

APPENDIX A

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APPENDIX B

REVIEW PROCESS

Successive drafts of this Assessment Document experienced progressive stages of review by its authors and by outside peers, and transcripts were recorded containing the review comments and the corresponding actions. The first draft, dated August 1998, was an internal NARSTO review draft. All groups within NARSTO were invited to provide comments, including the Executive Steering Committee (ESC), the NARSTO Technical Teams, the Critical Review Paper authors, and the Liaison Team. Written comments from this round were received from:

ESC Members:

Dr. Daniel Albritton (NOAA/AL)
 Dr. Steven Cadle (GM)
 Mr. John Elston (NJ-DEP)
 Mr. Alfred Ferullo (PA Power and Light)
 Mr. William Frick (API)
 Dr. Donald McKay (Env. Canada)
 Dr. Peter Mueller (EPRI)

Critical Review Paper Authors:

Dr. Marcia Dodge (consultant, chem. mech. review)
 Dr. David Parrish, (NOAA/AL, chem. measurements review)
 Dr. S.T. Rao (NY-DEC, trends review)
 Dr. Armisted Russell, (GIT, modeling review)
 Dr. Sanford Sillman (U. Mich., indicator species)
 Dr. Robert Slott, (Shell Oil, mobile sources review)

Liaison Team:

Dr. Peter Borrell (EUROTRAC)

Others:

Mr. John Bachmann (EPA/OAQPS).

In November 1998, the Assessment Report was revised based on comments from the first set of reviews. A second draft was produced, dated December 1998, and offered for external review by the National Research Council (a division of the National Academy of Sciences) as well as to the NARSTO-ESC. The second draft was also placed on the NARSTO Web site for public access. Comments were received on the second draft from:

Mr. John Dege (DuPont)
 Mr. Edward Edwards (Dunn-Edwards)
 Dr. James Meagher (NOAA/AL)
 EPA/OAQPS staff
 NARSTO Executive Assembly
 (verbal comments at meeting)
 NARSTO Fine Particle Workshop
 (verbal comments at meeting)
 Mr. Ralph Scanlan (PA-DEP)
 Dr. Frances Sharples (OSTP)
 Dr. Sanford Sillman (U. Mich.)
 TVA research staff
 Ms. Susan Weirman (MARAMA).

The comments from the second review were incorporated at the author's team meeting in October 1999. The NRC review comments were published in January 2000^a and incorporated into a third draft during February, which was prepared in a semifinal, page-layout format.

The semifinal draft was posted on the NARSTO Web site for final comments during the spring of 2000. These comments were processed, and appropriate modifications were made to the semifinal draft to produce the published version.

The Assessment Document authors acknowledge with thanks the insight, information, and critical analysis provided by the reviewers.

National Research Council, 2000. *Review of the NARSTO Draft Report: An Assessment of Tropospheric Ozone Pollution - A North American Perspective*. National Academy Press, Washington, D.C.

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APPENDIX C**GLOSSARY**

[This glossary is provided as a reference for the numerous abbreviations and acronyms used to identify agencies, regulations, field studies, air quality models, analytical tools, units of measure, and specific terms used in the study of air quality. It is assumed that the reader has a basic knowledge of chemistry and mathematical techniques.]

3-D	Three dimensional
4DDA	Four dimensional data assimilation
AHC	Anthropogenic hydrocarbons
AIRS	Aerometric Information Retrieval System, maintained by the U.S. Environmental Protection Agency
AL	Aeronomy Laboratory, U.S. National Oceanic and Atmospheric Administration
API	American Petroleum Institute
AQMS	Air Quality Modeling System
ARB	Air Resources Board (California)
BEIS	Biogenic Emissions Inventory System; BEIS2 denotes second version
CAA	U.S. Clean Air Act (42 USC 7401-7677 et seq.)
CAQMS	Community Air Quality Modeling System
CASTNET	Clean Air Status and Trends Network
CCME	Canadian Council of Ministers of the Environment
CEMS	Continuous Emission Monitoring System
CEPA/FPAC	Canadian Environmental Protection Agency, Federal/Provincial Advisory Committee
CH ₄	Methane
C ₂ H ₄	Ethene (ethylene)
CIT	California Institute of Technology
CO	Carbon monoxide
EKMA	Empirical Kinetic Modeling Approach
EMFAC7	Mobile-source emission model used in California
EPA	U.S. Environmental Protection Agency
EPRI	(Formerly) Electric Power Research Institute
EPS	Emissions Processor System
Eulerian	A three-dimensional, grid-based, space-fixed reference system used as a basis for model formulation
FREDS	Flexible Regional Emission Data System
FRM	Federal Reference Method (United States)
GEMAP	Geocoded Emissions Modeling and Projection System
GIS	Geographical information system
GM	General Motors
H ₂ O	Water
H ₂ O ₂	Hydrogen peroxide
HC	Hydrocarbon
HNO ₃	Nitric acid

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HO (or OH)	Hydroxyl radical
HO ₂	Hydroperoxyl radical
hν	Photon
IMECA	Indice Metropolitano de la Calidad del Aire (Mexican Metropolitan Air Quality Index)
IRPA	Integrated Process Rate Analysis
LEV	Low emission vehicle
M	Any atmospheric molecule that collisionally deactivates vibrationally excited reaction intermediates
MAPPER	Measurement-Based Analysis of Preferences in Planned Emissions Reduction
MARAMA	Mid Atlantic Regional Air Management Association
MC2	Compressible Community Model
MEPPS	Model 3 – Emissions Processing and Projection System
MIR	Maximum Incremental Reactivity
MM5	Mesoscale Meteorological Model version 5
MOBILE5	Mobile-source emission model used in North America except in California
MOR	Maximum Ozone Reactivity
MSA	Metropolitan Statistical Area
NAAQO	National Ambient Air Quality Objective (Canada)
NAAQS	National Ambient Air Quality Standard (United States)
NAPAP	U.S. National Acid Precipitation Assessment Program
NAPS	National Air Pollution Surveillance program of the Canadian Environmental Protection Agency
NARSTO	(Formerly) North American Research Strategy for Tropospheric Ozone
NHC	Naturally occurring hydrocarbons
NH ₃	Ammonia
NH ₄ NO ₃	Ammonium nitrate
NJ-DEP	New Jersey Department of Environmental Protection
NLEV	National low emission vehicle
NMHC	Non-methane hydrocarbons
N ₂ O ₅	Nitrogen pentoxide
NOAA	U. S. National Oceanic and Atmospheric Administration
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO ₃	Nitrate radical
NO ₃ ⁻	Nitrate ion
NO _x	Nitric oxide (NO) + nitrogen dioxide (NO ₂)
NO _y	Sum of all reactive, oxygen-containing nitrogen species: (NO + NO ₂ + PAN + HNO ₃ + NO ₃ + N ₂ O ₅ + NO ₃ ⁻ + organic nitrates +)
NO _z	NO _y - NO _x
NRC	U.S. National Research Council, a subset of the U.S. National Academy of Sciences
NY-DEC	New York State Department of Environmental Conservation
O ₂	Oxygen
O ₃	Ozone
OAQPS	U.S. EPA Office of Air Quality Planning and Standards
OBM	Observation-based model
OH	Hydroxyl radical
OPE	Ozone production efficiency
OSTP	U.S. President's Office of Science and Technology Policy
OTA	U.S. Office of Technology Assessment

OTAG	Ozone Transport Assessment Group
PAMS	Photochemical Assessment Monitoring Stations
PAN	Peroxyacetyl nitrate
Pb	Lead
PBL	Planetary Boundary Layer
PM	Particulate matter
PM _{2.5}	PM equal to and less than 2.5 micrometers in aerodynamic diameter
ppb, ppm	Parts per billion, parts per million
R	Any alkyl radical
r ²	Correlation coefficient squared
RAMS	Regional Atmospheric Modeling System
RH	Any hydrocarbon molecule
RIR	Relative Incremental Reactivity
RO	Alkoxy radical
RO ₂	Peroxy radical
RONO ₂	Alkyl or organic nitrate
SCAQ5	Southern California Air Quality Study
SCION	Southeastern Consortium Intermediate Oxidant Network
SENIOR	Southeastern Network for Intensive Oxidant Research
SIP	State Implementation Plan
SMOKE	Sparse Matrix Operator Kernel Emission processing code
SO ₂	Sulfur dioxide
SON	Spatial Ozone Network
SOS	Southern Oxidant Study
THC	Total hydrocarbons
TLEV	Transitional low emission vehicle
Troposphere	The layer of the atmosphere between 0 and 20 km in elevation
UAM	Urban Airshed Model; UAM-IV and UAM-V denote model versions
ULEV	Ultra low emission vehicle
UV	Ultraviolet
VKT	Vehicle kilometers traveled
VOC	Volatile organic compound
WGAQOG	CEPA/FPAC Working Group on Air Quality Objectives and Guidelines
WMO	World Meteorological Organization

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