
Principles of

AIR

QUALITY

MANAGEMENT

ROGER D. GRIFFIN

CONTENTS

1. The Atmosphere and Its Contaminants

History of Air Pollution	2
Terms and Definitions	5
Components of the Atmosphere	8
States of Air Pollutants	11
Contaminant Classifications	14
Photochemical Smog	17

2. Effects of Air Pollution

Sources of Health Effects Information	23
Criteria vs Noncriteria Air Pollutants	25
Basic Principles of Toxicology	29
Routes of Exposure	31
Response to Airborne Chemicals	32
Classes of Health Effects	37
Effects on Vegetation and Crops	39
Effects on Materials	42
Effects on Animals	46
Economic Losses	46

3. Air Quality Standards and Monitoring

Types of Air Quality Standards	51
Ambient Air Quality Standards and Exposures	54
The Pollution Standard Index	56
Noncriteria Air Contaminant Standards	59
Risk Assessments	60
Uncertainties in Risk Assessments	65
Screening Level Approaches	66
Comparison of Air Quality to Standards	69
Monitoring Air Quality	70

4. Sources and Measurement Methodologies

Global Source Comparisons	79
Air Pollution Sinks	81
Anthropogenic Air Emissions	84
Combustion Chemistry	91
Evaporative Emissions	95
Criteria Air Pollutant Generation	102
Hazardous Air Emissions	107
Quantification of Source Emissions	109

5. Meteorology, Dispersion, and Modeling

Earth's Energy and Air Movement	114
Regional Air Pollution Meteorology	124
Local Air Pollutant Dispersion	140
Dispersion Modeling	146
Planning Models	154
Statistical Air Quality Models	156

6. Stationary Source Control Approaches

Source Reduction	159
Management and Operational Changes	160
Process Optimizing Actions	166
Combustion Modifications	168
Fuels	174
Planning and Design	180
Emissions Characterization	182
Collection of Air Contaminants	184
Air Pollution Control Approaches	187
Particulate Technologies	193
Combustion Gas Technologies	201
Technology Comparisons	205

7. Mobile Source Control Approaches

Engines and Air Pollutants	208
Pollutant Formation in Spark-Ignited Engines	212
Diesel Ignition Emission Characteristics	218
IC Engine Emission Control Options	222
External Control Approaches	228
Fuel Change Effects	231
Alternative Power Systems	236

8. Global Concerns

Acid Deposition	241
Stratospheric Ozone	247
Global Climate Change	255
Alternative Views	270

9. Air Quality Laws and Regulations

General Approaches	275
Federal Laws Impacting Air Quality Management	279
The 1990 Amendments to the Clean Air Act	283
Nonregulatory Air Quality Management Approaches	320
The Influence of Nonregulatory Actions	321

10. Management, Trends, and Indoor Air Quality

Air Quality Management	324
Trends in Emissions	326
Trends in Strategies	330
Indoor Air Quality	336
Other Indoor Air Contaminant Concerns	351
Public Buildings	353

Bibliography	357
---------------------	-----

Glossary of Acronyms	365
-----------------------------	-----

Index	369
--------------	-----