

# Dr. Joachim Dieter Pleil



## Research Physical Scientist

Internal Exposure Indicators Branch  
Environmental Methods and Measurements Division  
National Exposure Research Laboratory  
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## EDUCATION/TRAINING

Ph.D. in Environmental Science and Engineering, 2004, University of North Carolina, Chapel Hill, NC  
M.S. in Physics, 1979, Southern Illinois University, Carbondale, IL  
B.S. in Physics, 1976, Southern Illinois University, Carbondale, IL  
B.S. in Mathematics, 1976, Southern Illinois University, Carbondale, IL

## PROFESSIONAL EXPERIENCE

Research Physical Scientist (GS-15), U.S. EPA, Research Triangle Park, NC, 1987-present.  
Professor (adjunct), Environmental Science and Engineering Dept., School of Public Health, University of North Carolina, 2012-present.  
Editor-in-Chief: Institute of Physics: *Journal of Breath Research*, 2015-present  
Core Faculty: Occupational and Environmental Exposure Science (OEES) Program, University of North Carolina, 2010-present.  
Associate Professor (adjunct) and Graduate Faculty appointments, Environmental Science and Engineering Dept., School of Public Health, University of North Carolina, 1994-2012.  
Senior Research Scientist; Northrop Corporation, Research Triangle Park, NC, 1979-1987.

## SELECTED AWARDS AND HONORS

U.S. EPA National Exposure Research Laboratory, Excellence in Mentorship Award, 2015  
NASA Engineering Achievement Award, "*F-22 life Support System Independent Analysis Team*", 2012.  
U.S. EPA, ORD, Bronze Medal for Exhaled Breath Condensate Research, 2007  
U.S. EPA, ORD, Bronze Medal for World Trade Center exposure assessment, 2006.  
U.S. EPA, ORD, Two NERL Special Achievement Awards, 2006.  
ORD Administrator's award for support of World Trade Center Experts Panel, 2005.  
U.S. EPA, eleven EPA Scientific and Technological Achievement Awards (STAA) for Research Publications, 1990, 1993, 1994, 2004, 2006, 2007, 2008(2), 2010(2), and 2012.  
EPA Special Achievement Awards, 1989 and 1991.  
National EPA Award: Speciner Award: "Outstanding Contribution by a Professional Employee", 1989.  
U.S. Patent #5,447,556, 14 technical claims - "Sample Injection Apparatus and Method"; Sept.5, 1995;  
EPA Exclusive License agreement (1996) with Graseby-Nutech Corp. for "Valveless injection cryogenic GC-MS interface"; Awarded four EPA Co-operative Research and Development Agreements (CRADA) with industrial partners under the Federal Technologies Transfer Act (FTTA)

Journal editorial board: Taylor and Francis: **Biomarkers**  
Founding member of **International Society of Breath Research** (IABR)  
Member of **Society of Toxicology** (SOT)  
Member of **Association for the Advancement of Science** (AAAS)  
Member of **American Chemical Society** (ACS)  
Member of International Navies Group: **Submarine Air Monitoring and Air Purification** (SAMAP)  
Member of **International Society of Exposure Science** (ISES)  
Member of **NASA F-22 Life Support System Independent Analysis Team**  
Member of **NASA F/A-18 Physiological Events Independent Analysis Team**

## **CURRENT RESEARCH**

Develop field sampling and extraction methods for organic compounds in biological and environmental media. Develop sample concentration and analysis laboratory methods for measuring and identifying patterns of endogenous and chemical biomarkers in human biological fluids including blood, breath, exhaled breath condensate, bronchial lavage fluid, and urine using gas chromatography – mass spectrometry (GC-MS) and immunochemistry platforms. Construct mathematical, statistical, and systems biology approaches to interpret the absorption, distribution, metabolism and elimination of human exposures to environmental stressors. Mentor Ph.D. students and post-doctoral fellows and teach Environmental Exposure Assessment at UNC School of Public Health.

## **HIGHLIGHTS**

Peer-reviewed publications and oral presentations on various technical topics (listed below).

Forensic chemist for NASA Engineering Safety Center (NESC) F-22 Raptor and F/A-18 Hornet/Super Hornet Investigation teams, 2012 and 2017.

Editor-in-Chief of *Journal for Breath Research* starting 2015 after serving 8 years on editorial board; published by Institute of Physics, London, UK.

Founding signatory member of the International Association for Breath Analysis (IABR) headquartered in Valduz, Liechtenstein; currently serving on IABR Governing Board.

Technical contact for “Memorandum of Understanding (MOU) between University of North Carolina, School of Public Health and U.S. Environmental Protection Agency, Office of Research and Development.

Adjunct Professor at University of North Carolina, Chapel Hill, NC; taught “Sampling and Analysis of Organic Air Pollutants” (4 yrs) and “Environmental Exposure Assessment” (10 yrs); serve on Ph.D. student committees; mentor graduate students under Student Services Agreements, training grants and practicum experience.

Scientific Chair, International Association of Breath Research (IABR) Meeting, Zurich Switzerland, Sept. 2016.

Member of International Scientific Organizing Committees for 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 breath research meetings (Dortmund, Germany; Cleveland, Ohio; Prague Czech Republic, Barga, Italy; Parma, Italy; Saarbrücken, Germany, Torun Poland, Vienna Austria, Zurich Switzerland), and for 2009, 2011 Submarine Air Monitoring and Air Purification (SAMAP) meetings, (San Diego, CA; Taranto, Italy)

EPA Principal investigator and originator of series of Cooperative Research and Development Agreements (CRADAs) with industrial partners: (1) Developed gas chromatographic sample injection systems for commercial market (Patent and exclusive license agreement issued), (2) Developed specialty surface coatings for chemical deactivation of metal surfaces based on vapor deposition of fused silica, (3) Developed miniaturized micro-environmental whole air samplers, (4) Developed novel approaches environmental application of tandem mass spectrometry.

Developed series of analytical (GC-MS) methods for volatile organic compounds in ambient air (TO-14) and for biomarkers in human exhaled breath, exhaled breath condensate, plasma, whole blood, and urine.

Developed methodology for retrospective assay of archived PM 2.5 samples for carcinogenic polycyclic aromatic hydrocarbons; application to World Trade Center (WTC) risk assessment. Developed analytical methods for discriminating residual WTC indoor contamination. Member of National Institutes of Environmental Health Sciences (NIEHS) Workgroup on WTC research. Advisor to WTC expert panel subcommittee on source signature development

Invited speaker at international conferences: Germany, Russia, Canada, Australia, Czech Republic, Austria, Italy, Japan, Netherlands, New Zealand; at domestic conferences: AWMA, ACS, ASTM, ISES, PittCon, SAMAP, Superfund, SAMAP, IABR, SOT, etc.; at U.S. Agencies: EPA, NIOSH, NIEHS, CDC; and at various industrial, and technical scientific functions.

Invited speaker/lecturer at University meetings, symposia, and work-shops including Harvard, Penn State, U. of Illinois, U. of North Carolina, NC State U., San Francisco State, UCLA, LSU, Notre Dame, Johns Hopkins, U. Colorado, Northwestern U., Princeton U., Dartmouth College, Fraunhofer Institute, Germany, Medical University of Innsbruck, Austria, J. Heyrovský Institute, Prague, Czech Rep., and U. of Pisa, Italy. Advisor/collaborator regarding environmental exposure: National Aeronautics and Space Administration (NASA), U.S. Department of Energy (DoE), North East States Coordinated Air Management (NESCAUM), EPA Offices of Radiation Programs (ORP), Air Quality and Planning Standards (OAQPS), Toxic Substances (OTS), Solid Waste (OSW), Indoor Air Division (IAD), U.S. Naval Undersea Medical Institute (NUMI), Air Force Office of Scientific Research (AFOSR), Centers for Disease Control (CDC), and the National Institute of Occupational Safety and Health (NIOSH).

Advisor to various branches of U.S. Military: U.S. Navy (and NATO) on artificial atmospheres contamination measurements onboard nuclear submarine fleet; U.S. Navy on impact of industrial incineration on Atsugi Naval Air Station, Japan, U.S. Marine Corps on groundwater and soil contamination, U.S. Air Force on Jet Fuel and halocarbon exposures.

Peer Review Panel member for American Institute for Biological Sciences, Army Gulf War Syndrome Research, NIH Heart, Lung, Blood Institute (NHLBI), EPA grants reviews, NIOSH program reviews, EPA technical contracts, and EPA promotion boards.

Journal peer reviewer for Environmental Health Perspectives, Journal of American Waste Management Association, Annals of Occupational Hygiene, Journal of Exposure Science & Environmental Epidemiology, Environmental Science and Technology, Journal of Chromatography A, Journal of Chromatography B, Biomarkers, Analytical and Bioanalytical Chemistry, Journal of Breath Research, Environmental Health, and Chemosphere.

Organizer and chairman of technical program sessions for AWMA, ASTM, EPA, IABR, SAMAP, PittCon, SOT, and ACS conferences.

## **PUBLICATIONS AND PRESENTATIONS**

### **BOOK CHAPTERS**

- Beauchamp JD and **Pleil JD**, 2015. "Breath: an often overlooked medium in biomarker discovery", in Biomarker Validation: Technological, Clinical and Commercial Aspects (Eds. H Seitz & S Schumacher) Wiley-VCH, Weinheim, Germany, ISBN: 978-3-527-33719-4.
- Pleil JD** and Sobus JR, 2013. "Mathematical and statistical approaches for interpreting exhaled breath measurements of organic compounds", Chap. 1: Volatile biomarkers: non-invasive diagnosis in physiology and medicine, Elsevier B.V., Amsterdam, eds. Amann A and Smith D.
- Amann A, Miekisch W, Schubert J, **Pleil J**, and Risby T, 2010. "Methodological issues of sample collection and analysis of exhaled breath", Chap. 7: European Respiratory Society Monograph Series: Exhaled Biomarkers, Vol. 49, eds. I Horvath and JC Jongsted.
- Sobus JR, Morgan MK, **Pleil JD**, and Barr DB, 2010. "Biomonitoring: Current Tools and Approaches for Assessing Human Exposure to Pesticides", Chap. 45: Hayes Handbook of Pesticide Toxicology, Elsevier Ltd. Oxford, UK, ed. R Krieger.
- Pleil JD**, Kim D, Prah JD, Ashley DL, and Rappaport SM, 2005. "The Unique value of Breath Biomarkers for Estimating Pharmacokinetic Rate Constants and Body Burden from Environmental Exposures", Chap. 24: Breath Analysis for Diagnosis and Therapeutic Monitoring, World Scientific Publishing Co., Singapore, eds. A Amann and D. Smith

Lindstrom AB and **Pleil JD**, 2002. "Volatile organic compounds as exposure biomarkers", Sec. 3, Chap. 1: Disease Markers in Exhaled Breath (Basic Mechanisms and Clinical Applications); IOS Press, Amsterdam, Berlin, Oxford, Tokyo, Washington, DC; eds. N. Marczin and M.H. Yacoub.

## JOURNAL PUBLICATIONS

- Pleil, JD** and R Giese, 2017. Integrating exhaled breath diagnostics by disease-sniffing dogs with instrumental laboratory analysis, *Journal of Breath Analysis* (submitted) ORD-020302
- O'Lenick C, **Pleil JD**, Stiegel MA, 2017. Detection and Analysis of Endogenous Polar Volatile Organic Compounds (PVOCs) in Urine: Building the Human Exposome, *Journal of Chromatography B* (in preparation)
- Stiegel MA and **Pleil JD**. 2017. Linking physiological parameters to perturbations in the human exposome: environmental exposures modify blood pressure and lung function via inflammatory cytokine pathway, *JTEH-A* (internal EPA review) ORD-019961
- Reyes JM, Hubbard H, Stiegel MA, **Pleil JD**, Serre ML, 2017. Incorporating mass fraction of polycyclic aromatic hydrocarbons into Bayesian Maximum Entropy Framework across North Carolina, *Environmental Epidemiology* (internal EPA review). ORD-019418
- Winters BR, **Pleil JD**, Angrish MM, Stiegel MA, Risby TH, and Madden MC, 2017. Standardization of exhaled breath condensate (EBC) and exhaled breath aerosol (EBA) collection using a feedback regulated sampling device, *Physiological Measurement* (submitted). ORD-018528
- Hackner K and **Pleil JD**, 2017. Canine olfaction as an alternative to analytical instruments for disease diagnosis: understanding "dog personality" to achieve reproducible results, *Journal of Breath Research* 11:012001 (January) ORD-018980
- Wallace MA, Kormos TM, and **Pleil JD**, 2016. Blood-borne Biomarkers and Bioindicators for Linking Exposure to Health Effects in Environmental Health Science, *Journal of Toxicology and Environmental Health, Part B. Critical Reviews* 19(8):380-409 (Nov.) ORD-016285
- Beauchamp JD, Pleil JD, Risby TR, and Dweik R, 2016. Meeting Report: IABR Breath Summit 2016 in Zurich, Switzerland, *Journal of Breath Research* 10(4):049001 (Nov.) ORD-018978
- Pleil JD**, 2016. Imputing defensible values for left-censored "below level of quantitation" (LoQ) biomarker measurements, *Journal of Breath Research* 10(4):045001 (Oct.) ORD-017468
- Pleil JD**, 2016. Breath biomarkers in toxicology, invited Review Article, *Archives of Toxicology*, 90:2669-2682. (Oct.) ORD-017222
- Pleil JD** and Sobus JR, 2016. Estimating central tendency from a single spot measure: A closed-form solution for lognormally distributed biomarker data for risk assessment at the individual level, *Journal of Toxicology and Environmental Health, Part A* 79(18):837-847. (Sept.) ORD-016063
- Pleil JD**, 2016. QQ-plots for assessing distributions of biomarker measurements and generating defensible summary statistics, *Journal of Breath Research* (Aug.) 10:035001. ORD-016627
- Williams J and **Pleil JD**, 2016. Crowd-based Breath Analysis: Assessing Behavior, Activity, Exposures, and Emotional Response of People in Groups, *Journal of Breath Analysis* 10:032001. (June) ORD-016555
- Pleil JD**, Risby TH and Herbig J, 2016. Breath Biomonitoring in National Security Assessment, Forensic THC Testing, Biomedical Technology and Quality Assurance Applications: Report from PittCon 2016, *Journal of Breath Research* 10:029001. (May) ORD-016183
- Stiegel MA, **Pleil JD**, Sobus JR, and Madden MC, 2016. Inflammatory Cytokines and White Blood Cell Counts Response to Environmental Levels of Diesel Exhaust and Ozone Inhalation Exposures, *PLoS ONE* 11(4):e0152458. (April) ORD-013864
- Pleil JD**, 2016. Cellular Respiration: recreating *in vivo* systems biology for *in vitro* exploration of human exposome and microbiome biomarkers, *Journal of Breath Research*, 10:010201. (March) ORD-015303
- Pleil JD** and Isaacs KK, 2016. High-resolution mass spectrometry: basic principles for using exact mass and mass defect for discovery analysis of organic molecules in blood, breath, urine and environmental media, *Journal of Breath Research*, 10:012001. (March) ORD-015049

- Angrish MM, **Pleil JD**, Stiegel MA, Madden MC, Moser VC, Herr DW, 2016. Taxonomic applicability of inflammatory cytokines in adverse outcome pathway (AOP) development. *Journal of Toxicology and Environmental Health, Part A*. 79(4):184-196. (March) ORD-012234
- Beauchamp JD, **Pleil JD**, Dweik RA, Herbig J, Risby TH. 2016. International Association of Breath Research 10th anniversary conference at the Schoenbrunn Palace in Vienna, Austria. *Journal of Breath Research*, 10(1):019001. (February) ORD-015040
- Pleil JD**, 2016. Comparing biomarker measurements to a normal range: when to use standard error of the mean (SEM) or standard deviation (SD) confidence intervals tests, *Biomarkers* 21(3):195-199. (Jan) ORD-012549
- Pleil JD**, Angrish MM, and Madden MC, 2015. Immunochemistry for high-throughput screening of human exhaled breath condensate (EBC) media: implementation of automated Quanterix SIMOA instrumentation, *Journal of Breath Research* 9:047108 (Dec.)
- Stiegel MA, **Pleil JD**, Angrish MM, Sobus JR, and Morgan MK, 2015. Kidney injury biomarkers and urinary creatinine variability in nominally healthy adults, *Biomarkers* 20(6-7):436-452. (Nov.)
- Funk WE, **Pleil JD**, Sauter DJ, McDade DW, and Holl JL, 2015. Use of Dried Blood Spots for Estimating Children's Exposures to Heavy Metals in Epidemiological Research, *Journal of Environmental and Analytical Toxicology* S7: 002. (July)
- Pleil JD**, 2015. The next chapter for the *Journal of Breath Research*, (editorial), *Journal of Breath Research* 9:030201.
- Pleil JD**, 2015. Understanding new "exploratory" biomarker data: a first look at observed concentrations and associated detection limits, *Biomarkers* 20(2):168-169.
- Pleil JD**, Miekisch W, Beauchamp JD, and Funk WE, 2015. Adapting biomarker technologies to adverse outcome pathways (AOPs) research: Current thoughts on using *in vivo* discovery for developing *in vitro* target methods, *Journal of Breath Research* 9:039001.
- Harper M, Weiss C, **Pleil JD**, Blount B, Miller A, Hoover MD, and Jahn S, 2015. Commentary on a More Comprehensive Vision and Strategy for the Discipline of Exposure Science, *Journal of Exposure Science and Environmental Epidemiology* 25(4):381-387
- Angrish MM, Madden MC and **Pleil JD**, 2015. Probe molecules (PrM) approach in adverse outcome pathway (AOP) based high throughput screening (HTS): *in vivo* discovery for developing *in vitro* target methods, *Chemical Research in Toxicology* 28(4):551-559.
- Bean HD, **Pleil JD**, and Hill, JE, 2015. Report: New analytical and statistical approaches for interpreting the relationships among environmental stressors and biomarkers, *Biomarkers* 20(1):1-4.
- Stiegel MA, **Pleil JD**, Sobus JR, Morgan MK, and Madden MC, 2015. "Analysis of inflammatory cytokines in human blood, breath condensate, and urine using a multiplex immunoassay platform", *Biomarkers*, 20(1): 35-46.
- Fent KW, Evans DE, Booher D, **Pleil JD**, Stiegel MA, Horn GP, and Dalton J, 2015. "Volatile organic compounds off-gassing from firefighters' personal protective equipment ensembles after use", *Journal of Occupational and Environmental Hygiene* 12(6):404-414).
- Sobus JR, Dewoskin RS, Tan YM, **Pleil JD**, Phillips MB, George BJ, Christensen KY, Schreinemachers DM, Williams MA, Cohen-Hubal EA, and Edwards SW, 2015. "Uses of NHANES biomarker data for chemical risk assessment: Trends, challenges and opportunities", *Environmental Health Perspectives* 123:919-927.
- Pleil JD**, Sobus JR, Stiegel MA, Hu D, Oliver KD, Olenick C, Strynar MJ, Clark M, Madden MC, and Funk WE, 2014. Estimating common parameters of log-normally distributed environmental and biomonitoring data: harmonizing disparate statistics from publications, *Journal of Toxicology and Environmental Health, Part B. Critical Reviews* 17:341-368.
- Amann A, de Lacy Costello B, Miekisch W, Schubert J, Buszewski B, **Pleil JD**, Ratcliffe N, Risby TH, 2014. The human volatilome: volatile organic compounds (VOCs) in exhaled breath, skin emanations, urine, feces and saliva", *Journal of Breath Research* 8:034001 (17pp).
- Pleil JD**, Stiegel MA, and Fent KW, 2014. "Exploratory breath analyses for assessing toxic dermal exposures of firefighters during suppression of structural burns", *Journal of Breath Research* 8:037107 (9pp).
- Fent KW, Eisenberg J, Snawder J, Ammons D, Pleil JD, Stiegel MA, Muller C, Horn GP, and Dalton J, 2014. "Systemic exposure to PAHs and benzene in firefighters suppressing controlled structure fires", *Annals of Occupational Hygiene* 58(7):830-845.

- Andersen EM, Sobus JR, Strynar MJ, **Pleil JD**, and Nakayama SF, 2014. "Evaluating an alternative method for rapid urinary creatinine determination", *Journal of Toxicology and Environmental Health A* 77(18): 1114-1123.
- Funk WE, **Pleil JD**, Pedit JA, Boundy MG, Nash DG, Trent CB, Yeatts KB, ElSadig M, Davidson CA, and Leith D, 2014. Indoor air quality in the United Arab Emirates, *Journal of Environmental Protection* 5:709-722.
- Amann A, Miekisch W, Schubert J, Buszewski B, Ligor T, Jezierski T, **Pleil JD** and Risby TH, 2014. "Analysis of exhaled breath for disease detection", invited review: *Annual Reviews of Analytical Chemistry* 7:455-482.
- Lu SS, Sobus JR, Sallsten G, Albin M, **Pleil JD**, Gudmundsson A, Madden MC, Strandberg B, Wierzbicka A, and Rappaport SM, 2014. "Are urinary PAHs biomarkers of exposure to diesel exhaust?", *Biomarkers* 19(4): 332-339.
- Pleil JD**, Miekisch W, Stiegel MA, and Beauchamp JD, 2014. Extending breath analysis to the cellular level: Current thoughts on the human microbiome and the expression of organic compounds in the human exposome, *Journal of Breath Research* 8:029001.
- Risby TH and **Pleil JD**, 2014. "CSI: Breathprint", (invited editorial) *The Analytical Scientist* (March 2014) 14:22-23.
- Pleil JD** and Stiegel MA, 2013. "The evolution of environmental exposure science: Using breath-borne biomarkers for "discovery" of the human exposome", Feature Article: *Analytical Chemistry* 85:9985-9990.
- Pleil JD**, 2013. "So, you've been asked to peer review an article for the *Journal of Breath Research*", Commentary: *Journal of Breath Research* 7:040201 (5pp).
- Beauchamp JD and **Pleil JD**, 2013. Simply breathtaking? Developing a strategy for consistent breath sampling, Commentary: *Journal of Breath Research*, 7:042001 (3pp).
- Pleil JD** and Sobus JR, 2013. "Estimating lifetime risk from spot biomarker data and intra-class correlation coefficients (ICC)", *Journal of Toxicology and Environmental Health A* 76(12):747-766.
- Pleil JD**, Miekisch W, Risby TH, Madden MC, and Sobus JR, 2013. "Meeting Reports for 2013: Recent Advances in Breath Biomarker Research", *Journal of Breath Research* 7:029001 (4pp).
- Pleil JD**, Stiegel MA and Risby TH, 2013. "Clinical breath analysis: Discriminating between human endogenous compounds and exogenous (environmental) chemical confounders", *Journal of Breath Research* 7:017107 (11pp).
- Risby, TH and **Pleil, JD**, 2013. "Breath analysis—past, present and future: a special issue in honor of Michael Phillips' 70th birthday", Editorial: *Journal of Breath Research*, 7:010201 (3pp).
- Ghimenti S, Di Francesco F, Onor M, Stiegel MA, Trivella MG, Comite C, Catania N, Fuoco R, and **Pleil JD**, 2013. "Post-operative elimination of sevoflurane anesthetic and hexafluoroisopropanol metabolite in exhaled breath: pharmacokinetic models for assessing liver function", *Journal of Breath Research* 7:036101 (11pp).
- Pleil JD**, Blount BC, Waidyanatha S, and Harper M, 2012. "Establishing Exposure Science as a Distinct Scientific Discipline", Editorial: *Journal of Exposure Science and Environmental Epidemiology* 22:317-319.
- Pleil JD**, Stiegel MA, Kormos TM, and Sobus JR, 2012. "Breath analysis science at PittCon 2012, Orlando, Florida", *Journal of Breath Research* 6:039001 (6pp).
- Ghio AJ, Sobus JR, **Pleil JD**, Madden MC, 2012. "Controlled human exposures to diesel exhaust", *Swiss Medical Weekly* 42:w13597.
- Pleil JD**, Williams M, and Sobus JR, 2012. "Chemical Safety for Sustainability (CSS): Biomonitoring *in vivo* data for distinguishing among adverse, adaptive, and random responses from *in vitro* toxicology", *Toxicology Letters* 215(3):201-207.
- Pleil JD** and Hanzel A, 2012. "Submarines, spacecraft, and exhaled breath", *Journal of Breath Research* 5:048005.
- Pleil JD**, 2012. "Categorizing biomarkers of the human exposome and developing metrics for assessing environmental sustainability", *Journal of Toxicology and Environmental Health, Part B. Critical Reviews* 15:264-280.
- Pleil JD**, Sobus JR, Sheppard PR, Ridenour G, and Witten ML, 2012. "Strategies for evaluating the environment-public health interaction of long-term latency disease: the quandary of the inconclusive case-control study", *Chemico-Biological Interactions* 196:89-95.

- Tan YM, Sobus JR, Chang D, Goldsmith M, Tornero-Velez R, **Pleil JD**, and Dary CC, 2012. "Reconstructing Human Exposures Using Biomarkers of Exposure and Other Clues", *Journal of Toxicology and Environmental Health, B. Critical Reviews* 15(1):22-38.
- Pleil JD**, Stiegel MA, and Sobus JR, 2011. "Breath Biomarkers in Environmental Health Science: Exploring Patterns in the Human Exposome", *Journal of Breath Research* 5:046005 (7pp).
- Pleil JD** and Amann A, 2011. "The 2011 International Association of Breath Research (IABR) meeting in Parma Italy: A collection of comments from attendees", *Journal of Breath Research* 5:049001 (5pp).
- Pleil JD**, 2011. "Meeting Report: Breath Biomarkers Networking Session at PittCon 2011", Atlanta, GA., *Journal of Breath Research* 5:029001 (4pp).
- Pleil JD**, Stiegel MA, Sobus JR, Liu Q, and Madden MC, 2011. "Observing the human exposome as reflected in breath biomarkers: heat map data interpretation for environmental and intelligence research", *Journal of Breath Research* 5:037104 (9pp).
- Pleil JD**, Stiegel MA, Madden MC, and Sobus JR, 2011. "Heat Map Visualization of Complex Environmental and Biomarker Measurements", *Chemosphere* 84:716-723.
- Sobus JR, Tan YM, **Pleil JD**, and Sheldon LS, 2011. "A biomonitoring framework to support exposure and risk assessments", *Science of the Total Environment* 409(22):4875-4884.
- Pleil JD** and Sheldon LS, 2011. "Adapting concepts from systems biology to develop systems exposure event networks for exposure science research", *Biomarkers* 16(2):99-105.
- Sobus JR, **Pleil JD**, McClean MD, Herrick RF, and Rappaport SM, 2010. "Biomarker variance component estimation for exposure surrogate selection and toxicokinetic inference", *Toxicology Letters* 199(3):247-253.
- Pleil JD**, 2010. "Meeting Report: Non-Invasive Biomedical Analysis - Breath Biomarkers Networking Sessions at PittCon 2010, Orlando Florida", *Journal of Breath Research*, 4:029001 (5pp).
- Pleil JD**, Stiegel MA, Sobus JR, Tabucchi S, Ghio AJ, and Madden MC, 2010. "Cumulative exposure assessment for trace-level polycyclic aromatic hydrocarbons (PAHs) using human blood and plasma analysis", *Journal of Chromatography B*. 878:1753-1760.
- Pleil JD**, 2009. "Influence of systems biology response and environmental exposure level on between-subject variability in breath and blood biomarkers", *Biomarkers* 14(8):560-571.
- Hubbard HF, Sobus JR, **Pleil JD**, Madden MC, and Tabucchi S, 2009. "Application of novel method to measure endogenous VOCs in exhaled breath condensate before and after exposure to diesel exhaust", *Journal of Chromatography, B* 877(29):3652-3658.
- Allshouse WB, **Pleil JD**, Rappaport SM, and Serre ML, 2009. "Mass fraction spatiotemporal geostatistics and its application to map atmospheric polycyclic aromatic hydrocarbons after 9/11", *Stochastic Environmental Research and Risk Assessment* 23:1213-1223.
- Swanson KJ, Kado NY, Funk WE, **Pleil JD**, Madden MC, and Ghio AJ, 2009. "Release of the Pro-inflammatory Markers by BEAS-2B Cells Following in vitro Exposure to Biodiesel Extracts", *The Open Toxicology Journal*, 3:8-15.
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- Pleil JD**, 2008. "Role of Exhaled Breath Biomarkers in Environmental Health Science", *Journal of Toxicology and Environmental Health: Part B: Critical Reviews*, 11:613-626.
- Pleil JD**, Hubbard HF, Sobus JR, and Madden MC. 2008. "Volatile polar metabolites in exhaled breath condensate (EBC): collection and analysis", *Journal of Breath Research*, 2: 026001.
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- Pleil JD**, Funk WE, and Rappaport SM, 2006. "Residual Indoor Contamination from World Trade Center Rubble Fires as Indicated by Polycyclic Aromatic Hydrocarbon (PAH) Profiles", *Environmental Science and Technology*, 40:1172-1177.
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- Pleil JD**, Vette AF, and S.M. Rappaport, 2004. "Assaying particle-bound polycyclic aromatic hydrocarbons from archived PM2.5 filters", *Journal of Chromatography A*, 1033:9-17.
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- McClenny WA, Oliver KD and **Pleil JD**, 1989. "A Field Strategy for Sorting Volatile Organics Into Source Related Groups", *Environmental Science and Technology*, 23:1373-1379.
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- McClenny WA, **Pleil JD**, Holdren MW, and Smith RN, 1984. "Automated Cryogenic Preconcentration and Gas Chromatographic Analysis of Volatile Organic Compounds in Air", *Analytical Chemistry*, 56:2947.
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## PRESENTATIONS (2017 - 2005)

- Pleil JD, Wallace MA, Madden MC, and Winters B, 2017. Breath biomarkers: non-targeted (discovery) measurements for environmental and clinical applications, PittCon 2017, Chicago, IL, March 6-10.
- Pleil JD, 2017. Overview of *in vitro* cellular respiration (gas-phase) analysis as a complement to systemic *in vivo* human metabolome discovery, PittCon 2017, Chicago, IL, March 6-10.
- Pleil JD and Funk WE, 2016. Human biomonitoring and *in vitro* toxicity testing applications for covert threat analysis and security applications, invited symposium lecture, PittCon 2016, Atlanta, GA, March 6-10.
- Winters BR, Pleil JD, and Beauchamp JD, 2016. Exhaled breath diagnostics: potential applications for real-time analysis at organism (*in vivo*) and cellular (*in vitro*) levels of organization, plenary lecture, 7<sup>th</sup> International PTR-MS Conference, Obergurgl, Austria, Feb. 14-19.
- Pleil JD, 2015. Exposure Science at US EPA: Linking environmental measurements to *in vivo* and *in vitro* biomonitoring data, invited lecture, Thayer School of Engineering, Dartmouth College, Hanover NH Oct. 9.
- Pleil JD, 2015. Publish or perish: improving your chances with the journal's editor, lecture ENVR 400, Oct. 7.
- Pleil, JD, 2015. Human exhaled breath condensate (EBC) media: Implementation of automated Quanterix SIMOA immunochemistry platform, plenary lecture, International Association of Breath Research, Vienna, Austria, Sept. 12-18.
- Pleil JD, 2015. The human exposome and systems biology: Ongoing empirical measurement studies and biomarker interpretation, HERCULES Workshop, Georgia Tech, Atlanta GA, May 26-28, 2015.
- Pleil JD, 2015. Human exposure science: linking environmental and biomonitoring data, invited lecture, Northwestern University, Evanston, IL, April 16, 2015.
- Pleil JD, 2015. Human exposure science: new research areas for medical and public health applications, invited lecture, Feinberg School of Medicine, Northwestern University, Chicago, IL, April 16, 2015.
- Pleil JD, Angrish MM, Madden MC, 2015. Adverse outcome pathways (AOPs) in human systems biology: Gas-phase probes for assessing *in vitro* enzyme system perturbations, invited symposium lecture, PittCon 2015, New Orleans, LA, March 8-12.
- Angrish MM, Madden MC, Pleil JD, 2014. "Gas phase probe molecules for assessing *in vitro* metabolism to infer an *in vivo* response." *ToxCast Data Summit*, US EPA, September 29–30.
- Pleil, JD. 2014. "Breath-borne Biomarkers: a) Timing and exposure reconstruction b) Implementing aerosols sampling and analysis", invited subject matter expert presentation, JASON Committee Meeting, FBI Weapons of Mass Destruction Directorate, San Diego, CA, June 26.
- Pleil JD and Miekisch W, 2014. "Analysis of microbiome contributions to the human biomarker metabolome", invited symposium, PittCon 2014, Chicago, IL, March 4.
- Pleil, JD, 2014. "Introduction to using breath-borne biomarkers in exposure assessment research: invited lecture, ENVR 770 Biological Monitoring, University of North Carolina, Chapel Hill, NC, Feb. 19.
- Pleil JD, 2014. "High-throughput toxicity testing of environmental chemicals: Potential mid-infrared applications for *in vitro* assessments", invited lecture, Princeton University, NJ, Feb. 17.
- Pleil JD, 2014. "Quantitative exposure science: using *in vivo* biological measurements for discovery and target analyses", invited lecture, Northwestern University, Evanston, IL, Feb. 11.
- Pleil JD, Stiegel MA, Kormos TM, and Sobus JR, 2013. "Identifying potential confounders from the pulmonary microbiome in suites of nominally endogenous human metabolites in exhaled breath", Breath Summit 2013, Saarbrücken Germany, June 8-13.
- Stiegel MA, Pleil JD, Kormos TM and Sobus JR, 2013. "Methods development for inflammatory markers in exhaled breath condensate samples and exhaled aerosols", International Association for Breath Research: Breath Analysis Summit 2013, Saarbrücken, Germany, June 8-13.
- Madden MC, Stevens T, Case M, Sobus JR, Stiegel MA, Diaz-Sanchez D, Cascio W, Devlin RB, and Pleil JD, 2013. "Controlled exposures of human volunteers to diesel engine exhaust: Biomarkers of exposure and health outcomes", International Society for Aerosols in Medicine, University of North Carolina, Chapel Hill, NC, April 6-10.
- Pleil JD, Stiegel MA, Wolfgang MC, Council S, Sobus JR, Kormos TM, and Madden MC, 2013. "Breath biomarkers from viable pulmonary aerosols: discovery of human micro-biome contributions", Society of Toxicology: 52<sup>nd</sup> Annual Meeting and ToxExpo, San Antonio, TX, March 8-13.
- Pleil JD, 2013. "Exploring the human exposome: Linking *in vivo* human studies to *in vitro* toxicity testing", Society of Toxicology, RTP Regional Meeting, Research Triangle Park, NC, February 21.

- Pleil JD, 2013. "Quantitative Exposure Science: Linking environmental measurements to *in vivo* human biomonitoring data", Program in Public Health (PPH 303), Northwestern University, Evanston, IL, February 12.
- Pleil JD, Stiegel MA, Kormos TM and Madden MC, 2012 "Environmental health applications for exhaled breath aerosols: Investigations of inflammatory proteins and opportunistic infections", plenary lecture: International Breath Analysis Meeting, Sonoma, CA, October 28-November 1.
- Pleil JD, 2012. "Collaborative Efforts between EPA Regions and HEASD/NERL: Focus on Methods Development and Applications", US EPA Superfund Regional Managers Meeting, Research Triangle Park, NC, October 25.
- Pleil JD, 2012 "Preliminary chemical investigation of used coalescer "socks" from F-22 aircraft", NASA F-22 Life Support Systems Independent Analysis Team, Johnson Spaceflight Center, Houston TX, August 6.
- Pleil JD, 2012 "Pulmonary function changes from controlled inhalation exposures to ozone and diesel exhaust", NASA F-22 Life Support Systems Independent Analysis Team, NASA Langley Research Center, Langley, VA, May 23.
- Pleil JD, 2012. "New CSS biomonitoring projects for linking *in vivo* human studies to *in vitro* toxicity testing", Human Exposure and Atmospheric Sciences Work in Progress Lecture Series, US EPA, Research Triangle Park, NC, April 18.
- Pleil JD, 2012. "Breath Biomarkers in Environmental Health Science: Decoding the Human Exposome", invited symposium lecture, PittCon 2012, Orlando, FL, March 12.
- Pleil JD, 2011. "Urban exposure science: from environmental media measurements of the 2001 WTC disaster forward to health assessments based on human biomarker methodology", invited lecture, University of Chicago's 6th Chicago Core Conference on "Biosocial and technology based approaches to urban health and aging", Chicago, IL, Oct. 25, 2011.
- Stiegel MA, Pleil JD, Sobus JR, Kormos TM, Mazurek W, Gan TH, De Nola G, and Hanhela PJ, 2011. "Human blood biomarker measurements from chemical exposures onboard an Australian *Collins* class diesel submarine", Air Independent Propulsion (AIP) and Related Atmosphere Control Technologies, Submarine Air Monitoring and Air Purification (SAMAP), Taranto, Italy, Oct. 9 -15.
- Pleil JD, Stiegel MA, and Sobus JR, 2011. "Breath Biomarkers in Environmental Health Science: Exploring Patterns in the Human Exposome", Breath Analysis Summit 2011: International Conference on Breath Research, Parma Italy, Sept. 11-14, 2011.
- Pleil JD, 2011. "Using human biomarker measurements to link environmental exposure to internal dose", invited lecture, NIOSH Research Center, Morgantown, WV, March 29.
- Pleil JD, Stiegel MA, Madden MC, Sobus JR, 2011. "Dealing with analytical results from breath analysis: What is real, what is background, and what is random?", invited lecture, PittCon 2011, Atlanta, GA, March 14.
- Pleil JD, Stiegel MA, Madden MC, and Sobus JR, 2010. "Heat Map Visualization of Complex Breath Biomarker Measurements for Environmental and Intelligence Applications", invited lecture, Exhaled Breath Analysis: from Sensors to Devices to Applications, Engineering Conferences International, Barga Italy, Oct. 24-30.
- Pleil JD, 2010. "Systems Biology Approaches for Environmental Exposure Science at the Individual Level", invited lecture, Environmental Sciences and Engineering Dept. University of North Carolina, March 16.
- Pleil JD, 2010. "Breath Tests in Medicine: How do we deal with inspired air and other external environmental exposures?", invited lecture, PittCon 2010, Orlando, FL, March 2.
- Pleil JD, 2009. "Overview of EPA biomarker research for Environmental Exposure Science", invited seminar, Mechanical Engineering Dept., University of Colorado, Boulder, CO, Nov. 2.
- Pleil JD, Stiegel MA, Sobus JR, Tabucchi S, Ghio AJ, and Madden MC, 2009. "Human blood and plasma analysis for trace-level polycyclic aromatic hydrocarbons (PAHs)", invited speaker, International Submarine Air Monitoring and Purification Conference, San Diego, CA, Oct. 18-22.
- Pleil JD, 2009. "Interpreting environmental exposures using human biomarker measurements and a systems biology approach", work in progress seminar series, Human exposure and Atmospheric Sciences Division, U.S. EPA, RTP, NC, Sept. 16.
- Pleil JD, 2009. "Overview of interpreting environmental influences on the assessment of exhaled breath measurements", invited plenary lecture, International Association for Breath Research (IABR), Dortmund, Germany, April 26-30.

- Pleil JD, 2008. "Evidentiary breath analysis for alcohol: chemical interferences and toxicokinetics related to environmental co-exposures", ENVR 400 seminar, School of Public Health, University of North Carolina, Chapel Hill, NC. Sept. 24.
- Pleil JD, 2008. "Exhaled Breath Analysis for Environmental Exposure Assessment", invited speaker, Mid-infrared Technologies for Health and Environment (MIRTHE) workshop, Johns Hopkins University, Baltimore, MD. Aug. 8.
- Pleil JD, 2008. "Environmental Exposure Assessment", invited lecture series, Dept. of Chemistry and Industrial Chemistry, University of Pisa, and Institute of Clinical Physiology, National Research Council, Italy, July 19 – Aug. 1.
- Pleil JD, 2008. "Interpretation of human biomarkers for exposure reconstruction", invited speaker, workshop for exposure assessment, University of California, Los Angeles (UCLA), CA. July 9-11.
- Pleil JD, 2008. "Non-traditional Biometrics for Threat Assessment", invited speaker and panelist, Air Force Office of Scientific Research (AFOSR), Arlington, VA. May 20-21.
- Pleil JD, 2008. "Diacetyl methods evaluation", invited reviewer and panelist, National Institute of Occupational Safety and Health (NIOSH), Cincinnati, OH. April 1 -2.
- Pleil JD, 2008. "Blood Biomonitoring", Invited panelist and speaker, InQTel meeting for Intelligence (CIA, NSA, DHS) Technology, San Francisco, CA, Jan 29-31.
- Pleil JD, 2007. "Role of exhaled breath biomarkers in environmental health science", Invited plenary speaker; Breath Summit, International Association of Breath Research (IABR), Cleveland Clinic Foundation, Cleveland OH, Nov. 1-4.
- Pleil JD, Madden MC, Sobus JR, Hubbard HF, 2007. "Biomarker Study of Controlled Human Exposures to Diesel Exhaust: Calibrating the Metabolic Response to Well Characterized Environmental Pollutant Levels", Conference of the International Society of Exposure Analysis (ISEA), Durham, NC Oct. 14-18.
- Pleil JD, Sobus JR, and Madden MC, 2007. "Environmental and biomarker measurements of polycyclic aromatic hydrocarbons as indicators of human diesel exhaust exposure using controlled chamber studies", invited lecture, Submarine Atmospheres Monitoring and Purification (SAMAP), Amsterdam, Netherlands, Oct. 6-11.
- Pleil JD and Glover PL, 2007. "Chemical and toxicokinetic evaluation of environmental exposures to solvents and fuels as potential interferences on evidentiary breath alcohol analyzers", invited plenary speaker, 20th Annual Meeting of the International Association for Chemical Testing (IACT), Wilmington, NC, May 6-10.
- Pleil JD, Sobus JR, Hubbard HF, and Madden MC, 2007. "Sample extraction and GC-MS analysis for water soluble volatile organic compounds in liquid biological media", Invited presentation, EnviroAnalysis 2007, Wellington, New Zealand, February 6-9.
- Pleil JD and Sobus JR, 2006. "Measurement method for volatile organic biomarkers in exhaled breath condensate", Invited presentation, International Scientific Meeting on Breath Analysis in Physiology and Medicine, sponsored by International Association for Breath Research, Prague, Czech Republic, Sept. 4-5.
- Smith JP, Olsen CR, Gontz AM, Benedict LA, Bopp RF, Pleil JD, Funk WE, and Rappaport SM, 2006. "Conducting Environmental Forensics in Dynamic Highly Urbanized Estuarine Systems: Lessons Learned from Investigating the Impact of the World Trade Center Attack on the Sediments of New York Harbor", Geological Society of America, Northeast Section – 41st Annual Meeting, Harrisburg, PA March 20-22.
- Sheldon LS, Morgan M, and Pleil JD, 2006. "Biomonitoring: Interpretation and Uses", International Life Sciences Institute (ILSI) Annual Meeting, San Juan, Puerto Rico, Jan. 16.
- Pleil JD, 2005. "Human Biomonitoring to Link Environmental Exposure to Biologically Relevant Dose", Invited presentation, International Life Sciences Institute Meeting (ILSI), Research Triangle Park, NC, Dec. 15-16.
- Kim D, Nylander-French L, Pleil JD, Prah JD, and Ashley DL, 2005. "Development of a Physiologically-Based Pharmacokinetic Model for Dermal Absorption and Penetration of Methyl *Tertiary* Butyl Ether in Humans", International Conference Occupational and Environmental Exposures of Skin to Chemicals (OEESC-2005) Karolinska Institute, Stockholm, Sweden, June 12 – 15.
- Pleil JD, Chao E, Egeghy PP, Nylander-French L, and Rappaport SM, 2005. "Exhaled Human Breath Measurement of Jet Fuel Constituents: Distinguishing between Inhalation and Dermal Exposure Routes", Invited plenary lecture, International Conference of Breath Analysis for Medical Diagnosis and Therapeutic Monitoring", University of Innsbruck, Austria, May 26-28.

Pleil JD, 2005. "Assessing Carcinogenic Polycyclic Aromatic Hydrocarbons (PAH) Levels in the Aftermath of the New York World Trade Center Disaster", Invited Seminar, Louisiana State University Medical Center, New Orleans, March 8.

## **NARRATIVE**

Over the past 35+ years, I have worked with many aspects of environmental science especially in analytical methods and instrument development. Using laboratory results from our field and applied studies with human subjects, I have also developed stochastic and classical pharmacokinetic models for the uptake, metabolism and eventual disposition of various organic carcinogens (or suspected carcinogens) including vinyl chloride, benzene, chloroform, MTBE, trichloroethene, tetrachloroethene and diesel exhaust constituents. Currently, there are a number of my analytical methods based on cryogenic focusing (air/breath), liquid-liquid (and solid-liquid) extraction for blood, urine and dust in use for trace analysis at the Agency and other institutions. Over the years I have worked in collaboration with most branches of the military, as well as DoD, NASA, NATO, NIOSH, CDC, AFOSR, and DoE. I have provided Agency expertise to the U.S. Navy's Undersea Medical Institute, have trained Marine Corps personnel in Okinawa, and participated in the U.S. Air Force's inter-services military Jet Fuel exposure study as the senior Government scientist. Since 2001, I have been involved with the World Trade Center (WTC) disaster and its environmental/health aftermath. In my current position, I develop laboratory methods for measuring and identifying patterns of endogenous and chemical biomarkers, construct mathematical, statistical, and systems biology approaches to interpret exposures to environmental stressors, and, as an adjunct Professor, teach "Environmental Exposure Assessment" for graduate students in the Gillings School of Public Health of the University of North Carolina, Chapel Hill.

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