engineering is concerned with the protection of people from physical, chemical, and biological hazards in the work environment.

工业卫生工程涉及保护员工在工作环境中不受物理、化学和生物的危害。