

Integrated Science Assessment for Carbon Monoxide

National Center for Environmental Assessment-RTP Division
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CO Project Team

Executive Direction

Dr. John Vandenberg (Director)—National Center for Environmental Assessment-RTP Division, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Ms. Debra Walsh (Deputy Director)—National Center for Environmental Assessment-RTP Division, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Mary Ross (Branch Chief)—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Scientific Staff

Dr. Thomas Long (CO Team Leader)—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Jeffrey Arnold—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Christal Bowman—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Barbara Buckley—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Mr. Allen Davis—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Steven J. Dutton—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Craig Hansen—Oak Ridge Institute for Science and Education, Postdoctoral Research Fellow to National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Erin Hines—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Douglas Johns—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Thomas Luben—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Elizabeth Oesterling Owens—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Joseph Pinto—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Jennifer Richmond-Bryant—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Mr. Jason Sacks—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Technical Support Staff

Ms. Laeda Baston—Senior Environmental Employment Program, National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Ms. Ellen Lorang—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Ms. Deborah Wales—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Ms. Barbara Wright—Senior Environmental Employment Program, National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Authors, Contributors, and Reviewers

Authors

Dr. Thomas Long (CO Team Leader)—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Jeffrey Arnold—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Christal Bowman—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Barbara Buckley—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Mr. Allen Davis—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Steven J. Dutton—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Craig Hansen— Oak Ridge Institute for Science and Education, Postdoctoral Research Fellow to National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Erin Hines—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Douglas Johns—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Thomas Luben—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Elizabeth Oesterling Owens— National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Joseph Pinto— National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Jennifer Richmond-Bryant—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Mary Ross—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Mr. Jason Sacks—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Matthew Campen—Lovelace Respiratory Research Institute, Albuquerque, NM

Dr. Kazuhiko Ito—Department of Environmental Medicine, New York University School of Medicine, Tuxedo, NY

Dr. Jennifer Peel—Department of Environmental and Radiological Health Sciences, Colorado State University, Fort Collins, CO

Contributors

Dr. Richard Baldauf—National Risk Management Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Vernon Benignus—National Health and Environmental Effects Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Mr. Antonio Fernandez—Office of Transportation and Air Quality, Office of Air and Radiation, U.S. Environmental Protection Agency, Ann Arbor, MI

Mr. Lance McCluney—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Kris Novak—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Adam Reff—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Ms. Kathryn Sargeant—Office of Transportation and Air Quality, Office of Air and Radiation, U.S. Environmental Protection Agency, Ann Arbor, MI

Mr. Mark Schmidt—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Joseph H. Somers—Office of Transportation and Air Quality, Office of Air and Radiation, U.S. Environmental Protection Agency, Ann Arbor, MI

Ms. Rhonda Thompson—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Reviewers

Dr. Richard Baldauf—National Risk Management Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Vernon Benignus—National Health and Environmental Effects Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Souad Benromdhane—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Philip Bromberg—School of Medicine, University of North Carolina, Chapel Hill, NC

Dr. Matthew Campen—Lovelace Respiratory Research Institute, Albuquerque, NM

Dr. Daniel Costa—National Program Director for Air, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Andrew Ghio—National Health and Environmental Effects Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Kazuhiko Ito—Department of Environmental Medicine, New York University School of Medicine, Tuxedo, NY

Dr. Petros Koutrakis—Harvard School of Public Health, Harvard University, Cambridge, MA

Mr. John Langstaff—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Barry Lefer—Department of Geosciences, University of Houston, Houston, TX

Dr. Karen Martin—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Dave McKee—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Ms. Connie Meacham—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Deirdre Murphy—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Ines Pagan—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Jennifer Parker—National Center for Health Statistics, Centers for Disease Control, Atlanta, GA

Dr. Jennifer Peel—Department of Environmental and Radiological Health Sciences, Colorado State University, Fort Collins, CO

Dr. Pradeep Rajan—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Mr. Harvey Richmond—Office of Air Quality Planning and Standards, Office of Air and Radiation, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Joseph H. Somers—Office of Transportation and Air Quality, Office of Air and Radiation, U.S. Environmental Protection Agency, Ann Arbor, MI

Dr. John Vandenberg—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Alan Vette—National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. William Vizquete—Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, NC

Ms. Debra Walsh—National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC

Dr. Lin Weaver—Department of Internal Medicine, LDS Hospital, Salt Lake City, UT

Dr. Lewis Weinstock—Office of Air Quality Planning and Standards, Office of Air and Radiation,
U.S. Environmental Protection Agency, Research Triangle Park, NC

Mr. Ron Williams—National Exposure Research Laboratory, Office of Research and Development,
U.S. Environmental Protection Agency, Research Triangle Park, NC

Clean Air Scientific Advisory Committee

CO NAAQS Review Panel

Chair of the Environmental Protection Agency's Clean Air Scientific Advisory Committee

Dr. Jonathan M. Samet*, Department of Preventive Medicine at the Keck School of Medicine, and Director of the Institute for Global Health at the University of Southern California, Los Angeles, CA

Chair of the Carbon Monoxide Review Panel

Dr. Joseph Brain*, Department of Environmental Health, Harvard School of Public Health, Harvard University, Boston, MA

Members

Dr. Paul Blanc, Department of Occupational Medicine, University of California-San Francisco, San Francisco, CA

Dr. Thomas Dahms, Department of Anesthesiology Research and Critical Care, St. Louis University School of Medicine, St. Louis, MO

Dr. Russell R. Dickerson, Department of Meteorology, University of Maryland, College Park, MD

Dr. Laurence Fechter, Research Service, Department of Veterans Affairs, Loma Linda VA Medical Center, Loma Linda, CA

Dr. H. Christopher Frey*, College of Engineering, Department of Civil, Construction, and Environmental Engineering, North Carolina State University, Raleigh, NC

Dr. Milan Hazucha, Department of Medicine, Center for Environmental Medicine, Asthma and Lung Biology, University of North Carolina, Chapel Hill, NC

Dr. Joel Kaufman, Department of Environmental & Occupational Health Sciences, University of Washington, Seattle, WA

Dr. Michael T. Kleinman, Department of Community & Environmental Medicine, University of California-Irvine, Irvine, CA

Dr. Francine Laden, Department of Environmental Health, Harvard School of Public Health, Harvard University, Boston, MA

Dr. Arthur Penn, Department of Comparative Biomedical Sciences, Louisiana State University School of Veterinary Medicine, Baton Rouge, LA

Dr. Beate Ritz, School of Public Health, Epidemiology, University of California at Los Angeles, Los Angeles, CA

Dr. Paul Roberts, Sonoma Technology, Inc., Petaluma, CA

Dr. Armistead (Ted) Russell*, Department of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

Dr. Anne Sweeney, Department of Epidemiology & Biostatistics, School of Rural Public Health, Texas A&M Health Science Center, College Station, TX

Dr. Stephen R. Thom, Institute for Environmental Medicine, University of Pennsylvania, Philadelphia, PA

* Members of the statutory Clean Air Scientific Advisory Committee (CASAC) appointed by the EPA Administrator

Science Advisory Board Staff

Ms. Kyndall Barry, Designated Federal Officer, 1200 Pennsylvania Avenue, N.W., Washington, DC, 20460, Phone: 202-343-9868, Fax: 202-233-0643, Email: barry.kyndall@epa.gov

Physical/Courier/FedEx Address:

Ms. Kyndall Barry, U.S. EPA Science Advisory Board Staff Office, Mail Code 1400F, Ariel Rios Building, Room 3610A, 1025 F Street, N.W., Washington, DC 20004

Acronyms and Abbreviations

α	alpha, ambient exposure factor
a	air exchange rate of the microenvironment
AA	abdominal aorta(s)
AADT	annual average daily traffic
ABR	auditory brainstem response
ACS	American Cancer Society
ACS-CPS-II	ACS Cancer Prevention Study II
ADP	adenosine diphosphate
AEFV	area under the expiratory flow-volume curve
AGL	above ground level
Akt	Akt cell signaling pathway
AMI	acute myocardial infarction
AMP	adenosine monophosphate
ANOVA	analysis of variance
APO E	apolipoprotein E
ARI	acute respiratory infection
AP	action potential
APD	action potential duration
APEX	Air Pollution Exposure
APHEA	Air Pollution and Health: A European Approach
APTT	activated partial thromboplastin time
AQ	air quality
AQCD	Air Quality Criteria Document
AQS	Air Quality System
AR	gastronomy reared
ARCO	gastronomy reared + CO exposure
ARIC	Atherosclerosis Risk in Communities
ARID	gastronomy reared with iron deficient diet
ARIDCO	gastronomy reared with iron deficient diet + CO exposure
ATP	adenosine triphosphate
ATS	American Thoracic Society
AVP	aortic valve prosthesis

β	beta, beta coefficient, slope
B lymphocytes	bursa-dependent lymphocytes
BALF	bronchoalveolar lavage fluid
BC	black carbon
BEAS-2B	human bronchial epithelial cell line
BEIS	Biogenic Emissions Inventory System
BELD	Biogenic Emissions Landcover Database
BHR	bronchial hyper-responsiveness
BK _{Ca}	voltage and Ca ²⁺ -activated K ⁺ channel(s)
BP	blood pressure
BQ-123	endothelin A (ET _A) receptor antagonist
BS	black smoke
BSP	black smoke particles
C _a	ambient concentration
CA	cardiac arrhythmia
Ca ²⁺	calcium ion
CAA	Clean Air Act
CAD	coronary artery disease
CALINE	California Line Source Dispersion Model
CAMP	Childhood Asthma Management Program
cAMP	cyclic AMP
CAP(s)	concentrated ambient particles, compound action potential(s)
CASAC	Clean Air Scientific Advisory Committee
CASN	Cooperative Air Sampling Network
CAtH	cardiac atherosclerosis
CBSA	Core-Based Statistical Area
CCGG	Carbon Cycle Greenhouse Gases Group
CD	cardiac dysrhythmias
CD-1	mouse strain
CDC	Centers for Disease Control and Prevention
CdCl ₂	cadmium chloride
CFK	Coburn-Forster-Kane
CFR	Code of Federal Regulations
cGMP	cyclic GMP
CH ₂ O	formaldehyde

CH ₂ O ₂	formic acid
CH ₃	methyl groups
CH ₃ CHO	acetaldehyde
CH ₃ CO	acetyl radical(s)
CH ₃ CO ₃ NO ₂	PAN, peroxyacetyl nitrate
CH ₃ O ₂	methyl peroxy radical
CH ₃ OOH	methyl hydroperoxide
CH ₄	methane
ChAT	choline acetyl-transferase
CHD	coronary heart disease
CHF	congestive heart failure
CI	confidence interval(s)
CIS	cerebral ischemic stroke
C _j	airborne concentration at location <i>j</i>
CL/P	cleft lip with or without palate
CNS	central nervous system
CO	carbon monoxide
CO ₂	carbon dioxide
COD	coefficient of divergence
CoH, COH	coefficient of haze
COHb	carboxyhemoglobin (% concentration measured in (mL CO/mL blood))
COMb	carboxymyoglobin
CONUS	contiguous U.S.
COPD	chronic obstructive pulmonary disease
CPS II	Cancer Prevention Study II
C-R	concentration-response
CRC	Coordinating Research Council
CrMP	collapsin response mediator protein
CRP	C-reactive protein
CSA	Combined Statistical Area
CVD	cardiovascular disease
d	straight-line distance between monitor pairs
df	degrees of freedom
D _L	lung diffusing capacity
D _L CO	lung diffusing capacity of CO

D_mCO	capacity for diffusion of CO into the muscle
DMT-1	divalent metal transporter-1
DMV	dorsal motor nucleus of the vagus nerve
DNA	deoxyribonucleic acid
DOCA	Deoxycorticosterone acetate
dP/dt_{LV}	left ventricular maximal and minimal first derived pressure ($+dP/dt_{LV}$, $-dP/dt_{LV}$)
dP/dt_{RV}	right ventricular maximal and minimal first derived pressure ($+dP/dt_{RV}$, $-dP/dt_{RV}$)
DSA	deletion/substitution/addition
E	exposure over some duration
E_a	exposure to pollutant of ambient origin
EC	elemental carbon
ED	emergency department
EKG, ECG	electrocardiogram
E_{na}	exposure to pollutant of non-ambient origin
eNOS	endothelial nitric oxide synthase
EPA	U.S. Environmental Protection Agency
EPO	erythropoietin
EPR	Electron Paramagnetic Resonance
EPRI	Electric Power Research Institute
ESRL	Earth System Research Laboratory
ET-1	endothelin-1
ET_A	endothelin A (ET_A) receptor
ETS	environmental tobacco smoke
EXPOLIS	six-city European air pollution study
FAS	apoptosis stimulating fragment
FC	interference filter
FEF	forced expiratory flow (L/s)
FEF_{25-75}	forced expiratory flow between the times at which 25% and 75% of the vital capacity is reached
FEM	Federal equivalent method
FEV_1	forced expiratory volume in 1 second
f_i	fraction of time spent indoors
F_1CO	fractional concentration of CO in ambient air
F_{inf}	infiltration factor

f_o	fraction of time spent outdoors
FR	Federal Register
FGR	fetal growth restriction(s)
FRM	Federal reference method
FSH	follicle stimulating hormone
FVC	forced vital capacity
FVII	Factor VII
FW	fresh weight
GAM	generalized additive model(s)
GD	gestational day
GEE	generalized estimating equations
GEM	gas extraction monitor
GFAP	glial fibrillary acidic protein
GFC	gas filter correlation
GLM	generalized linear models
GLMM	generalized linear mixed models
GMD	Global Monitoring Division
GMP	guanosine monophosphate
GSH	glutathione
GSSG	oxidized glutathione
GTP	guanosine triphosphate
GWP(s)	global warming potential(s)
H	atomic hydrogen, hydrogen radical, height
h	hour
H ₂ O ₂	hydrogen peroxide
H9c2	rat embryonic cardiomyocytes
Hb	hemoglobin
HC(s)	hydrocarbon(s)
HCFC(s)	hydrochlorofluorocarbon(s)
HCO	formyl radical
HEAPSS	Health Effects of Air Pollution among Susceptible Subpopulations
HEK293	human embryonic kidney cells (experimentally transformed cell line)
Hep3B	Human hepatocarcinoma cell line
HF	heart failure, high frequency (HRV parameter)
HFLFR	high frequency to low frequency ratio (HRV parameter)

HH	hypobaric hypoxia
HIF-1 α	hypoxia-inducible factor
HO	heme oxygenase
HO ₂	hydroperoxy radical
HO-1	inducible isoform of heme oxygenase
HO-2	constitutively expressed isoform of heme-oxygenase
HO/CO	heme oxygenase/carbon monoxide system
HR	heart rate, hazard ratio
H/R	hypoxia followed by reoxygenation
HRV	heart rate variability
HS	hemorrhagic stroke
HUVEC(s)	human umbilical vein endothelial cell(s)
h ν	photon
IARC	International Agency for Research on Cancer
IC	inferior colliculus
ICAM-1	intercellular adhesion molecule
ICD	implantable cardioverter defibrillator(s)
ICR	Institute for Cancer Research
IDW	inverse-distance-weighted
IHD	ischemic heart disease
IL-x	interleukin-6, 8, etc.
INDAIR	Indoor Air Model
IOM	Institute of Medicine
IQR	interquartile range
IR	immunoreactivity
IS	ischemic stroke
ISA	Integrated Science Assessment
ITA	internal thoracic artery of the heart
I _{to}	transient outward current
IUGR	intrauterine growth restriction
K ⁺	potassium ion
k	dissociation rate
k _{CO}	dissociation rate of carbon monoxide from hemoglobin
K _m	Michaelis Constant; Michaelis-Menten equation of enzyme kinetics
k _{O₂}	Dissociation rate of oxygen from hemoglobin

LBW	low birth weight (<2,500 grams, (≈5lbs, 8 oz))
LCA+	leucocyte common antigen cells
LD	lactational day
LDH	lactate dehydrogenase
LDL	low-density lipoprotein
LF	low frequency (HRV parameter)
LH	luetenizing hormone
LOAEL	lowest observed adverse effect level
LOD	limit of detection
LOESS	locally weighted scatterplot smoothing
LPS	lipopolysaccharide
LTP	long-term potentiation
LUR	land use regression
LV	left ventricle
LV+S	left ventricular plus septum
LVDP	left ventricular developed pressure
LVESP	left ventricular end diastolic pressure
LVSF	left ventricular shortening fraction
LVW	left ventricular work
M	Haldane coefficient representing the CO chemical affinity for Hb [or Mb]), Reaction mediator.
MAPK	mitogen-activated protein kinase
MAO-A	monoamine oxidase A
Mb	myoglobin
MC	ultrafine particle mass concentration
METs	metabolic equivalent unit(s)
MHC	major histocompatibility complex
MI	myocardial infarction, “heart attack”
min	minute(s)
MIP-2	macrophage inflammatory protein-2
mitral E to A ratio	mitral ratio of peak early to late diastolic filling velocity
MMEF	maximal midexpiratory flow
MMP	matrix metalloproteinase
MOA(s)	mode(s) of Action
MOBILE6	Mobile source emission factor model
MODIS	Moderate Resolution Imaging Spectroradiometer

MONICA	Monitoring of Trends and Determinants in Cardiovascular Disease
MOPITT	Measurement of Pollution in the Troposphere
MPO	myeloperoxidase
MPT	mitochondrial permeability transition
MR	maternally reared
mRNA	messenger RNA
MSA	Metropolitan Statistical Area
MSNA	muscle sympathetic nerve activity
MT	million tons
MVO ₂	myocardial oxygen consumption
NAAQS	National Ambient Air Quality Standards
NADPH	nicotinamide adenine dinucleotide phosphate
NADH-TR	nicotinamide adenine dinucleotide - tetrazolium reductase
NAPAP	National Acid Precipitation Assessment Program
NARSTO	North American Research Strategy for Tropospheric Ozone
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
Nb	neuroglobin
NC	ultrafine particle number concentration
NDIR	nondispersive infrared
NE	norepinephrine
NEI	National Emissions Inventory
NF-κB	nuclear factor kappa B
NIHL	noise-induced hearing loss
NMDA	N-methyl-D-aspartate
NMHC(s)	nonmethane hydrocarbon(s)
NMMAPS	National Morbidity, Mortality, and Air Pollution Study
NN	normal-to-normal (NN or RR) time interval between each QRS complex in the EKG
nNOS	neuronal nitric oxide synthase (NOS)
NO	nitric oxide
NO [•]	nitric oxide free radical
NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no observed adverse effect level
NO [•] -Hb	nitrosyl bound Hb

NO [•] -Mb	nitrosyl bound Mb
NO _x	nitrogen oxides, oxides of nitrogen
NRC	National Research Council
NTS	nucleus of the solitary tract (in brainstem)
O ₃	ozone
O ₂ Hb	oxyhemoglobin (% concentration in mL O ₂ / mL blood)
O ₂ Mb	oxymyoglobin
OAE	otoacoustic emissions
OAQPS	Office of Air Quality Planning and Standards
OC	organic carbon
OH, OH [•]	hydroxyl group, hydroxyl radical
OR	odds ratio
OS	occlusive stroke
OSPM	Operational Street Pollution Model
P	penetration factor
P, p	probability
P90	90th percentile of the absolute difference in concentrations
P _A	alveolar pressure
PA	pulmonary artery (myocytes)
PACF	partial auto-correlation functions
P _A CO	alveolar pressure for carbon monoxide
PAF	platelet activating factor
PAH	polycyclic aromatic hydrocarbon
PAHT	pulmonary artery hypertension
PAN	peroxyacetyl nitrate (CH ₃ CO ₃ NO ₂)
P _A O ₂	alveolar pressure for oxygen
P _a O ₂	arterial oxygen pressure
PARP	poly(ADP-ribose) polymerase
P _B	barometric pressure (in mmHg)
PBN	N-tert-butyl-alpha-phenylnitron
P _C	average partial pressure in lung capillaries
pCO	partial pressure of CO
P _C O ₂	average partial pressure of O ₂ in lung capillaries
PDGF	platelet derived growth factor
PEE	prediction equation estimates

PEF	peak expiratory flow
PEFD(s)	Personal Exposures Frequency Distributions
PEM(s)	personal exposure monitor(s)
P_{H_2O}	saturation pressure of water vapor
PHD	pulmonary heart disease
P_I	partial pressure of inhaled air
Pi	inorganic phosphate
PI3K	phosphoinositide 3-kinase
$P_I CO$	CO partial pressure in inhaled air
PIH	primary intracerebral hemorrhage
PKB	protein kinases B
PM	particulate matter
$PM_{2.5}$	particulate matter with a nominal mean aerodynamic diameter less than or equal to 2.5 μm (referred to as fine PM)
PM_{10}	particulate matter with a nominal mean aerodynamic diameter less than or equal to 10 μm
$PM_{10-2.5}$	particulate matter with a nominal mean aerodynamic diameter greater than 2.5 μm and less than or equal to 10 μm (referred to as thoracic coarse particulate matter or the coarse fraction of PM_{10}). Concentration may be measured or calculated as the difference between measured PM_{10} and measured $PM_{2.5}$ concentrations.
PMN	polymorphonuclear leukocytes
PNC	particle number concentration / count
PND	post natal day
pNEM/CO	probabilistic NAAQS Exposure Model for CO
PNN	proportion of interval differences of successive normal-beat intervals in EKG
PNN_{50}	proportion of interval differences of successive normal-beat intervals greater than 50 ms in EKG
PNS	peripheral nervous system
pO_2	partial pressure of oxygen in lung capillaries
pPRB	policy-relevant background
PT	prothrombin time
PTB	preterm birth
PVCD	peripheral vascular and cerebrovascular disease
PvO_2	venous oxygen tension
PVO_2	peak oxygen consumption
Q	cardiac output
QCP	Quantitative Circulatory Physiology

\dot{Q}_{or}	blood flow to other tissues
RA	radial artery of the heart
RAW 264.7	mouse macrophage cell line
RBC	red blood cell
RF	radiative forcing
rho(0)	rho(0) cells (cells lacking mitochondrial DNA)
Ri	Richardson number
rMSSD	mean squared differences of successive difference normal-beat to normal-beat (NN or RR) time intervals between each QRS complex in the EKG
RNA	ribonucleic acid
ROE	Report on the Environment
ROFA	residual oil fly ash (particles)
ROS	reactive oxygen species
RR	normal-to-normal (NN or RR) time interval between each QRS complex in the EKG
RR	risk ratio(s)
RUPERT	Reducing Urban Pollution Exposure from Road Transport
RV	right ventricle (of heart)
RVEDP	right ventricular end diastolic pressure
RVESP	right ventricular end-systolic pressure
RVSF	right ventricular shortening fraction
RVW	right ventricular work
SA	sphinganine
SAA	serum amyloid A
SAB	Science Advisory Board
SBP	systolic blood pressure, spontaneous bacterial peritonitis
SDNN	standard deviation normal-to-normal (NN or RR) time interval between each QRS complex in the EKG
sEng	soluble endoglin
SES	socioeconomic status
SF ₆	sulfur hexafluoride (tracer gas)
sFlt	soluble Fms-like tyrosine kinase-1
SGA	small for gestational age
sGC	soluble guanylate cyclase
SHEDS	Stochastic Human Exposure and Dose Simulation
SHR	Spontaneously hypertensive rat strain

SIDS	sudden infant death syndrome
SIPs	State Implementation Plan(s)
siRNA	small inhibitory RNA
SLAMS	State and Local Air Monitoring Stations
SMC	smooth muscle cell(s)
SnMP	tin-(IV)-mesoporphyrin
SNP	single-nucleotide polymorphism
SnPP-IX	tin protoporphyrin IX
SO	sphingosine
SO ₂	sulfur dioxide
SO ₄ ²⁻	sulfate
SOD	superoxide dismutase
SOPHIA	Study of Particles and Health in Atlanta
STEMS	Space-Time Exposure Modeling System
STN	Speciation Trends Network
STPD	standard temperature and pressure, dry
SV	stroke volume
SVEB	supraventricular (atrium or atrioventricular node) ectopic beats
τ	tau, photochemical lifetime
T lymphocytes	thymus-dependent lymphocytes
TBARS	thiobarbituric acid reactive substances
TC	total carbon
TFAM	mitochondrial transcription factor A
Tg	teragram(s)
TH	tyrosine hydroxylase
THP-1	human monocyte-derived cell line, (can differentiate into macrophages)
TIA	transient ischemic attack
TNF-α	tissue necrosis factor alpha
TPM	total particulate matter
TSP	total suspended particles
UFP	ultrafine particle(s)
ULTRA	Exposure and Risk Assessment for Fine and Ultrafine Particles in Ambient Air (Study)
URI	upper respiratory infection
URTI	upper respiratory tract infection

USC	U.S. Code
V_A	alveolar ventilation
V_b	blood volume
V_{CO}	endogenous CO production rate
V_D	Dead space volume
V_E	ventilation rate
VEGF	vascular endothelial growth factor
VLf	very low energy frequency (HRV parameter)
V_{max}	maximum velocity
VO_2 max	maximum volume per time, of oxygen (maximal oxygen consumption, maximal oxygen uptake or aerobic capacity)
VOC(s)	volatile organic compound(s)
VPB	ventricular premature beat
vWF	von Willebrand factor
W	width
WBC	white blood cell
WHI	Women's Health Initiative
WKY	Wistar-Kyoto rat strain
ZnPP IX	Zn protoporphyrin IX