

# TABLE OF CONTENTS

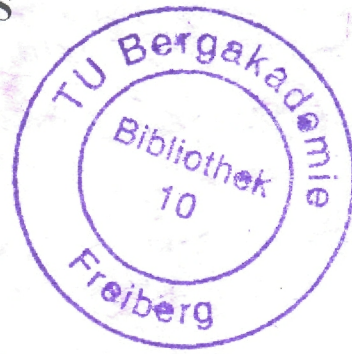


TABLE OF CONTENTS	iii
SESSION CHAIRS	ix
AUTHORS & PANEL MEMBERS	xi
FINANCIAL SPONSORS	xxiii
VOLUNTEERS	xxiv
EXHIBITORS	xxv
FOREWORD	xxvi

## Keynote Address

The Costs and Benefits of Air Pollution Control <i>Maureen L. Cropper</i>	3
--	---

### Session 1 - Current Status of Air Quality Regulations in Canada and Trends in International Air Quality Agreements

Chairs: G. Steve Hart, Air Pollution Prevention Directorate, Environment Canada; and Randy P. Angle, Air Issues and Monitoring Branch, Alberta Department of Environmental Protection

Canadian National Ambient Air Quality Objectives: Process and Status <i>Marjorie Shepherd and Ann McMillan</i>	15
---	----

Ambient Air Quality Guideline Development in Alberta: Environmental Guidelines <i>Kenneth R. Foster</i>	22
--	----

Towards a National Particulate Matter Strategy for Canada <i>Karen McDonald and Kathleen Hedley</i>	29
--	----

Current Status of International Agreements on Air Pollution Control: A Canadian Perspective <i>G. Steve Hart and Jessica Thomson</i>	37
---	----

### Session 2 - Global Climate Change: Where Do We Stand?

Chairs: Marlene Phillips, Climate and Atmospheric Research Directorate, Atmospheric Environment Service, Environment Canada; and Gary A. Webster, Canadian Association of Petroleum Producers

Status and Directions of Global Climate Models <i>Gregory M. Flato</i>	49
---	----

Greenhouse Gases and Global Budgets: Status of Sources and Sinks <i>Henry G. Hengeveld</i>	56
---	----

Trends in Ozone Over Canada, Ozone Depleting Substances and the UV-B <i>D.I. Wardle</i>	66
--	----

Ultraviolet (UV-B) Radiation and Canada's Forests: State of Science and Risk <i>Kevin E. Percy and Dawn C. Gordon</i>	75
--	----

Climate Change: Implications for the Boreal Forest <i>Robert B. Stewart, Elaine Wheaton, and Dave Spittlehouse</i>	86
Climate Change Implications for Agriculture in Western Canada <i>James M. Byrne</i>	102
Climate Change and the Adaptability of Agriculture <i>Tom Johnston and Quentin Chiotti</i>	108
 <b>Session 3 - Status and Trends in the Control of Hazardous Air Pollutants</b> Chairs: David W. Pryce, Canadian Association of Petroleum Producers; and Brian W. Zelt, Golder Associates  	
Characterization of Emissions from Diffusion Flare Systems <i>Mel T. Stroscher</i>	119
Use of Energy and Utilities Board Production Statistics Reports (S-Reports) as a Performance Measure of Flaring Activities in Alberta <i>Ian Dowsett</i>	134
Policy Review of Solution Gas Flaring and Conservation in Alberta - A Review of the Review <i>Kevin Johnston</i>	144
Air Emissions Monitoring System for Predictive Maintenance and Environmental Compliance <i>Robert Salerno and David Day</i>	154
Management of Air Emissions from Glycol Dehydrators in Canada <i>R. Brad Johnston, C. Donald Leitch, and Rod P. Sikora</i>	161
The Impact of California Phase 2 RFG on Real-World Vehicle Emissions <i>Alan W. Gertler, John C. Sagebiel, William A. Dippel, and C. Michael O'Connor</i>	178
Effective Management of Fugitive Emissions from Natural Gas Transmission Facilities <i>Robert K. McBrien, Bert Jones, and Srikanth Venugopal</i>	190
 <b>Session 4 - Advancements in Measurement of Trace Gases in the Atmosphere</b> Chair: Roger Creasey, Alberta Energy and Utilities Board  	
The LasIR - A Versatile System for Remote Sensing of Gases <i>Harold I. Schiff, Alak Chanda, John Pisano, and Gervase Mackay</i>	205
The Future of an Illusion <i>Jack W. Ondrack</i>	215
Capabilities of Open Path Instrumentation <i>Jeffrey E. Johnston, Evgeniy V. Ivanov, and Clive M. Lee</i>	219

Open Path Monitoring for Toxic Gases Using Tunable Diode Laser Spectroscopy <i>Michael B. Frish and Len Edwards</i>	227
--	-----

### **Session 5 - Trends and Advancements in Particle Measurement Technologies**

Chair: Larry Strachan, Manitoba Environment

Continuous Ambient Mass Monitor <i>Peter C. Babich, Peng-Yan Wang, Constantinos Sioutas, and Petros Koutrakis</i>	239
Monitoring Methods for the Identification of PM ... What's the (Particulate) Matter? <i>Michael B. Meyer</i>	250
PM <sub>10</sub> and PM <sub>2.5</sub> Concentrations and Trends at Canadian Urban and Rural Sites <i>Tom F. Dann and Jeffrey R. Brook</i>	256
Particulate Matter in Calgary and Edmonton <i>L. Cheng, H.S. Sandhu, R.P. Angle, and R.H. Myrick</i>	268

### **Session 6 - Advances in Waste Gas Treatment Technologies**

Chairs: Robert F. Becker, Colt Engineering Corporation; and  
Bill Berzins, BOVAR Environmental

Comparison of Flameless Thermal Oxidation and Granular Activated Carbon for VOC Control <i>Howard Hohl</i>	281
Biofiltration of Contaminated Air <i>Hinrich L. Bohn</i>	288
Methane Oxidation in Soils as a Tool for Reducing Greenhouse Gas Emissions <i>Vincent B. Stein and J. Patrick Hettiaratchi</i>	297

### **Session 7 - Human Health and Ecological Risk Assessment**

Chairs: Linton Kulak, Shell Canada Limited; and  
Sheldon Roth, The University of Calgary

Air Issues and Human Health - How High a Priority? <i>Geoffrey C. Granville</i>	309
Airborne Toxic Compounds in the Arctic Region <i>P. Fellin, L.A. Barrie, C. Halsall, and D. Muir</i>	316
Visionary Approach to Air Quality Management <i>Randy P. Angle and Harby S. Sandhu</i>	326
Comparative Pulmonary Responses of Humans and Animals to Air Pollutants: A Commentary <i>F.H.Y. Green, S. Boser, S.H. Roth, K. Nikula, F. Hahn, and V. Vallyathan</i>	338



Learning from Experience: How Could We Have Missed the Association Between Particulates and Mortality? <i>Tee L. Guidotti</i>	349
Integrated Human Health Risk Assessment of Air Emissions from an Oriented Strandboard Mill, Sawmill and Wood-Fired Power Plant Near a Rural Alberta Community <i>Gordon L. Brown, Ross M. Wilson, Dennis Yee, Michael B. Schroeder, Robert Olson, and Michael Woods</i>	355
Carbon Monoxide Exposure Assessment for Urban Residents in Edmonton, Alberta <i>Long Fu</i>	365
<b>Session 8 - Advances in Environmental Monitoring</b>	
Chairs: Teresa de Grosbois, NOVA Gas Transmission Limited; and Andrzej Bytnerowicz, USDA Forest Service	
Canada's Ecological Monitoring and Assessment Network <i>Tom Brydges and John Anderson</i>	379
Vegetation Recovery Near the Cominco Smelter, Trail, British Columbia <i>Katherine Enns</i>	386
Assessing the Impact of Ethylene Around a Petrochemical Site <i>T.R. Jack and R.K. McBrien</i>	403
Epilithic Lichens – Atmospheric Deposition Monitors of Trace Elements and Organohalogenes? <i>Jörg Matschullat, Tim Scharnweber, Dieter Garbe-Schönberg, Annette Walther, and Volkmar Wirth</i>	412
Regional Airshed Management in the Southern Wood Buffalo Zone of Alberta <i>Robert Scotten, James E. Little, and Gordon Kemp</i>	428
Regional Effects of Acidifying Emissions from Oil Sand Plants in Northeastern Alberta <i>Judith A. Smith, Kim Ottenbreit, Mervyn Davies, Ron Pauls, Larry Turchenek, and Calvin Duane</i>	435
Air Quality Issues in Canadian National Parks and North American Protected Areas <i>David Welch</i>	448
Gas Migration Across Landfill Cover Systems: A Methodology for Determining Gas Source Strength <i>N.M. To, J.P. Hettiaratchi, J.W. Shaw, C. Chomsurin, and C. Visvanathan</i>	460



**Session 9 - Voluntary Programs for Air Quality Management:  
Status and Various Viewpoints (Paper and Panel)**

Chairs: Paresh Thanawala, 2000 Environmental Services; and  
Robert F. Becker, Colt Engineering Corporation

**PANEL**

Nick McCartney, Canada's Climate Change Voluntary Challenge and Registry;  
Gary A. Webster, Canadian Association of Petroleum Producers;  
Dan Smith, Pembina Institute for Appropriate Development;  
Goldie Edworthy, Alberta Energy;  
William R. Remmer, Alberta Energy and Utilities Board; and  
Sagar V. Krupa, University of Minnesota

Positive Demonstration of Initiatives Under the Voluntary Climate Change Challenge Program 471  
*Jennifer Keyes and Marika Hare*

**Session 10 - Status and Trends in Ambient Passive Monitoring**

Chair: John Torneby, Air Issues and Monitoring Branch,  
Alberta Department of Environmental Protection

Passive Sampling of Ambient, Gaseous Air Pollutants: A Review 485  
*Sagar V. Krupa*

Application of Personal Exposure Monitors (PEMs) in a Human Health Risk Assessment 506  
*R. Vincent Gagner and Dennis Trotter*

Use of Passive Samplers, Sentinel Plants and Native Bioindicators for Evaluating Ozone Effects on Forests in the Carpathian Mountains 515  
*Andrzej Bytnerowicz, William Manning, Barbara Godzik, Krystyna Grodzinska, and Robert C. Musselman*

A New All-Season Passive Sampling System for Monitoring SO<sub>2</sub> and NO<sub>2</sub> in the Atmosphere 529  
*Hongmao Tang, Thomas Lau, and Bernie Brassard*

**Session 11 - Opportunities in Air Pollution Control:  
Is the Free Market an Option?**

Chair: Elaine McCoy, Q.C., Macleod Institute for Environmental Analysis  
at The University of Calgary

The Need for Multidisciplinary Management: Alternative and Market-Based Approaches to Environmental Protection in the Energy Industry 541  
*Magdalena A.K. Muir*

The Need for Multidisciplinary Management: Alternative and Market-Based Approaches to Environmental Protection in the Pesticides Industries 549  
*Deborah R.H. Straw*

Greenhouse Gas Emissions Due to Canadian Fossil Fuel Exports 554  
*T.J. McCann, P.H.S. Magee, and David Picard*

The Alberta Ambient Air Quality Monitoring System: Seeing the Provincial Picture  
*Andy Teal and Randy Angle* 566

**Session 12 - Innovative Approaches to Air Quality Management in North America**

Chair: Harby S. Sandhu, Atmospheric Science and Management Associates

The Role of Science Assessment in Air Quality Policy Development  
*Marjorie Shepherd and Ann McMillan* 579

Innovative and Regional Approaches to Air Quality in the West  
*Richard W. Halvey* 587

Integrated Planning for Air Quality and Growth Management for the  
Vancouver Region  
*Morris Mennell* 597

The Clean Air Strategic Alliance - A New Approach to Air Quality Management  
*Murray Ellis, Christine Macken, and Mike Kelly* 609

SUBJECT INDEX 619

AUTHOR INDEX 625