

## **William W Nazaroff**

Daniel Tellep Distinguished Professor Emeritus  
Civil and Environmental Engineering Department  
University of California  
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### **Experience**

Professor, Department of Civil and Environmental Engineering, University of California, Berkeley (Assistant Professor 1988-1992; Associate Professor 1992-1996; Professor 1996-2018; Emeritus Professor 2018-).

Visiting Professor, International Centre for Indoor Environment and Energy, Department of Mechanical Engineering, Technical University of Denmark, Lyngby, June-August 2001, September-December 2006.

Visiting Professor, Department of Civil Engineering, Technion — Israel Institute of Technology, Haifa, Israel, 1996-1997.

Faculty Senior Scientist, Energy Technologies Division, Lawrence Berkeley National Laboratory (Faculty Scientist 1988-2008; Faculty Senior Scientist, 2008-2018).

Staff Scientist, Indoor Environment Program, Lawrence Berkeley Laboratory, 1980-1988.

### **Education**

Ph.D., 1989, Environmental Engineering Science, California Institute of Technology;  
Dissertation: Mathematical modeling and control of pollutant dynamics in indoor air.

M.Eng., 1980, Electrical Engineering and Computer Science, University of California, Berkeley.

B.A., 1978, Physics, University of California, Berkeley.

### **Research Interests**

Indoor air quality, emphasizing the following topics: pollutant-surface interactions; transport/mixing phenomena; aerosols; environmental tobacco smoke; source characterization; control techniques

Exposure analysis: development and application of methods for assessing exposure to air pollutants

### **Awards and Distinctions**

Pettenkofer Award, Academy of Fellows of the International Society of Indoor Air Quality and Climate, 2018.

Haagen-Smit Prize, for the paper WW Nazaroff and CJ Weschler, Cleaning products and air fresheners: Exposure to primary and secondary air pollutants, *Atmospheric Environment* **38**, 2841, 2004 (<https://www.journals.elsevier.com/atmospheric-environment/news/haagen-smit-prize-2017-winners-announcement>), awarded by Executive Editors and Publisher of *Atmospheric Environment*, 2017.

Doctor Technices, Honoris Causa, Technical University of Denmark (“in recognition of outstanding contributions advancing understanding of the physics and chemistry that control human exposure to pollutants in indoor environments”), 2015.

Best papers of 2013 (2<sup>nd</sup> runner up in environmental science), Weschler CJ, Nazaroff WW, Dermal uptake of organic vapors commonly found in indoor air, *Environmental Science & Technology* **48**, 1230-1237, 2014.

QSI Best Application Paper Award, IEEE International Conference on Automation Science and Engineering — CASE 2013 (K Weekly et al., Low-cost coarse airborne particulate matter sensing for indoor occupancy detection), Madison, Wisconsin, 17-21 August 2013.

Top paper of 2011 (second runner-up among feature articles), McKone TE, Nazaroff WW, et al., Grand challenges for life-cycle assessment of biofuels, *Environmental Science & Technology* **45**, 1751-1756, 2011.

Elected AAAR Fellow, American Association for Aerosol Research, 2009.

Daniel Tellep Distinguished Professor, University of California, Berkeley, 2009-2018.

Outstanding Faculty of the Year 2008, FAA Air Transportation Center of Excellence for Research in the Intermodal Transport Environment.

Best paper, American Industrial Hygiene Association Indoor Environmental Quality Committee, 2005 (Nicas M, Nazaroff WW, and Hubbard A, Toward understanding the risk of secondary airborne infection: Emission of respirable pathogens, *Journal of Occupational and Environmental Hygiene* **2**, 143-154, 2005).

Excellence in Review Award, *Environmental Science & Technology*, **37**, 414A, 2003.

Roy W. Carlson Distinguished Professor, University of California, Berkeley, 1998-2001.

Best paper, 20<sup>th</sup> Annual Conference, Air Infiltration and Ventilation Centre, Edinburgh, Scotland, 9-13 August 1999 (Sippola MR, Nazaroff WW, and Thatcher TL, Particle deposition from turbulent duct flow, in *Indoor Air 99 — Proceedings of the 8<sup>th</sup> International Conference on Indoor Air Quality and Climate*, BRE, Garston, Watford, UK, Vol. 2, pp. 24-29, 1999).

Elected member, International Academy of Indoor Air Sciences, 1991.

Presidential Young Investigator, National Science Foundation, 1990.

Bachelor's degree awarded with "great distinction in general scholarship," 1978.

Phi Beta Kappa, 1978.

### **Courses Developed and Taught**

CE 107, Climate Change Mitigation, 3-unit upper-division undergraduate course (13 offerings, 2003-2018).

CE 109, Indoor Air Quality, 3-unit upper-division undergraduate course (6 offerings at UC Berkeley, 1993-2001; one offering at Technion, 1997).

CE 111, Environmental Engineering, 3-unit upper-division undergraduate course (25 offerings, 1989-2017).

CE 218A, Air Quality Engineering, 3-unit graduate course (11 offerings, 1989-2002; cotaught 2016 and 2017).

CE 218B, Atmospheric Aerosols, 3-unit graduate course (12 offerings, 1990-2013).

CE C293A/ER C293A, Technology and Sustainability, 2-unit graduate course (1<sup>st</sup> offering, F 2005) [with A Horvath and AJ Gadgil].

*Seminars and Study Groups (1-unit each):*

Airheads [graduate student research seminar in air quality engineering] (each fall semester since 1995) [with RA Harley].  
Environmental Engineering Graduate Student Research (4 offerings, 1993-1996).  
Relative Humidity in Indoor Environments (Spring 2001) [with RL Corsi].  
Sustainability and the Built Environment (Fall 2001) [with AJ Gadgil and A Horvath].  
Technologies for Sustainable Societies (8 offerings, 2002-2013) [with AJ Gadgil, A Horvath, A Agogino].  
Atmospheric Science on Particulate Matter [NARSTO Review] (Spring 2002) [with RA Harley].

**Academic Administrative Responsibilities**

*Civil and Environmental Engineering Department:*

Curriculum committee, 2009-2011, 2012 (Sp) (chair)  
Development and awards committee, 2012-2014 (chair)  
Executive committee, 1997-2001, 2009-2011, 2012 (Sp)  
Faculty search committees, 1991-1992, 1994, 1999-00 (chair), 2003-04 (chair), 2005-06, 2007-08  
Graduate admissions/affairs, 1993-1994  
Graduate admissions officer, Environmental Engineering Program, 2015-2018  
Graduate major-field advisor, Environmental Engineering Program, 1990-1996, 1997-2004 (lead adviser), 2012-2014  
Group leader, Environmental Engineering Program, 1997-2001  
Outreach committee, 2004-05  
Space planning committee, 1998-99  
Strategic planning committee, 1992-1994, 2001-2003 (chair)  
Undergraduate admissions committee, 1989-1993  
Undergraduate advisor, 1989-1990, 2004-06, 2007-2008  
Undergraduate studies committee, 1989-1993, 1994-1996 (chair)  
Vice-Chair (Academic Affairs), 2009-2012

*College of Engineering:*

Continuing Education committee, 1994-1996  
Graduate studies committee, 2009-2011, 2012 (Sp)  
Environmental Engineering committee, 1993-1996  
Undergraduate studies committee, 1994-1996, 2009-2011, 2012 (Sp) (chair)

*University (Berkeley campus):*

Committee on Prizes, 1994-1996, 1997-2003 (chair 2000-2003)  
Environmental Council Executive Committee, 1994-99  
Committee on Undergraduate Instruction in Environmental Studies, 1995-1996  
Chair, Energy and Resources Group, 2004-2008  
Academic Senate Liaison for External Review of Department of Environmental Science, Policy and Management, 2011-2012.

*Other University Service:*

Faculty search committees: Biomedical and Environmental Health Sciences, 1993; Energy and Resources Group, 1997-98; Energy and Resources Group, 2001-02  
Air Quality Management Advisory Committee, UC Berkeley Extension, 1992-97

Committee on Atmospheric Sciences, College of Letters and Science, 1994-96  
Environmental Council Working Group, University of California, Berkeley, 1993-94  
Environmental Sciences Advisory Committee, Division of Undergraduate and  
Interdisciplinary Studies, 1994-95  
Advisory Committee, UC Toxic Substances Teaching and Research Program, Health Effects  
of Modern Technologies Component, 1997-2004  
Intercampus Advisory Committee, University of California Energy Institute, 2007-2010

### **Graduate Student Research Supervision**

Master of Science (does not include those who continued for PhD study under my supervision)

|                  |                   |                    |
|------------------|-------------------|--------------------|
| J Wooley, 1990   | AV Baughman, 1991 | JA Cano-Ruiz, 1992 |
| RB Balas, 1993   | A Wadhwa, 1993    | C Lobascio, 1993   |
| D Wampler, 1994  | K Leiserson, 1995 | S Branoff, 1997    |
| B Pekala, 1998   | W Yin, 2000       | A Webb, 2001       |
| HY Hammer, 2001  | AS Hoats, 2002    | K Blumberg, 2003   |
| F Kamakate, 2005 | S Cowlin, 2006    |                    |

Master of Engineering

D Kong, 1992

Doctor of Philosophy (dissertation title)

1. K Garbesi, 1993, Toward resolving the model-measurement discrepancy of radon entry into houses
2. T-F Lin, 1995, Transport and sorption of volatile organic compounds and water vapor in porous media
3. AC Drescher, 1995, Computed tomography and optical remote sensing: Development for the study of indoor air pollutant transport and dispersion
4. WJ Riley, 1996, Wind-induced contaminant transport in near-surface soils with application to radon entry into buildings
5. TL Thatcher, 1996, Particle dynamics in the indoor environment with an emphasis on particle deposition from natural convection flow
6. SL Miller, 1996, Characterization and control of exposures to indoor air pollutants generated by occupants
7. MD Van Loy, 1998, Dynamic behavior of semivolatile organic compounds in indoor air
8. GC Morrison, 1999, Ozone-surface interactions: Investigations of mechanisms, kinetics, mass transport, and implications for indoor air quality
9. D-L Liu, 2002, Air pollutant penetration through airflow leaks into buildings
10. MR Sippola, 2002, Particle deposition in ventilation ducts
11. NE Klepeis, 2004, Using computer simulation to explore multi-compartment effects and mitigation strategies for residential exposure to secondhand tobacco smoke
12. JD Marshall, 2005, Inhalation of motor vehicle emissions in urban environments
13. WR Chan, 2006, Assessing the effectiveness of shelter-in-place as an emergency response to large-scale outdoor chemical releases
14. GA Heath, 2006, Redistributing pollution: Exposure implications of a shift toward distributed electricity generation in California
15. P Sreedharan, 2007, Bayesian based design of real-time sensor systems for high-risk indoor contaminants
16. BK Coleman, 2009, Exposure-relevant ozone chemistry in occupied spaces

17. A Shehabi (coadvised with A Horvath), 2009, Energy demands and efficiency strategies in data center buildings
18. S Bhangar, 2010, Human exposure to dynamic air pollutants: Ozone in airplanes and ultrafine particles in homes
19. N Mullen, 2011, Characterizing ultrafine particle exposures in two types of indoor environments: San Francisco Bay area classrooms and Beijing high-rise apartments
20. J Apte, 2013, Human exposure to urban vehicle emissions

### **Sponsored Research**

- Release of ethanol to the atmosphere during use of consumer cleaning products, The Soap and Detergent Association, 1989.
- Release of 2-aminoethanol and 1,2-propanediol to the atmosphere during use of liquid laundry detergent, Procter and Gamble, 1989.
- Pollutant deposition from natural convection flow onto indoor surfaces, Universitywide Energy Research Group, University of California, 1989-1990.
- Indoor air pollutant transport, dispersion, and interactions with surfaces, National Science Foundation (PYI award), 1990-1995.
- Controlling exposure to environmental tobacco smoke, University of California Tobacco-Related Disease Research Program, 1990-1993.
- Characterization of particulate-phase ETS in differing environments (with R. Sextro and A. Gadgil), University of California Tobacco-Related Disease Research Program, 1990-1993.
- Particle deposition from natural convection flow onto indoor surfaces, Exploratory Research Grant, U. S. Environmental Protection Agency, 1991-1994.
- Indoor ozone concentrations: Quantification of mechanisms of outdoor concentration attenuation (with M. Modera), California Institute for Energy Efficiency, 1991-1992.
- Soil-gas transport: A mechanism of indoor exposures to volatile organic compounds (with J. Daisey and R. Sextro), National Institutes for Environmental Health Sciences, 1992-1995.
- Effectiveness of portable filtration units in TB control (with R. Spear), E. R. C., Inc., 1993-1995.
- Pollutant mixing in indoor air, California Institute for Energy Efficiency, 1994.
- Engineering controls for reducing tuberculosis exposure, California Department of Health Services, 1995-1996.
- Fate of volatile organic compounds in indoor air, SC Johnson Wax, 1995-97.
- Assessing exposure to air toxics from environmental tobacco smoke, California Air Resources Board, 1995-1998.
- Mathematical modeling of bipolar ion generation systems, Ion Systems, 1996.
- Particle deposition in ventilation system ducts, Lawrence Berkeley National Laboratory, 1998-1999.
- Dynamic behavior of particles and vapors in buildings, Lawrence Berkeley National Laboratory, 1998-2002.
- Air pollutant exposure associated with distributed electricity generation, California Air Resources Board, 2002-2003.

Indoor air chemistry: Cleaning agents, ozone and toxic air contaminants, California Air Resources Board, 2002-2005.

Quantifying exposure implications of distributed energy generation, University of California Energy Institute, 2003-2004.

Air Transportation Center of Excellence for Airliner Cabin Environment Research, Federal Aviation Administration (Auburn University, Purdue University, Harvard University, Boise State University, Kansas State University, Lawrence Berkeley National Laboratory, UC Berkeley, and University of Medicine and Dentistry of New Jersey), PI of UC Berkeley component, 2004-2010.

Ultrafine particle concentrations in schoolrooms and homes, California Air Resources Board, 2006-2009.

Influence of aerosol dynamics on microbial materials in indoor environments, Sloan Foundation, 2008-2013. (PI on subaward of prime grant to Yale University, J Peccia, PI)

Life-cycle environmental and economic decision-making for alternative biofuels, Energy Biosciences Institute, 2008-2013 (Responsible for “air emissions and air quality impacts from the lifecycle of biofuels,” on multi-investigator team, A Horvath & TE McKone, co-PIs)

Berkeley Indoor Microbial Ecology Research Center (BIMERC), Sloan Foundation, 2010-2018, T Bruns, PI.

Building efficiency and sustainability in the tropics (SinBerBEST), Singapore National Research Foundation, 2012-2017 (Thrust co-lead for human/building interactions and the environment), C Spanos, PI.

Analysis of the ICU room environment as a source of microorganisms colonizing the GI tract of premature infants, Sloan Foundation, 2013-2015, J Banfield, PI.

Emissions from humans affect indoor air chemistry, Sloan Foundation, 2014-2019, WW Nazaroff, PI (2014-2015), AH Goldstein, PI (2016-).

Analysis of dispersal and persistence of microbial strains in the room environment, Sloan Foundation, 2016-2019, J Banfield, PI.

### **Services to the Profession (selected)**

*1980-1989*

Associate Editor, *Health Physics*, 1987-1990

Environmental Chemistry and Physics—Air, Proposal Review Panel, U.S. EPA, 1987, 1991

Interviewer, Switzer Foundation Environmental Fellowships, 1988-1992

*1990-1999*

Session organizer and chair, “Indoor Air Quality: Sources, Sinks, Transport, and Transformation”, Air & Waste Management Association, 85th Annual Meeting, Kansas City, MO, June 1992

Session organizer and chair, “Indoor Air Quality Science and Technology,” Air & Waste Management Association, 86th Annual Meeting, Denver, CO, June 1993

Editorial Board, *Environmental Software*, 1993-1995

Publications Committee, American Association for Aerosol Research, Vice-Chair: 1994-1995

University Education Committee, Air & Waste Management Association, Secretary: 1992-1994,  
Vice-Chair: 1994-96

Associate Editor, *Journal of the Air & Waste Management Association*, 1995-2007

Membership Committee, International Academy of Indoor Air Sciences, Chair: 1996-1999

Risk Assessment Advisory Committee, Office of Environmental Health Hazard Assessment's  
Science Advisory Board, California Environmental Protection Agency, 1995-1996

Editorial Committee (guest, 1997), *Annual Review of Energy and the Environment*, **24**, 1999

Indoor Air Health Advisory Committee, NSF International, 1999

Board of Directors, American Association for Aerosol Research, 1999-2002

Executive Advisory Board, UltraViolet Devices, Inc., 1998-2004

*2000-2009*

Poster jury (chair), Healthy Buildings 2000, Espoo, Finland, August 2000

Research Screening Committee, California Air Resources Board, 2000-2002

Awards Committee, Association of Environmental Engineering and Science Professors, 2000-  
2003

Committee on Air Quality in Passenger Cabins of Commercial Aircraft, National Research  
Council, 2000-2001

Search Committee, Department Head, Indoor Environment Department, Lawrence Berkeley  
National Laboratory, 2000-2001 (chair)

Co-chair, US delegation, U.S. — Italian Bilateral Workshop on “New Technologies and Cultural  
Heritage”, Venice, Italy, April 2001

Expert Panel, Indoor Air Quality, US EPA Radiation and Indoor Environments National  
Laboratory, November 2001

Editorial Advisory Board, *Indoor Air*, 2001-2006

Vice-President, Organizing Committee for Indoor Air 2002, 9<sup>th</sup> International Conference on  
Indoor Air Quality & Climate, Monterey, California, 30 June – 5 July 2002

Tutorials Chair for Annual Meeting, American Association for Aerosol Research, 2003

Scientific Advisory Committee, Strategically Targeted Research for Intelligent Built  
Environmental Systems, Syracuse University, 2005-2007

Board of Directors, Golden West Section, Air & Waste Management Association, 2003-2007

Poster jury (chair), First International Conference on Building Energy and Environment, Dalian,  
China, July 2008

Conference Chair, 27<sup>th</sup> Annual Meeting of the American Association for Aerosol Research  
(AAAR), Orlando, FL, 20-24 October 2008

External Advisory Board, National Science Foundation Integrative Graduate Education &  
Research Traineeship (NSF-IGERT) on Indoor Environmental Science & Engineering  
— An Emerging Frontier, The University of Texas at Austin, 2006-2009

International Advisory Board, International Centre for Indoor Environment and Energy,  
Technical University of Denmark, 2001-2007

2010-2019

Editorial Board, *Building Simulation: An International Journal*, 2007-2012.

Committee on the effect of climate change on indoor air quality and public health, Institute of Medicine of the National Academies, 2010-2011.

Scientific Review Panel on Toxic Air Contaminants, California Environmental Protection Agency, 2010-2013.

Officer, American Association for Aerosol Research, 2009-2013 (Vice-President Elect 2009-2010, Vice-President 2010-2011, President 2011-2012, Past-President 2012-2013).

Executive Committee, Academy of Fellows, International Society of Indoor Air Quality and Climate: Secretary 2005-2008; Vice President 2008-2011; President 2011-2014.

Chair, Planning Committee, Workshop on the Health Risks of Indoor Exposure to Particulate Matter, The National Academies, 2015-2016.

Editor, *Indoor Air* (Editor-in-Chief, 2010-2018; Associate Editor, 2007-2009)

Member, Committee on Advancing Understanding of the Implications of Environmental-Chemical Interactions with the Human Microbiomes, National Academies of Science, Engineering and Medicine, 2016-2017.

Vice President, Indoor Air Institute, 2005-2018.

Review Coordinator, *Microbiomes of the Built Environment: From Research to Application*, National Academies of Science, Engineering, and Medicine, 2017.

Advisory Chair, Indoor Air 2018, 15<sup>th</sup> International Conference of the International Society of Indoor Air Quality and Climate, Philadelphia, PA, 22-27 July 2018.

#### *General Support of Conferences, Journals and Funding Agencies*

International scientific committee for conferences: Indoor Air '99 (Edinburgh, Scotland); Healthy Buildings 2000 (Espoo, Finland); 4<sup>th</sup> International Conference on Indoor Air Quality, Ventilation and Energy Conservation in Buildings, IAQVEC 2001 (Changsha, China); Seventh International Symposium on Natural Radiation Environment (NRE-VII) 2002 (Greece); Indoor Air 2005 (Beijing, China); Indoor Air 2008 (Copenhagen, Denmark); COBEE 2008 (Dalian, China); Indoor Air 2011 (Austin, TX); Healthy Buildings 2012 (Brisbane, Australia); Indoor Air 2014 (Hong Kong); Indoor Air 2016 (Ghent, Belgium)

International advisory board for conferences: Fifth international workshop on energy and environment of residential buildings and third international conference on built environment and public health 2009 (Guilin, China).

Session chair or cochair at national or international conference

- Symposium on Methods for Characterizing Indoor Sources and Sinks, American Society for Testing and Materials, Washington, DC, September 1994
- Engineering Solutions to Indoor Air Quality Problems, Air & Waste Management Association, Research Triangle Park, NC, July 1995
- AAAR 1999, 18th annual conference of the American Association for Aerosol Research, Tacoma, Washington, October 1999
- Indoor Air 99, The 8<sup>th</sup> International Conference on Indoor Air Quality & Climate, Edinburgh, Scotland, August 1999
- Healthy Buildings 2000, Espoo, Finland, August 2000
- Indoor Air 2002, Monterey, California, July 2002



- Indoor Air 2005, Beijing, China, September 2005.
- COBEE, Dalian, China, July 2008.
- Healthy Buildings 2009, Syracuse, New York, September 2009.
- Indoor Air 2011, Austin, TX, June 2011.
- Healthy Buildings 2012, Brisbane, Australia, July 2012.

Peer review of research proposals: Center for Indoor Air Research, Environmental Protection Agency, National Science Foundation, North Carolina Board of Science & Technology, Research Grants Council (Hong Kong), Universitywide Energy Research Group (University of California), Water Resources Center (University of California), Office of Health and Environmental Research (U. S. Department of Energy)

Peer review for archival journals: *Aerosol Science and Technology*, *Air Quality Atmosphere and Health*, *Atmospheric Environment*, *Building and Environment*, *Chemosphere*, *Environmental Pollution*, *Environmental Science & Technology*, *Environmental Software*, *Environmental Technology*, *Geoderma*, *Geophysica Cosmochimica Acta*, *Health Physics*, *HVAC&R Research*, *Indoor Air*, *Industrial & Engineering Chemistry Research*, *Inhalation Toxicology*, *Journal of Aerosol Science*, *Journal of the Air & Waste Management Association*, *Journal of ASTM International*, *Journal of Colloid and Interface Science*, *Journal of Environmental Engineering (ASCE)*, *Journal of Environmental Engineering Science*, *Journal of Environmental Quality*, *Journal of Exposure Assessment and Environmental Epidemiology*, *Journal of Geophysical Research—Atmospheres*, *Journal of Hazardous Materials*, *Journal of Infrastructure Systems (ASCE)*, *Journal of the National Medical Association*, *Journal of Occupational and Environmental Hygiene*, *Journal of the Water Pollution Control Federation*, *Natural Hazards*, *Radiation Measurements*, *Radiation Protection Dosimetry*, *Review of Scientific Instruments*, *Risk Analysis*, *Science of the Total Environment*, *Water Resources Research*

### Edited Special Issues of Archival Journals

- Burge H.B., Leovic K.W., and Nazaroff W.W. (Eds.), Engineering solutions to indoor air quality problems, *Journal of the Air & Waste Management Association*, **46**, September 1996.
- Nazaroff W.W., and Leovic K.W. (Eds.), Engineering solutions to indoor air quality problems II, *Journal of the Air & Waste Management Association*, **48**, October 1998.
- Nazaroff W.W., Weschler C.J., and Corsi R.L. (Eds.), Indoor Air Chemistry and Physics: Papers from Indoor Air 2002, *Atmospheric Environment*, **37**, 5451-5646, 2003.

### Consulting Services

1980-1989

Greenpeace Northwest, 1985-1986

Life Systems, Inc., 1986, 1990-91

Aqua Resources, 1989

Forelaws on Board, 1987

Camp, Dresser and McKee, 1987

Law Offices of McKeehan, Bernard & Wood, 1989

1990-1999

Procter & Gamble Company, 1991

Reed, Elliot, Creech & Roth, 1993

Motorola, 1993-1996

Law Offices of Cotchett, Illston, & Pitre, 1992-93

Hinshaw & Culbertson, 1993-1995

Ion Systems, 1994

SC Johnson, 1994-1995, 2000-2001  
Crosby, Heafey, Roach & May, 1998  
Jaffe, Martini & Blum, 1999

Rincon Consultants, 1997-1998  
Preston, Gates & Ellis, LLP, 1998-2000  
The Clorox Company, 1999, 2002

2000-2009

The Sharper Image, 2000-2001, 2003  
Environmental Defense, 2002

University of Minnesota Extension, 2001  
URS Corporation, 2002-2004

California Air Resources Board, 2003-2004

Innovative Construction & Building Materials, 2003-2005

Building Ecology Research Group, 2006

### Patents

Nazaroff WW and Cass GR, Systems for reducing deposition of fluid-borne particles, No. 5,061,444, October 29, 1991.

Nazaroff WW and Gadgil AJ, An apparatus for treating environmental tobacco smoke (ETS) particle and gas-phase contaminants, No. 5,678,576, October 21, 1997.

### Publications (in archival journals)

1. Budnitz RJ, Berk JV, Hollowell CD, Nazaroff WW, Nero AV, and Rosenfeld AH, Human disease from radon exposures: The impact of energy conservation in residential buildings, *Energy and Buildings* **2**, 209-215, 1979.
2. Nazaroff WW, An improved technique for measuring working levels of radon daughters in residences, *Health Physics* **39**, 683-686, 1980.
3. Nazaroff WW, Boegel ML, Hollowell CD, and Roseme GD, The use of mechanical ventilation with heat recovery for controlling radon and radon-daughter concentrations in houses, *Atmospheric Environment* **15**, 263-270, 1981.
4. Offermann FJ, Hollowell CD, Nazaroff WW, Roseme GD, and Rizzuto JR, Low-infiltration housing in Rochester, New York: A study of air-exchange rates and indoor air quality, *Environment International* **8**, 435-445, 1982.
5. Nazaroff WW, Offermann FJ, and Robb AW, Automated system for measuring air-exchange rate and radon concentration in houses, *Health Physics* **45**, 525-538, 1983.
6. Revzan KL and Nazaroff WW, A rapid spectroscopic technique for determining the potential alpha-energy concentration of radon decay products, *Health Physics* **45**, 509-524, 1983.
7. Nero AV, Boegel ML, Hollowell CD, Ingersoll JG, and Nazaroff WW, Radon concentrations and infiltration rates measured in conventional and energy-efficient houses, *Health Physics* **45**, 401-406, 1983.
8. Nazaroff WW, Radon daughter carousel: An automated instrument for measuring indoor concentrations of Po-218, Pb-214, and Bi-214, *Review of Scientific Instruments* **54**, 1227-1233, 1983.
9. Robb AW and Nazaroff WW, Field data logger with EPROM storage, *Review of Scientific Instruments* **54**, 1252-1253, 1983.
10. Nazaroff WW, Optimizing the total-alpha three-count technique for measuring concentrations of radon progeny in residences, *Health Physics* **46**, 395-405, 1984.

11. Nero AV and Nazaroff WW, Characterising the source of radon indoors, *Radiation Protection Dosimetry* **7**, 23-39, 1984.
12. Doyle SM, Nazaroff WW, and Nero AV, Time-averaged indoor Rn concentrations and infiltration rates sampled in four U.S. cities, *Health Physics* **47**, 579-586, 1984.
13. Nazaroff WW and Doyle SM, Radon entry into houses having a crawl space, *Health Physics* **48**, 265-281, 1985.
14. Nazaroff WW, Feustel H, Nero AV, Revzan KL, Grimsrud DT, Essling MA, and Toohy RE, Radon transport into a detached one-story house with a basement, *Atmospheric Environment* **19**, 31-46, 1985.
15. Offermann FJ, Sextro RG, Fisk WJ, Grimsrud DT, Nazaroff WW, Nero AV, Revzan KL, and Yater J, Control of respirable particles in indoor air with portable air cleaners, *Atmospheric Environment* **19**, 1761-1771, 1985.
16. Nero AV, Sextro RG, Doyle SM, Moed BA, Nazaroff WW, Revzan KL, and Schwehr MB, Characterizing the sources, range, and environmental influences of radon-222 and its decay products, *The Science of the Total Environment* **45**, 233-244, 1985.
17. Nazaroff WW and Cass GR, Mathematical modeling of chemically reactive pollutants in indoor air, *Environmental Science & Technology* **20**, 924-934, 1986.
18. Sextro RG, Offermann FJ, Nazaroff WW, Nero AV, Revzan KL, and Yater J, Evaluation of indoor aerosol control devices and their effects on radon progeny concentrations, *Environment International* **12**, 429-438, 1986.
19. Nero AV, Schwehr MB, Nazaroff WW, and Revzan KL, Distribution of airborne radon-222 concentrations in U.S. homes, *Science* **234**, 992-997, 1986.
20. Nazaroff WW, Doyle SM, Nero AV, and Sextro RG, Potable water as a source of airborne radon-222 in U.S. dwellings: A review and assessment, *Health Physics* **52**, 281-295, 1987.
21. Nazaroff WW, Lewis SR, Doyle SM, Moed BA, and Nero AV, Experiments on pollutant transport from soil into residential basements by pressure-driven air flow, *Environmental Science & Technology* **21**, 459-466, 1987.
22. Nazaroff WW and Cass GR, Particle deposition from a natural convection flow onto a vertical isothermal flat plate, *Journal of Aerosol Science* **18**, 445-455, 1987.
23. Nazaroff WW, Predicting the rate of radon entry from soil into the basement of a dwelling due to pressure-driven air flow, *Radiation Protection Dosimetry* **24**, 199-202, 1988.
24. Nazaroff WW and Cass GR, Mathematical modeling of indoor aerosol dynamics, *Environmental Science & Technology* **23**, 157-166, 1989.
25. Nazaroff WW and Sextro RG, Technique for measuring the indoor <sup>222</sup>Rn source potential of soil, *Environmental Science & Technology* **23**, 451-458, 1989.
26. Nazaroff WW and Cass GR, Mass-transport aspects of pollutant removal at indoor surfaces, *Environment International* **15**, 567-584, 1989.
27. Nazaroff WW, Salmon LG, and Cass GR, Concentration and fate of airborne particles in museums, *Environmental Science & Technology* **24**, 66-77, 1990.
28. Nazaroff WW and Teichman K, Indoor radon: Exploring U.S. federal policy for controlling human exposures, *Environmental Science & Technology* **24**, 774-782, 1990.

29. Salmon LG, Nazaroff WW, Ligocki MP, Jones MC, and Cass GR, Nitric acid concentrations in Southern California museums, *Environmental Science & Technology* **24**, 1004-1013, 1990.
30. Wooley J, Nazaroff WW, and Hodgson AT, Release of ethanol to the atmosphere during use of consumer cleaning products, *Journal of the Air & Waste Management Association* **40**, 1114-1120, 1990.
31. Nazaroff WW, Ligocki MP, Ma T, and Cass GR, Particle deposition in museums: Comparison of modeling and measurement results, *Aerosol Science and Technology* **13**, 332-348, 1990.
32. Cass GR, Nazaroff WW, Tiller C, and Whitmore PM, Protection of works of art from damage due to atmospheric ozone, *Atmospheric Environment* **25A**, 441-451, 1991.
33. Nazaroff WW and Cass GR, Protecting museum collections from soiling due to the deposition of airborne particles, *Atmospheric Environment* **25A**, 841-852, 1991.
34. Nazaroff WW, Radon transport from soil to air, *Reviews of Geophysics* **30(2)**, 137-160, 1992.
35. Nazaroff WW, Kong D, and Gadgil AJ, Numerical investigations of the deposition of unattached <sup>218</sup>Po and <sup>212</sup>Pb from natural convection enclosure flow, *Journal of Aerosol Science* **23**, 339-352, 1992.
36. Little JC, Daisey JM, and Nazaroff WW, Transport of subsurface contaminants into buildings: An exposure pathway for volatile organics, *Environmental Science & Technology* **26**, 2058-2066, 1992.
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209. Nazaroff WW, Semivolatile organic compounds: Partitioning and dynamics indoors, International Centre for Indoor Environment and Energy, Technical University of Denmark, Lyngby, Denmark, 6 May 2010 (invited).
210. Nazaroff WW, Indoor exposures to chemicals from products used in buildings, California Green Chemistry Workshop: Indicators of Ecotoxicity Hazards and Exposure Potential, Berkeley, California, 10 May 2010 (invited).
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233. Nazaroff WW, Perihuman aerosol science: UFP, SVOCs and the indoor microbiome, Environmental Science and Engineering Seminar, California Institute of Technology, Pasadena, CA, 16 May 2012; also presented at the 3<sup>rd</sup> CISBO Annual Meeting, 30 October 2012, Sønderborg, Denmark; also presented at Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA, 18 April 2013.
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