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THE OHIO POWER SITING BOARD

In the Matter of the Application of Black Fork Wind Energy, LLC for a Certificate to Install Numerous Electricity Generating Wind Turbines in Crawford and Richland Counties, Ohio	)))))	**Case No. 10-2865-EL-BGN**

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DIRECT TESTIMONY OF DR. DIANE J. MUNDT

Q.1 Please state your name and business address?

A.1 My name is Dr. Diane J. Mundt. I am a Senior Manager at ENVIRON International Corporation. My business address is 20 Custom House Street, Suite 800, Boston, Massachusetts, 02110.

Q.2 What is your educational background?

A.2 I completed my Bachelor of Science in Biology and English at Valparaiso University, my Master of Science in Epidemiology at Harvard University, School of Public Health and my doctoral degree in Epidemiology at the University of Massachusetts, Amherst. I have also done post-doctoral work in Epidemiology at Columbia University, School of Public Health.

Q.3 What is your professional background?

A.3 I started my career as an epidemiologist at the National Cancer Institute, which is part of the National Institutes of Health, and have subsequently held positions as an epidemiologist at both Georgetown University and the University of Chicago, the Health Effects Institute in Cambridge, MA, and the Institute of Medicine of the National

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Academies, in Washington, DC. I was working for Applied Epidemiology, which merged with ENVIRON in 2003. I am a member of several professional organizations, and I serve as an advisor to two academic Nanotechnology Manufacturing centers. I have published numerous scientific articles in peer-reviewed journals and presented scientific papers at professional meetings. I am also on the executive board of the professional organization known as Medichem – which has as its prime objective the international co-operation in occupational and environmental health issues related to the production and use of chemicals.

A copy of my current *Curriculum Vitae*, which provides additional details as well as a complete list of my publications, is attached.

Q.4. On whose behalf are you offering testimony?

A.4. I am testifying on behalf of the Applicant, Black Fork Wind Energy, LLC.

Q.5 What is the purpose of your testimony?

A.5 I have been asked by Black Fork Wind Energy, LLC to comprehensively search, evaluate, and summarize the published, peer-reviewed epidemiological literature on the human health effects, if any, associated with living in proximity to industrial wind turbines. In addition to searching relevant databases such as PubMed – the indexing system of the United States National Library of Medicine – my staff has searched the World Wide Web to identify any credible, well-conducted reports of harm to human health associated with industrial wind turbines.

My testimony is based on a critical review and synthesis of the available epidemiological literature, as well as my professional training and experience in applying epidemiological concepts and methods to diverse human health issues.

Q.6 Can you describe the field of epidemiology?

A.6 Epidemiology is the field of public health that studies the incidence, prevalence, and distribution of disease -- as well as risk factors that are associated with disease -- in human populations. Epidemiologists use standard scientific methods to identify and interpret statistical correlations between disease occurrence and disease risk factors and other associated factors. Epidemiological evidence is key to determining the causal relationship, if any, between various risk factors and the occurrence of disease.

The strength of epidemiological study results depends on the study design used, study size, data quality and completeness, validity of analytical methods, and the ability to anticipate and control bias. The validity of evidence from an epidemiological study is influenced by a number of factors, including, but not limited to, identification of testable hypotheses based on reasonable research questions; selection and implementation of an appropriate study design; valid ascertainment of disease; definition and measurement of exposure; measurement and control of confounding factors.

There are two basic epidemiological approaches to evaluating associations between risk factors and disease: cohort studies in which disease rates are compared between groups of exposed persons and groups of unexposed persons; and case-control studies in which exposure history among individuals with disease (cases) is compared with exposure history among individuals without the disease (controls). Study design is a primary

determinant of the quality of the results, which impacts that study's importance in contributing to the weight of epidemiological evidence it generates.

Case reports and case series are not epidemiological studies, but may be useful in generating hypotheses that can be tested using proper epidemiological study design. Similarly, disease prevalence surveys and surveys lacking a valid comparison group may be useful for generating hypotheses, but are not valid or useful for determining real associations or disease causation.

The validity of epidemiological studies depends on the investigator's ability to anticipate and avoid biases such as selective participation of certain subsets of individuals (selection bias), systematic errors in responses or measured data (information or misclassification bias), and the mixing of possible effects of other strong risk factors for the same disease (confounding bias). In evaluating the weight of evidence, epidemiologists are concerned with whether biases due to study design issues – or systematic error – have impacted study results. Systematic error in the methodology or resulting from missing or inaccurate information can render study findings invalid and misleading.

Interpretation of epidemiological evidence also considers the role chance may play in statistical analyses and results. Statisticians and epidemiologists evaluate the probability that an observed result may be due to chance by applying tests of statistical significance. Nevertheless, statistically significant results do not imply or indicate causation, and some proportion of significant findings (typically 5%) is expected to arise simply due to chance.

Epidemiological evidence is fundamentally relied upon for determining causes of disease in humans, and serves as a scientific basis for a wide range of decision-making, including identifying and evaluating public health interventions, deriving occupational and environmental exposure limits; determining drug and consumer product safety; guiding medical treatment decisions; supporting policy and litigation decisions, etc.

Q.7 As an epidemiologist, can you give an opinion on whether the operation of utility-scale wind turbines cause adverse health effects?

A.7 Yes. There have been six peer-reviewed cross-sectional studies of populations residing near utility-scale wind turbines; however, no comparisons were made to non-exposed populations (Pedersen and Persson 2007; Pedersen, van den, et al. 2009; Pedersen and Waye 2004; Pedersen and Larsman 2008; Pedersen and Persson Waye 2008; Pedersen, van den Berg, et al. 2010). The outcome of interest in these studies was primarily annoyance, and three studies evaluated associations between wind turbine noise exposure and self-reported hypertension or self-reported conditions such as headaches (Pedersen and Persson 2007; Pedersen and Waye 2004; Pedersen and Larsman 2008). In this literature, individuals' annoyance with wind turbines was strongly correlated with their negative perception of the visual impact of the turbines.

Adequate scientific information regarding health effects of noise and shadow flicker from sources other than wind turbines is available and informative. This scientific information consists of studies conducted among individuals exposed to sounds at similar frequencies from other sources or those exposed to sources of flicker such as helicopter blades or ceiling fans. While this scientific evidence is not specific to wind turbines, the relevance of evidence from other settings is directly applicable and biologically relevant to

understanding the potential for comparable effects associated with wind turbines. For example, epidemiological studies of occupational exposures of workers and health outcomes are often used to understand risk of similar exposures in non-occupational settings.

The scientific literature also addresses the tendency of individuals to perceive and self-report symptoms differently under different circumstances. For example, the well-known placebo effect has been shown to occur where individuals given inactive substances resembling active drugs tend to report improvement in symptoms, or conversely, over-reporting symptoms when they think they have been exposed to a hazard. This bias in scientific studies can be addressed in an experimental setting through the "blinding" of participants as to the treatment they receive, but this is generally not possible to do in population-based epidemiological studies.

Q.8. Upon what do you base your opinion?

A.8 All of my opinions are based upon my critical review and synthesis of the evidence from the available scientific literature, primarily consisting of peer-reviewed published articles, as well as a report by the National Research Council, an arm of the National Academy of Sciences released a report "*Environmental Impacts of Wind-Energy Projects,*" in 2007 (NRC 2007), in which the Committee on Environmental Impacts of Wind Energy Projects addresses many of the scientific issues discussed here.

Q.9 What is your opinion?

A.9 Based on my review of the relevant published, peer-reviewed scientific literature, I found no consistent or well-substantiated causal connection between residential

proximity to industrial wind turbines and health effects. It should be noted that some degree of noise is consistently perceived by residents living near wind turbines depending on number of turbines, time of day, season, and level of background noise, and to a lesser extent shadow flicker, again, depending on time of day, season, and position of the turbine blades. However, exposures to turbine noise or shadows, while potentially distracting or annoying to some people, are not known to harm human health.

Q.10. Do you believe noise from wind turbines causes adverse health effects?

A.10. No, I found no convincing or consistent evidence to support this claim. The body of scientific literature addressing general noise-related health effects is quite large – greater than 1000 publications. However, relatively few of these studies are epidemiological studies, and even fewer are epidemiological studies directly assessing wind turbine audible noise (Pedersen and Persson 2007; Pedersen, van den, et al. 2009; Pedersen and Waye 2004; Pedersen and Larsman 2008; Pedersen and Persson Waye 2008; Pedersen, van den Berg, et al. 2010).

Pederson (2004) observed a significant dose-response relationship between wind turbine audible noise and self-reported annoyance in a cross-sectional study conducted in 351 subjects living varying distances from wind turbines in Sweden. However, they also found a significant risk of reporting noise annoyance among those with a negative attitude towards the visual impact of the wind turbines. These results suggest that attitude is a predictor of self-reported complaints, and does not correlate with actual exposure (e.g., distance from turbine noise source). In addition to the cross-sectional design and reliance on self-reported outcomes, this study is limited by selection bias, which is indicated in the difference in response rate between the highest-exposed

individuals (78%) versus lowest-exposed individuals (60%) (Pedersen and Waye 2004). If more people with symptoms among the high-exposure group participated, an association would be seen, even if those symptoms were unrelated to the turbines.

Pederson (2007) examined the association between wind turbine noise and self-reported annoyance, health, and well-being in 754 Swedish residents living in proximity to one of seven wind turbine sites. The authors reported that annoyance was significantly associated with sound pressure levels from wind turbines as well as having a negative attitude toward wind turbines, living in a rural area, and living in an area with rocky or hilly terrain. Those annoyed by wind turbine noise reported a higher prevalence of sleep disturbance than those not annoyed by noise. Due to the cross-sectional design, it cannot be determined whether wind turbine noise caused sleep disruption, or those who experienced disrupted sleep were more likely to notice (and report annoyance to) noise. Sound pressure levels, however, were not found to be associated with any health effects or well-being factors studied.

Pedersen and Persson Waye combined the data from their 2004 and 2007 cross-sectional studies described above for a total analytic pool of 1,095 participants exposed to wind turbine noise of at least 30 dB(A) (Pedersen and Larsman 2008; Pedersen and Persson Waye 2008). A total of 84 participants (7.7%) reported being fairly or very annoyed by wind turbine noise, and a significant association between noise annoyance and sound pressure level was observed. Respondents reporting wind turbines as having a negative impact on the scenery were also significantly more likely to report annoyance to wind turbine noise, regardless of sound pressure levels (Pedersen and Larsman 2008). Self-reported stress was found to be higher among those who were fairly or very annoyed

compared to those not annoyed, but no differences in hearing impairment, diabetes, or cardiovascular diseases were found (Pedersen and Persson Waye 2008). A later study by Pederson et al. (2009) of 725 residents in the Netherlands living within 2.5 km of a site containing at least two wind turbines of 500 kW or greater found similar results: Annoyance increased with increasing sound level, but was also strongly correlated with a negative attitude toward the visual impact of wind turbines on the landscape. In addition, a significantly decreased risk of annoyance from noise was observed among those who benefited economically from wind turbines, despite equal perception of noise and exposure to generally higher (>40 dB(A)) sound levels (Pedersen, van den, et al. 2009).

Additionally, a multidisciplinary panel of experts recently completed a document that reviewed the scientific literature pertaining to health effects of wind turbines, and concluded that: "The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences" (Colby, Dobie, et al. 2009).

In the cited literature, individuals' annoyance with wind turbines was strongly correlated with their negative perception of the visual impact of the turbines. This outcome is consistent with the statement by Berglund et al. suggesting that individuals' attitudes towards a source contribute to reported adverse effects (Berglund, Hassmen, et al. 1996). Further analyses on annoyance from both wind turbine and road traffic noise in the Pedersen et al. (2009) population revealed that road traffic noise had no effect on annoyance to wind turbine noise, and vice versa. Visibility of, and attitude towards, wind turbines and road traffic were significantly related to annoyance from their respective

noise, and stress was significantly associated with both types of noise (Pedersen, van den Berg, et al. 2010).

In summary, no available literature on noise has demonstrated adverse health effects specific to wind turbines, and the only epidemiological studies directly assessing wind turbine audible noise lead to the conclusion that self reported annoyance is highly correlated to a negative view of turbines.

Q.11 Do you believe shadow flicker from wind turbines causes adverse health effects?

A.11 Health effects of concern with shadow flicker, not specific to wind turbines, include nausea, loss of balance, and triggering of epileptic seizures. Only two studies were found specific to the health effects associated with shadow flicker from wind turbines (Harding, Harding, et al. 2008; Smedley, Webb, et al. 2010). Harding, et al. reviewed literature pertaining to risk of photosensitive seizure from shadow flicker by wind turbines, concluding that flicker from turbines interrupting or reflecting sunlight at greater than 3 Hz or with blade speeds exceeding 60 rpm may pose a potential risk of inducing seizures in photosensitive individuals. Harding, et al.'s recommendations for maximum frequency and rotation are far greater than that of the wind turbines proposed for the project in this proceeding. Likewise, Smedley, Webb and Wilkins modeled risk of seizures from wind turbines among individuals with photosensitive epilepsy and found that "large turbines rotate at a rate below that at which the flicker is likely to present a risk."

Since there is no other relevant literature, it is reasonable to examine scientific findings from research on other similar sources of natural light flicker exposure (e.g., propellers,

ceiling fans, flickering light when driving past trees). A review of study findings pertaining to risk of photosensitive epileptic seizure associated with light flicker, concluded that an epileptic seizure could be triggered in the range of 12 to 25 Hz (Fisher, Harding, et al. 2005), which again, is well above the frequency levels for the proposed turbines, noted as being 0.8 Hz in the Staff Report which I have reviewed.

In summary, there is no scientific evidence available in the peer-reviewed literature that finds an association between adverse health effects and shadow flicker at the frequency of the proposed turbines.

Q.12 Are you familiar with those portions of the Application in this proceeding that relate to setbacks, noise and shadow flicker?

A.12 Yes.

Q.13. Do you believe that the Black Fork Wind Energy project as proposed in the Application will result in sleep disturbance and deprivation, tinnitus (ringing of the years), ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic episodes?

A.13. No. As previously discussed, there is no peer-reviewed epidemiological study that indicates that residence in proximity to wind turbines causes any of these disease or symptoms. A few reports in the lay press and on the internet claim a causal relationship between wind turbine noise or shadow flicker and an array of health effects. However, these are anecdotal reports, case series or surveys that are not epidemiologically well-designed and free from the various biases previously mentioned. It is also important to

realize that complaints may have many causes, and that a direct causal link between living in proximity to wind turbines and health complaints has not been demonstrated.

Q.14 Does this conclude your direct testimony?

A.14 Yes, it does.

CERTIFICATE OF SERVICE

I certify that a copy of the foregoing document was served by hand delivery upon John Jones and Stephen Reilly, Assistant Attorneys General, Public Utilities Section, 180 E. Broad Street, 6th Floor, Columbus, OH 43215 and via U.S. Mail upon the following persons listed below this 8th day of September 2011:

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Reference List

Berglund B, Hassmen P, et al. 1996. Sources and effects of low-frequency noise. J Acoust Soc Am 99: 2985-3002.

Colby, D. C., R. Dobie, et al. 2009. Wind turbine sound and health effects an expert panel review. American Wind Energy Association; Canadian Wind Energy Association.

Fisher RS, Harding G, et al. 2005. Photic- and pattern-induced seizures: a review for the Epilepsy Foundation of America Working Group. Epilepsia 46: 1426-1441.

Harding G, Harding P, et al. 2008. Wind turbines, flicker, and photosensitive epilepsy: characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them. Epilepsia 49: 1095-1098.

NRC. 2007. Environmental Impacts of Wind-Energy Projects. 1-4Washington, DC, National Acadmies Press.

Pedersen E, Persson WK. 2007. Wind turbine noise, annoyance and self-reported health and well-being in different living environments. Occup Environ Med 64: 480-486.

Pedersen E, van den BF, et al. 2009. Response to noise from modern wind farms in The Netherlands. J Acoust Soc Am 126: 634-643.

Pedersen E, Waye KP. 2004. Perception and annoyance due to wind turbine noise--a dose-response relationship. J Acoust Soc Am 116: 3460-3470.

Pedersen E, Larsman P. 2008. The impact of visual factors on noise annoyance among people living in the vicinity of wind turbines. Journal of Environmental Psychology 28: 379-389.

Pedersen E, Persson Waye K. 2008. Wind turbines - low level noise sources interfering with restoration? Environ Res Lett 3: 1-5.

Pedersen E, van den Berg F, et al. 2010. Can road traffic mask sound from wind turbines? Response to wind turbine sound at different levels of road traffic sound. Energy Policy 38: 2520-2527.

Smedley AR, Webb AR, et al. 2010. Potential of wind turbines to elicit seizures under various meteorological conditions. Epilepsia 51: 1146-1151.

Diane J. Mundt, PhD

EDUCATION

1991	Post Doctoral Fellowship, Musculoskeletal Epidemiology, Columbia University
1990	PhD, Epidemiology, University of Massachusetts at Amherst
1979	MS, Epidemiology, Harvard University
1977	BS, Biology & English, Valparaiso University

EXPERIENCE

Dr. Diane J. Mundt is a Senior Manager of ENVIRON with over 20 years of experience in the application of epidemiological methods in the areas of occupational and environmental health, specializing in research and policy applications. She has particular expertise in the systematic evaluation of health effects of chemical compounds and an extensive background in the critical review and interpretation of epidemiological studies. Prior to joining ENVIRON, Diane served as Director of Public Health Policy for Applied Epidemiology, Inc. She also spent several years managing and providing scientific input to numerous Institute of Medicine, National Academies committees. She began her career as an epidemiologist in the Environmental Epidemiology Branch of the National Cancer Institute. Diane's recent work at ENVIRON includes the following:

- Heading ENVIRON's team of experts on epidemiology, toxicology, industrial hygiene, and environmental fate and transport of nanomaterials.
- Membership on the Industry Advisory Board to Northeastern University Collaborative Nanoscale Science & Engineering Center for High Rate Nanomanufacturing.
- Directed an epidemiological study of perflourinated surfactant exposure and possible clinical health outcomes.
- Directed a critical review and evaluation of confounding in the occupational asphalt epidemiological literature and a field assessment of historical process changes for a trade organization.
- Directed two reviews in the refining and hot mix paving sectors to evaluate and document materials added historically to asphalt in each of these sectors.
- Provided technical and editorial oversight of reviews of the epidemiological and toxicological literature regarding the health effects of dioxin exposure for the Air Force 2002 Ranch Hands Health Study.
- At the request of the Institute of Medicine, comprehensively reviewed and summarized occupational and environmental epidemiology studies of associations between solvent exposure (including benzene, trichloroethylene, perchloroethylene, methelyne chloride) and risk of disease in humans.
- Providing technical and editorial oversight of reviews of the epidemiological literature for various chemical compounds in support of various litigation matters.

1998-2000 - Staff Scientist, Health Effects Institute

Managed the Health Effects Institute (HEI) Review Committee to peer-review and publish investigator reports. Responsibilities included, but were not limited to, synthesizing information from the Committee, drafting the HEI Commentary that accompanies all HEI investigator reports, and assisting in editorial preparations for publication of the following:

- "The National Morbidity, Mortality, and Air Pollution Study: Methods and Methodologic Issues – Part I." Investigators: Samet JM, Zeger S, Dominici F, et al. May 2000.
- "The National Morbidity, Mortality, and Air Pollution Study: Morbidity and Mortality from Air Pollution in the United States– Part II." Investigators: Samet JM, Zeger S, Dominici F, et al. June 2000.
- "Identifying Subgroups of the General Population that may be Susceptible to Short-term Increases in Particulate Air Pollution: A Time Series Study in Montreal, Quebec." Investigators Goldberg MS, Bailar JC, Burnett RT et al. November 2000.
- "A Case-Crossover Analysis of Fine Particulate Matter Air Pollution and Out-of-Hospital Sudden Cardiac Arrest." Investigators: Checkoway H, Levy D, Sheppard L et al. December 2000.

Worked with a specially designated Diesel Epidemiology Expert Panel to assemble work from investigators, synthesizing information, responding to peer review, writing and editing the Panel report:

- "Diesel Emissions and Lung Cancer: Epidemiology and Quantitative Risk Assessment." A Special Report of the Institute's Diesel Epidemiology Expert Panel. June, 1999.

Co-coordinator for: "Diesel Workshop: Building a Research Strategy to Improve Risk Assessment." March 7-9, 1999, Stone Mountain, Georgia. Summarized workshop proceedings, and compiled presentations for publication in:

- "Diesel Workshop: Building a Research Strategy to Improve Risk Assessment." HEI Communications, Number 7. October/November, 1999.

Additional diesel publications:

- "Research on Diesel Exhaust." A Program Summary. December, 1999.

At the request of the US Environmental Protection Agency, coordinated the work of a formal expert panel to peer-review a draft EPA document, "Reconstruction of Teamsters' Union Exposures 1950-1990."

Coordinated peer-review of applications responding to Request for Proposals to conduct feasibility studies of diesel exposure methods and identifying cohorts for epidemiologic study. Acted as project officer for the six studies funded by the Institute.

1992-1996 - Senior Program Officer, National Academy of Sciences, Institute of Medicine

Senior staff officer primarily responsible for directing work of a committee of experts to result in the publications listed below. Responsibilities included, but were not limited to: working directly with all committee members; interacting with sponsors, extensive information gathering, synthesizing, and disseminating to committee; writing and editing final reports; responding to and coordinating extensive peer review of reports:

- Institute of Medicine. "Health Consequences of Service during the Persian Gulf War: Recommendations for Research and Information Systems." National Academy Press, 1996.
- Institute of Medicine. "Health Consequences of Service during the Persian Gulf War: Initial Findings and Recommendations for Immediate Action." National Academy Press, 1995.

- Final progress report to the US Army Medical Research and Materiel Command, Fort Detrick, Maryland. "Study of Post-Separation HIV-Positive Service Members Lost to Follow-up." October 1995.

Additionally responsible for drafting or editing selected sections or chapters in the following publications.

- Institute of Medicine. "Veterans and Agent Orange." National Academy Press, 1994.
- National Research Council. "Toxicological Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests." National Academy Press, 1997.
- National Research Council. "Toxicological Assessment of the Army's Zinc Cadmium Sulfide Dispersion Tests. Answers to Commonly Asked Questions." National Academy Press, 1997.

Staff consultant:

- Institute of Medicine. "Veterans and Agent Orange. Update 1996." National Academy Press, 1996.

PROFESSIONAL AFFILIATIONS & ACTIVITIES

American College of Epidemiology
ASTM International – Committee E56, Nanotechnology
International Society for Environmental Epidemiology
International Commission on Occupational Health – ICOH
Medichem – Occupational & Environmental Health in the Production & Use of Chemicals
Society for Epidemiologic Research

Secretary, Medichem Board's Executive Committee, 2008-2011

Member, Planning Committee for NIOSH sponsored conference *Nanomaterials and Worker Health: Occupational health surveillance, exposure registries, and epidemiological research* to be held in Colorado, July 2010.

Session Moderator, *Human Health and Environmental Exposure*, International Conference on the Environmental Implications and Applications of Nanotechnology. Co-Hosted by The Environmental Institute, University of Massachusetts Amherst and the US EPA Office of Superfund Remediation and Technology Innovation. Amherst, Massachusetts, June 9-11, 2009.

Member, Advisory Committee to the Massachusetts Interagency Committee on Nanotechnology, 2008-present

Member, InterNano Advisory Board, National Science Foundation Center for Hierarchical Manufacturing, University of Massachusetts, Amherst, MA, 2007-present

Co-chair, Nanotechnology Application Program, International Conference on Nanotechnology and Occupational and Environmental Health & Safety: Research to Practice, 2006

Member, Industry Advisory Board, National Science Foundation Nanoscale Science and Engineering Center for High-rate Nanomanufacturing. Northeastern University, Boston, MA 2002-present

Director of Public Health Policy, Applied Epidemiology, Inc., Amherst, MA, 2001-2003

Staff Scientist and Epidemiologist, Health Effects Institute, Cambridge, MA, 1998-2000

Senior Research Professional, University of Chicago, Department of Health Studies, 1997-1998

Instructor, University of Chicago, Department of Health Studies, Chicago, IL, 1997-1998

Consultant and Advisor, Family Practice Residency Program, MacNeal Hospital, Berwyn, IL, 1997-1998

Senior Program Officer and Study Director, National Academy of Sciences, Institute of Medicine, Washington, D.C., 1993-1996

Program Officer, National Academy of Sciences, Institute of Medicine, Washington, D.C., 1992-1993

Assistant Research Professor, Division of Biostatistics and Epidemiology, Department of Community and Family Medicine, School of Medicine, Georgetown University, Washington, D.C., 1991-1992

Post-doctoral Fellow, National Institute of Arthritis, Musculoskeletal and Skin Diseases NIH Training Grant, Columbia University, New York, NY, 1989-1991

Project Manager, NIH grant: A case-control study of herniated cervical and lumbar disc. Department of Epidemiology, School of Public Health, University of Massachusetts, 1985-1989

Director, Alumni Relations and Student Activities, Concordia College, Bronxville, NY, 1981-1983

Epidemiologist, Environmental Epidemiology Branch, Radiation Studies Section, National Cancer Institute, National Institutes of Health, Bethesda, MD, 1979-1981

PRESENTATIONS

Mundt KA, Mundt DJ, Montgomery R. Meta-Analysis of risk associated with occupational formaldehyde exposure. Society of Risk Analysis Annual Meeting; Risk Analysis: The Evolution of a Science, Baltimore, MD, December 6-9, 2009.

Mundt DJ, Mundt KA, Montgomery R., Bachand A. Meta-analysis of formaldehyde exposure and risk of Leukemia and nasopharyngeal cancer. MEDICHEM Workshop: Risk Assessment and Human Exposure to Hazardous Materials, Thessaloniki, Greece, October 21-24, 2009.

Praolini F, Guilhem M, Mundt DJ, Mundt KA, Santamaria A. Preparing for the future: proposal for an International Nanomaterial Exposure Registry (INER). Nanosafe 2008, Grenoble, France November 3-7, 2008.

Mundt DJ, Mundt KA, Skinner D, Klapper A, Kosnett MJ. Planning for the future: exposure reqistries for engineered nanomaterial employees. The 36th Medichem International Congress "Innovation in Occupational Health." Amsterdam, The Netherlands, September 9-11, 2008.

Mundt KA, Mundt DJ. Occupational Health Surveillance: A proactive approach to occupational safety in the nanotechnology workplace. Nanotechnology: The Future of Environment Health & Safety Regulatory Policy, Baltimore, MD, March 20, 2008.

Mundt, DJ, Invited Speaker. Next Steps and Concluding Remarks. The Big Picture: Safe Development of Nanotechnology Workshop. Marlborough, MA, November 15, 2007.

Mundt DJ. From Uncertainty to Practice: Practical Strategies in Nanotechnology. The Big Picture: Safe Development of Nanotechnology Workshop, Marlborough, MA, November 14, 2007.

Mundt DJ. Nanotechnology and Nanomaterials. Are the Workers Safe? 5th New England International Nanomanufacturing Workshop, Boston, MA, June 20, 2007.

Adams R, Mundt DJ. What Businesses Should be Doing Now to Prepare for Tomorrow. Nanotechnology: Waiting for OSHA. Teleconference with Reed Smith, May 2, 2007.

Mundt DJ, Adams R, Daugherty D, Santamaria A, Mundt KA. Managing uncertainty: Practical approaches to nanoscale materials and occupational health in small workplaces. The 28th International Congress on Occupational Health (ICOH) "Renewing a century of commitment to a healthy, safe & productive working life", Milan, Italy, June 11-16, 2006.

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Mundt DJ, Adams R, Marano K, Heidenreich M. Nunes A. Historical changes in occupational exposures in the US asphalt paving industry – an investigation of refining and hot mix processes. BG Academy for Occupational Health and Safety, Health Effects of Occupational Exposure to Emissions from Asphalt/Bitumen Symposium, Dresden, Germany, June 7-8, 2006.

Mundt DJ, van Wijngaarden E, Mundt KA. An assessment of the possible extent of confounding in epidemiological studies of lung cancer risk among roofers. BG Academy for Occupational Health and Safety, Health Effects of Occupational Exposure to Emissions from Asphalt/Bitumen Symposium, Dresden, Germany, June 7-8, 2006.

Mundt DJ, Mundt KA. Nanotechnology and health· Not a second thought. Nanotechnology from Lab to Product Seminar, IGERT – Program in Nanotechnology Innovation, University of Massachusetts, Amherst, March 30, 2006.

Santamaria AB, Mundt DJ, Mundt KA. Risk assessment of nanoparticles: Issues and datagaps. American College of Toxicology Williamsburg, VA, Nov. 6-9, 2005.

Mundt DJ, Mundt KA, Adams RC, Santamaria A, Daugherty D. Health effects of Occupational exposure to nanoscale materials: Pragmatic approaches to managing occupational health uncertainty. The 2nd International Symposium on Nanotechnology and Occupational Health, National Institute for Occupational Safety and Health, Minneapolis, MN, October 3-6, 2005.

Mundt DJ, Mundt KA, Smylie M, Brock WJ, Rodricks JV. Nanotechnology – a new page in an old book. Medichem's XXXII International Congress "Toward Global Sustainable Best Practices in Chemical Safety and Health" Paris, France, September 1-3, 2004.

PUBLICATIONS

Publications in Peer-Reviewed Journals

Bachand A, Mundt KA, Mundt DJ, Montgomery R. Epidemiological studies of formaldehyde exposure and risk of leukemia and nasopharyngeal cancer: A Meta-Analysis. Critical Reviews in Toxicology, 2010;40(2)85-100.

Bachand A, Mundt KA, Mundt DJ, Carlton LE. Meta-analyses of occupational exposure as a painter and lung and bladder cancer morbidity and mortality 1950-2008. Critical Reviews in Toxicology, 2010;40(2):101-125.

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