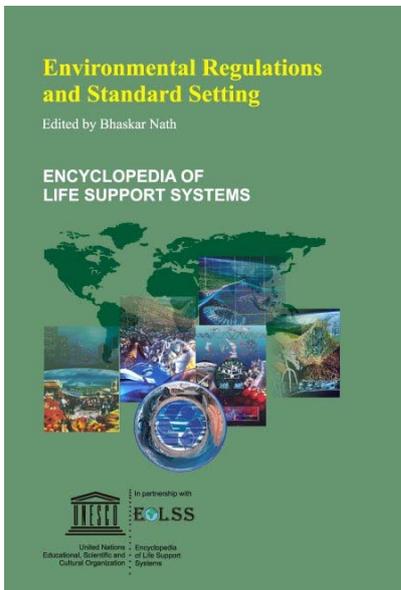


CONTENTS

ENVIRONMENTAL REGULATIONS AND STANDARD SETTING



Environmental Regulations and Standard Setting - Volume 1

No. of Pages: 512

ISBN: 978-1-84826-103-7 (eBook)

ISBN: 978-1-84826-553-0 (Print Volume)

For more information of e-book and Print Volume(s) order, please [click here](#)

Or [contact : colssunesco@gmail.com](mailto:colssunesco@gmail.com)

CONTENTS

Environmental Regulations and Standard Setting **1**
 Bhaskar Nath, *European Centre for Pollution Research, London, United Kingdom*

1. Introduction
 - 1.1. What is an Environmental Standard?
 - 1.2. Why Environmental Standards?
 - 1.2.1. Production, Consumption, and Waste
 - 1.2.2. Environmental Issues and Problems
 - 1.2.3. The North–South Divide
 - 1.2.4. Sustainable Development: A Realistic Hope?
 - 1.3. Sustainable Development and Standard Setting
2. Problems Encountered in Setting Standards
 - 2.1. Economic Considerations
 - 2.2. Scale of the Problem
 - 2.3. The Problem of Secondary Compounds
 - 2.4. Problems of Enforcement
 - 2.5. Political Will
 - 2.6. Where Do We Go From Here?
3. Conclusion

Environmental Pollution Regulations **22**
 Prabir Ganguly, *Centre for European Studies, VSB-Technical University of Ostrava, Ostrava-Poruba, Czech Republic*

1. Introduction
2. Human rights & environmental protection
3. Meaning of environmental pollution regulation
4. History and trends of environmental pollution regulation
 - 4.1. The historical context
 - 4.2. Modern trends in regulatory practice
5. Basic philosophies, principles and policies of pollution control
 - 5.1. Guiding philosophies for pollution control
 - 5.2. Basic principles governing pollution control regulations
 - 5.3. Pollution control policy
6. Pollution control legislation
 - 6.1. Characteristics of pollution control legislation
 - 6.2. Different sectors of pollution control
 - 6.2.1. Planning and pollution control
 - 6.2.2. Regulatory control of contaminated land
 - 6.2.3. Air pollution regulation
 - 6.2.4. Water pollution regulation
 - 6.2.5. Waste control regulation
 - 6.2.6. Noise Pollution Regulation
 - 6.2.7. Integrated pollution prevention and control
 - 6.3. Voluntary pollution control
 - 6.4. Other tools for pollution control
 - 6.4.1. Access to information
 - 6.4.2. Public participation
 - 6.4.3. Environmental education and awareness
 - 6.4.4. Economic instruments
 - 6.4.5. Reliance on market forces
 - 6.4.6. Enforcement
7. Concluding remarks

Local Regulations**61**Prabir Ganguly, *Centre for European Studies, VSB-Technical University of Ostrava, Ostrava-Poruba, The Czech Republic*

1. Introduction
2. Meaning of a local authority
3. Local authority and pollution control
 - 3.1. Nuisance management by local regulations
 - 3.2. Planning control as regulatory measure
 - 3.2.1. Environmental impact assessment and the role of the local authority
 - 3.2.2. Air pollution control by local authority
 - 3.2.3. Waste regulation at the local level
 - 3.2.4. Water pollution control at the local level
 - 3.2.5. Other pollution control measures at the local level
4. Concluding remarks

National (Federal) Regulations**74**Prabir Ganguly, *Centre for European Studies, VSB-Technical University of Ostrava, Ostrava-Poruba, The Czech Republic*

1. Introduction
2. Overview of the legal system
 - 2.1. System of government
 - 2.2. Statutory, common and other laws
 - 2.3. Relationship between different tiers of government
 - 2.4. The judicial system
3. Sources of national regulation on environmental pollution control
 - 3.1. National law as source of regulation
 - 3.2. International law as source of regulation
4. Outline of the evolution of pollution control regulation in selected countries
 - 4.1. The United States of America
 - 4.2. Japan
 - 4.3. India
 - 4.4. The European Community (EC)
 - 4.5. China
5. Structural features of pollution control regulation
 - 5.1. Policies guiding pollution control regulation
 - 5.2. Main features of pollution control regulation
 - 5.2.1. Integrated pollution prevention and control regulation
 - 5.2.2. Air pollution control regulation
 - 5.2.3. Water pollution control regulations
 - 5.2.4. Waste control regulation
 - 5.2.5. Noise pollution control
6. Concluding remarks

International Regulations**91**Prabir Ganguly, *Centre for European Studies, VSB-Technical University of Ostrava, Ostrava-Poruba, The Czech Republic*

1. Introduction
2. Basic Elements of International Environmental Law
3. International Environmental Treaties and their Implementation
 - 3.1. Compliance with treaties
4. Important Milestones in Development of International Regulations
5. Environmental Pollution Regulations in the European Community
6. Overview of Selected International Agreements

- 6.1. Freshwater pollution agreements
- 6.2. Marine pollution agreements
- 6.3. Hazardous waste control agreements
- 6.4. Air pollution agreements
7. Concluding remarks

Regulation of Air Pollutants

103

Prabir Ganguly, *Centre for European Studies, VSB-Technical University of Ostrava, Ostrava-Poruba, The Czech Republic*

1. Introduction
2. International Efforts to Regulate Air Pollutants
3. Regional Regulations of Air Pollutants in European Community
 - 3.1. Environment Quality Standard
 - 3.2. Product Standards
 - 3.3. Exhaust Emission from Vehicles
 - 3.4. Industrial Plants and their Emission Limits
4. National Regulations of Air Pollutants
5. Conclusion

Regulation of Water Pollutants

114

Prabir Ganguly, *Centre for European Studies, VSB-Technical University of Ostrava, Ostrava-Poruba, The Czech Republic*

1. Introduction
2. Principles of Regulating Water Pollutants
3. International Regulations on Water Pollutants
4. National Regulations of Water Pollutants
5. Conclusion

Regulation of Land Pollutants and Solid Waste Disposal

125

Prabir Ganguly, *Centre for European Studies, VSB-Technical University of Ostrava, Ostrava-Poruba, The Czech Republic*

1. Introduction
2. Regulations Dealing with Prevention of Land Pollution
 - 2.1 Regulations on past contamination
3. Regulations on Waste Disposal
4. Conclusion

Regulations on Fuel Extraction and Combustion

133

Prabir Ganguly, *Centre for European Studies, VSB-Technical University of Ostrava, Ostrava-Poruba, The Czech Republic*

1. Introduction
2. Planning Control for Fuel Extraction and Combustion Facilities
3. Pollution Control during Fuel Extraction
 - 3.1. Air Pollution
 - 3.2. Water Pollution
 - 3.3. Waste on Land
 - 3.4. Noise Pollution
4. Regulations on Fuel Combustion
5. Conclusion

Environmental Quality Standards**142**

P. D. Kalabokas, *Research Centre for Atmospheric Physics and Climatology, Academy of Athens, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

1. Introduction
2. Air quality criteria
 - 2.1. Exposure to air pollution
 - 2.2. Evaluating exposure-response relationships
 - 2.3. Formulation of air quality criteria or guidelines
 - 2.4. Criteria for endpoints other than for carcinogenicity
 - 2.5. Criteria for carcinogenic endpoints
 - 2.6. Ecological effects
3. Air quality standards
4. Advantages and disadvantages of air quality standards
5. Adoption of standards
6. Aspects of air pollution control strategy

Objectives of and Procedures for Setting Standards**158**

P. D. Kalabokas, *Research Centre for Atmospheric Physics and Climatology, Academy of Athens, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

1. The general framework
2. Identification of priority pollution issues
3. International programs
 - 3.1. The WHO Regional Office for Europe
 - 3.2. The WHO Environmental Health Criteria Program
 - 3.3. The United Nations Environment Programme
 - 3.4. International Register of Potentially Toxic Chemicals
 - 3.5. International Agency for Research on Cancer
 - 3.6. FAO/WHO Pesticide Reviews
 - 3.7. FAO/WHO Food Additive Reviews
 - 3.8. Guidelines for Drinking-water Quality
 - 3.9. Workplace Standards

Science of Environmental Quality Standard Setting**168**

P. D. Kalabokas, *Research Centre for Atmospheric Physics and Climatology, Academy of Athens, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

1. Introduction
2. Air Quality Criteria or Guides
 - 2.1. Health effects
 - 2.1.1. Spectrum of response
 - 2.1.2. Sources of information on health effects of environmental pollutants
 - 2.1.3. Pollutants and human exposure response
 - 2.1.4. The exposure-response matrix
 - 2.1.5. Estimation of exposure
 - 2.1.6. Evaluating exposure-response relationships

- 2.2. Other biological effects
- 2.3. Physical effects
- 2.4. Formulation of air quality criteria based on available information
- 2.5. The WHO guidelines
 - 2.5.1. General characteristics of the WHO guidelines
 - 2.5.2. Criteria adopted for establishing guideline values
 - 2.5.3. Criteria common to carcinogens and non-carcinogens
 - 2.5.4. Criteria for endpoints other than carcinogenicity
 - 2.5.5. Criteria for carcinogenic endpoint
 - 2.5.6. Ecological effects
- 3. Air Quality Goals
- 4. Air Quality Standards

Advantages and Disadvantages of Air Quality Standards **194**
 P. D. Kalabokas, *Research Centre for Atmospheric Physics and Climatology, Academy of Athens, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*
 N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

- 1. Air pollution control philosophies
- 2. General Characteristics of the Emission Standard Philosophy
- 3. The Advantages and Disadvantages of Emission Standards
- 4. The Air Quality Standard Philosophy
- 5. The Advantages and Disadvantages of Ambient Air Quality Standards

Adoption of Standards **203**
 P. D. Kalabokas, *Research Centre for Atmospheric Physics and Climatology, Academy of Athens, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*
 N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

- 1. General legislative procedures in environmental control
- 2. Legislative procedures concerning ambient air quality standards
- 3. The social and economical aspects in setting air quality standards.
- 4. Summary of the WHO guidelines
 - 4.1. Guideline values based on effects other than cancer
 - 4.2. Criteria Based on Carcinogenic Effects
 - 4.3. Guidelines Based on Ecological Effects on Vegetation
 - 4.4. Use of the Guidelines in Protecting Public Health

Implementation and Enforcement **219**
 P. D. Kalabokas, *Research Centre for Atmospheric Physics and Climatology, Academy of Athens, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*
 N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece.*

- 1. General approach
- 2. Aspects of air pollution control strategy

Source-Oriented Control of Pollution**228**

A. K. Karavanas, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

1. Licensing and permitting of discharges
2. Emission and effluent limits: a main element of the permitting system
3. Performance standards: establishing discharge zones
4. Facility design requirements
5. Trading pollution discharge rights
6. Best management practices

Licensing and Permitting of Discharges**243**

A. K. Karavanas, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

1. Environmental Permitting and Licensing Systems
2. Basic principles of environmental permitting
3. Permitting Policy and Legislation
 - 3.1. Best Available Techniques (BAT) and Environmental Quality Objectives (EQOs)
 - 3.2. Economic considerations
 - 3.3. Integrated permitting
 - 3.4. Strengthening the links with other policy instruments
 - 3.5. Involvement of the public
 - 3.6. Permitting legislation
 - 3.7. Relationship between the environmental impact assessment (EIA) process and integrated permitting
4. Procedure for issuing permits
 - 4.1. The application procedure
 - 4.2. Consultation and public participation
 - 4.3. Granting of permits
 - 4.4. Monitoring and enforcement
5. Conclusions

Effluent Limits for Discharges**262**

A. Karavanas, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece,*

N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

1. Emission or effluent standards.
2. Environmental Quality Objectives (EQO) and Environmental Quality Standards (EQS).
3. The setting of Emission or Effluent Limit Values (ELVs).
 - 3.1. Stages of setting ELVs
 - 3.2. Relation between emission limit values and best available techniques (BAT)
 - 3.3. Relation between ELVs and EQSs
4. The use of ELVs during the permitting process.

- 4.1. The implementation of ELVs through legislation
- 4.2. Permits and ELVs based on BAT
- 4.3. Monitoring and enforcement
5. Conclusions

Performance Standards: Establishing Discharge Zones **275**

A. Karavanas, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*
 N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

1. Business environmental performance
2. Discharges to Water
3. Legal framework for the prevention of water pollution
4. Effluent Guidelines and Performance standards
 - 4.1. Analysis of performance standards
5. Discharges to the Aquatic Environment
 - 5.1. Mixing zones in waters and environmental quality standard compliance
6. Conclusions

Facility Design Requirements **284**

A. Karavanas, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece*
 N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece*

1. The meaning of clean production and the principle of pollution prevention
 - 1.1. Clean production
 - 1.2. Pollution prevention
2. Aspects Affecting the Design of A Facility
 - 2.1. Pollution prevention strategy
 - 2.2. Environmental management tools for a facility or process design
 - 2.3. Integrated permitting
3. Best Available Techniques used for Pollution Prevention and for the Environmental Management of a Facility
 - 3.1. Best Available Techniques and emission /effluent limit values based on BAT
 - 3.2. BAT guidelines for permits and facility design
 - 3.3. Current emission and consumption levels
 - 3.4. Techniques to be considered in determining BAT
4. Conclusions

Trading of Pollution Discharge Rights **297**

A. Karavanas, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*
 M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*
 N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept. Computational Fluid Dynamics Unit, Greece*

1. Introduction: what is emissions or discharge trading?
2. Advantages and disadvantages of emission and discharge trading

3. The process of developing a trade
 - 3.1. Need for regulations authorising trading
 - 3.2. Allocation
 - 3.3. Timing of trade negotiations
 - 3.4. Identifying trading partners
 - 3.5. Calculation of trading quantities
 - 3.6. Trade negotiations
 - 3.7. Trade agreements
 - 3.8. Approving the trade
 - 3.9. Timing the development of a trade program
 - 3.10. Credibility
4. Air emissions trading
 - 4.1. Pollutants in the Kyoto Protocol
 - 4.2. Sector coverage
5. Waste water discharges trading
 - 5.1. An example of how to calculate effluent trading quantities for an industrial area served by a common waste water treatment plant
6. Conclusions

Best Management Practices**312**

A. Karavanas, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece*

M.N. Christolis, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece*

N.C. Markatos, *National Technical University of Athens, Chemical Engineering Dept., Computational Fluid Dynamics Unit, Greece*

1. Integrated environmental management
2. Industry and the environment
 - 2.1. Industrial ecology
 - 2.2. Good environmental practice is good business practice
3. Guides and guidance manuals
 - 3.1. Objectives of guides
 - 3.2. The principles of a guidance manual
 - 3.3. Contents of guidance manuals
4. Usage of water in industry and agriculture
 - 4.1. Optimizing water use
 - 4.2. Managing waste
 - 4.3. BAT guidelines for permits and facility design
5. Conclusions

Types of Standards**326**

Luc Hens, *Human Ecology Department, Free University of Brussels (VUB), Belgium*

1. Scope of standards
2. Definitions
3. Origins and evolution of environmental standards
4. Evolution of the rationale and methods of guideline establishment and standard setting
 - 4.1. Hazard identification
 - 4.2. Dose-response assessment
 - 4.3. Exposure assessment
 - 4.4. Risk characterization
5. Categories of standards
6. Advantages and limitations of the use of standards
7. Groups of standards

Ecologically Based Standards**349**Luc Hens, *Department of Human Ecology, Free University of Brussels (VUB), Belgium*

1. Introduction
2. Definition
3. Background information
 - 3.1. Characteristics of ecosystems relevant to ecological standard setting
 - 3.2. Typology and classification
 - 3.3. Borders of ecosystems
4. Basic principles for ecological standard establishment
 - 4.1. Definition and scope of ecotoxicology
 - 4.2. Single-species tests
 - 4.2.1. Test organisms
 - 4.2.2. Exposure time
 - 4.2.3. Toxicity parameters
 - 4.2.4. Standardized single-species tests
 - 4.3. Ecosystem models
 - 4.4. Field investigations
 - 4.5. Tiering data and testing schemes
 - 4.6. Extrapolation from experimental data to ecosystems
 - 4.7. Transport, transformation, distribution
 - 4.8. Integrated risk assessment for environmental objectives
5. Surface water management in the Netherlands: an application
6. Conclusions and future developments

Health Based Standards: Epidemiology**373**Luc Hens, *Human Ecology Department, Free University of Brussels (VUB), Belgium.*

1. Introduction
2. Definitions: epidemiology and environmental epidemiology
3. Principles of epidemiological research
 - 3.1. Retrospective studies
 - 3.2. Prospective studies
 - 3.3. Cross-sectional studies
 - 3.4. Case-control studies
4. Effects studied in epidemiology
 - 4.1. Mortality
 - 4.2. Morbidity
 - 4.3. Dose-effect relationships
5. Related study areas
 - 5.1. Controlled human exposure studies
 - 5.2. Accidental poisoning
 - 5.3. Biomonitoring
6. Criteria for determining acceptable levels of effects
 - 6.1. General quality criteria for epidemiological studies used in guideline establishment
 - 6.2. Examples of environmental standard setting based upon epidemiological studies
7. Conclusions

Health Based Standards: Toxicology**397**Luc Hens, *Human Ecology Department, Free University of Brussels (VUB), Belgium.*

1. Introduction
2. Definition: toxicology and environmental toxicology
3. Qualitative aspects of the action of substances in the organism
 - 3.1. Exposure
 - 3.2. Toxicokinetic phase

- 3.3. Toxicodynamic phase
4. Quantitative aspects of toxic agents
5. Extrapolation to humans
 - 5.1. Body weight
 - 5.2. Safety factor
 - 5.3. Strengths and limitations
6. Calculating guidelines for contaminants in drinking water
7. Conclusions

Health Based Standards: Oncology**419**Luc Hens, *Human Ecology Department, Free University of Brussels (VUB), Belgium.*

1. Introduction
2. Cancer development as a multi step process
3. Carcinogenicity tests
 - 3.1. Rationale
 - 3.2. Genotoxic tests
 - 3.3. Carcinogenicity tests
 - 3.4. Limited *in vivo* bioassay
 - 3.5. Case reports and epidemiology
4. Classification of carcinogens
5. Dose-response relationships for genotoxic carcinogens
6. Risk figures for non-threshold carcinogens
7. Standard establishment based upon risk figures
8. Discussion – conclusions

Participants in Standard Setting**440**Luc Hens, *Department of Human Ecology, Free University of Brussels (VUB), Belgium*

1. Introduction
2. Process of standard establishment
3. Societal groups in standard establishment
 - 3.1. Environmental groups
 - 3.2. Business and industry
 - 3.3. The scientific community
 - 3.4. Labor unions
 - 3.5. International organizations
 - 3.5.1. United Nations (UN)
 - 3.5.2. Organization for Economic Cooperation and Development (OECD)
 - 3.5.3. International Standards Organization (ISO)
 - 3.6. Authorities
4. Methods for the socio-economic basis of standards establishment
 - 4.1. Responsibilities
 - 4.2. Methodologies
 - 4.3. Communication
5. Conclusion

Index**457****About EOLSS****467**