**CURRICULUM VITAE**

**William A. Groves, PhD, CIH, CSP**

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**EDUCATION**

**Degree University Program Year**

Ph.D. University of Michigan Industrial Health 1997

M.P.H. University of Michigan Industrial Health 1993

B.S. Case Western Reserve University Chemical Engineering 1985

**EMPLOYMENT HISTORY**

2017-present Program Chair, Environmental Systems Engineering, Department of Energy and Mineral Engineering, The Pennsylvania State University, University Park, PA

2007-present Associate Professor of Industrial Health and Safety, Department of Energy and Mineral Engineering, The Pennsylvania State University, University Park, PA

2002-2006 Graduate Program Chair, Industrial Health and Safety Program, Department of Energy and Geo-Environmental Engineering, The Pennsylvania State University, University Park, PA

2000-2007 Assistant Professor of Industrial Health and Safety, Department of Energy and Geo-Environmental Engineering, The Pennsylvania State University, University Park, PA

1997-1999 Co-Director, Industrial Hygiene Core, Great Plains Center for Agricultural Health, University of Iowa, Iowa City, IA

1997-1999 Assistant Professor, Department of Preventive Medicine & Environmental Health, University of Iowa, Iowa City, IA

1995-1996 Graduate Student Teaching Assistant, University of Michigan, Ann Arbor, MI

1993-1996 Graduate Student Research Assistant, University of Michigan, Ann Arbor, MI

1992 Industrial Hygienist-Summer Intern, The Dow Chemical Company, Midland, MI

1990-1991 Industrial Hygienist, Newport News Shipbuilding, Newport News, VA

1988-1990 Industrial Hygienist, Aetna Life & Casualty, Windsor, CT

1986-1988 Engineering Loss Control Representative, Aetna Life & Casualty, Harrisburg, PA

**PROFESSIONAL CERTIFICATIONS / REGISTRATIONS**

Certified Industrial Hygienist (CIH) #6394, 1994-present

Certified Safety Professional (CSP) #10994, 1992-present

Engineer in Training (EIT) #ET017361, 2012-present

**HONORS**

2013 AIHA Fellow (American Industrial Hygiene Association)

2010 Awarded Best of Poster Session 401 (18 entries) at 2010 American Industrial Hygiene Conference and Exposition (AIHCE): A New Sampling Method Using Physiologic Sampling Pump, E. Lee, L. Lee, M. Flemmer, J. Slaven, M.Harper, M. Lin, W. Groves, 2010 AIHCE, May 24, 2010, Denver CO

2010 Co-Author on paper nominated by NIOSH for the 2010 Charles C. Shepard Science Award in the category Laboratory and Methods: Lee L, Flemmer M, Lee EG, Harper M, Lin MI, Groves W, Freivalds A, Slaven J. A Novel Physiologic Sampling Pump Capable of Rapid Response to Breathing. Journal of Environmental Monitoring, 11:1020-1027, 2009.

1996 University of Michigan Warren Cook Award

1996 Rackham School of Graduate Studies Pre-Doctoral Fellowship, University of Michigan

1995 Best Abstract Platform Presentation – “Use of a microsensor array to measure low-ppm concentrations of perchloroethylene, trichloroethylene, and methoxyflurane in spiked breath samples”, American Industrial Hygiene Conference and Exposition (AIHCE)

1991 Dow Chemical Industrial Hygiene Graduate Fellowship Award

**REFEREED PUBLICATIONS**

1. Yanosky, J.D., Fisher, J., Liao, D., Donghyun, R., Vander Wal, R., Groves, W., Puett, R.C. Air Qual Atmos Health (2018) 11(6):741-754. <https://doi.org/10.1007/s11869-018-0580-6>
2. B. S. Marpoe, W. A. Groves,3 E. G. Lee, J. E. Slaven, and M. Harper. Effects of covered solid sorbent tube sample holders on organic vapor measurements. J Occup Environ Hyg. 2012; 9(10):572-9.
3. M.I. Lin, W.A. Groves,3 A. Freivalds, E.G. Lee, and M. Harper. Comparison of artificial neural network (ANN) and partial least squares (PLS) regression models for predicting respiratory ventilation: an exploratory study, Eur J Appl Physiol. 2012 May;112(5):1603-11.
4. M.I. Lin, W.A. Groves,3 A. Freivalds, L. Lee, E.G. Lee, J.E. Slaven, and M. Harper, Laboratory evaluation of a physiologic sampling pump (PSP), J Environ Monit. 2010 Jul 8;12(7):1415-21.
5. Lee, L., Flemmer, M., Lee, E., Harper, M., Lin, M., Groves,2 W., Freivalds, A., and J. Slaven. (2009). A novel physiologic sampling pump capable of rapid response to breathing, J. Environ. Monit., 2009, 11, 1020 - 1027, DOI: 10.1039/b816699d.
6. Kecojevic, V., Md-Nor, Z.A, Komljenovic, D., Groves, W.2 (2008). Risk Assessment for Belt Conveyor-Related Fatal Incidents in U.S. Mining. Bulk Solids & Powder Science &Technology Vol. 3, No. 2, pp 63-73.
7. Kecojevic, V., Md-Nor, Z.A, Komljenovic, D., Groves, W.2, Grayson, L. (2008). Risk Assessment for Continuous Miner-Related Fatal Incidents in the U.S. Underground Mining. Mineral Resources Engineering. Vol. 13, No. 2, pp. 49-60.
8. Lin, M., Groves, W.2,3, Freivalds, A., Lee, E., Harper, M., Slaven, J., and L. Lee. (2008). Exposure assessment by physiological sampling pump-prediction of minute ventilation using a portable respiratory inductive plethysmograph system. J. Environ. Monit., 2008, 10, 1179-1186. DOI: 10.1039/b806292g. Royal Society of Chemistry.
9. Md-Nor, Z.A, Kecojevic, V., Komljenovic, D., Groves, W.2 (2008).  Risk Assessment for Loader- and Dozer-Related Fatal Incidents in the U.S. Mining. International Journal of Injury Control and Safety Promotion. Vol. 15, No. 2, pp. 65-75, Taylor & Francis.
10. Komljenovic, D., Groves, W.,2 Kecojevic, V. (2008). Injuries in U.S. Mining Operations – A Preliminary Risk Analysis. Safety Science. Vol. 46, Issue 5, pp.792-801, Elsevier.
11. Md-Nor, Z.A., Kecojevic, V., Komljenovic, D., Groves, W.2 (2008).  Risk Assessment for Haul Truck-Related Fatalities in Mining. Mining Engineering. Vol. 60, No. 3, pp. 43-49, Society for Mining, Metallurgy, and Exploration.
12. Groves, W.,1 Kecojevic, V., Komljenovic, D. (2007). Analysis of Fatalities and Injuries Involving Mining Equipment. Journal of Safety Research. Vol. 38, Issue 4, pp. 461-470, Elsevier.
13. Kamalakannan B, Groves W.A.,2,3 Freivalds A. (2007). Predictive Models for Estimating Metabolic Workload based on Heart Rate and Physical Characteristics, Journal of Safety, Health & Environmental Research, 4(1), Spring 2007.
14. Kecojevic, V., Komljenovic, D., Groves, W.,2 Radomsky, M. (2007). An Analysis of Equipment-Related Fatal Accidents in U.S. Mining Operations: 1995-2005.  Safety Science. Vol. 45, Issue 8, pp. 864-874, Elsevier.
15. Agraz-Boeneker R., Groves W.A.,2,3 Haight J.M. (2007). An Examination of Observations and Incident Rates for a Behavior Based Safety Program, Journal of Safety, Health and Environmental Research, Fall 2007, Vol 4., No. 3.
16. Groves W.A.,1 Grey A.B., O’Shaughnessy P.T., (2006). Surface Acoustic Wave Microsensor Array for Measuring VOCs in Drinking Water, J. Environ. Monit., 8, 932 – 941.
17. Groves W.A.,1 (2006). Personal Sampling System for Measuring Workplace Protection Factors for Gases and Vapors, Journal of the International Society for Respiratory Protection, Spring/Summer, 30-43.
18. Groves W.A.,1 Agarwal D, Chandra MJ, Reynolds SJ, (2005). A Fluorometric Method for Ammonia Analysis”, J. Environ. Monit., 1, 163 – 168.
19. Groves W.A.,1 Achutan C, (2004). Laboratory and Field Evaluation of a SAW Microsensor Array for Measuring Perchloroethylene in Breath, Journal of Occupational and Environmental Hygiene 1; 779-788.
20. Groves W.A.,1 Ramani R.V., Radomsky M.C., Flick J.P., (2004). An Analysis of PPE Guidelines Distributed to Emergency Responders at the World Trade Center and Pentagon Disaster Sites, Professional Safety, November; 31-41.
21. Groves W.A.,1 Reynolds S.J., (2003). Prototype Sampling System for Measuring Workplace Protection Factors for Gases and Vapors”, Appl Occup Environ Hyg, 18(5); 394-402.
22. Groves W.A.,1 Zellers E.T., (2001). Analysis of Solvent Vapors in Breath and Ambient Air with A Surface Acoustic Wave Sensor Array, Ann Occup Hyg, 45(8); 609-623.
23. Reynolds S.J., Groves W.A.,2 (2000). Effectiveness of Roll-Over Protective Structures in Reducing Farm Tractor Fatalities, Am J Prev Med, 18(4) (Supplement 1); 63-69.
24. Park J., Groves W.A.,2 Zellers E.T., (1999). Vapor Recognition with Small Arrays of Polymer-Coated Microsensors--A Comprehensive Analysis, Anal Chem, 71(17); 3877-3886.
25. Zellers E.T., Park J., Hsu T., Groves W.A,2 (1998). Establishing A "Limit of Recognition" For A Vapor Sensor Array, Anal Chem, 70:4191-201.
26. Groves W.A.,1 Zellers E.T., Frye G.C., (1998). Analyzing Organic Vapors in Exhaled Breath Using A Surface Acoustic Wave Sensor Array with Preconcentration -- Selection and Characterization of The Preconcentrator Adsorbent, Anal Chim Act, 371:131-43.
27. Groves W.A.,1 Zellers E.T., (1996). Prototype Instrument Employing a Microsensor Array for The Analysis of Organic Vapors in Exhaled Breath, Am Ind Hyg Assoc J, 57:1103-8.
28. Groves W.A.,1 Zellers E.T., (1996). Investigation of Organic Vapor Losses to Condensed Water Vapor in Tedlar® Bags used for Exhaled-Breath Sampling, Am Ind Hyg Assoc J, 57:257-63.
29. Groves W.A.,1 Hahne R.M., Levine S.P., Schork M.A., (1994). A Field Comparison of Respirable Dust Samplers, Am Ind Hyg Assoc J, 55:748-55.

1 Principal author 2 Co-author 3 Principal author’s supervisor

**ARTICLES PUBLISHED IN PROCEEDINGS**

1. Kecojevic V., Komljenovic D., Groves W.A.,2 “Risk analysis of equipment-related fatalities in U.S. mining operations”, 15th International Symposium on Mine Planning and Equipment Selection (MPES 2006), 19-22 September 2006; Torino, Italy.
2. Groves W.A.,1 Ramani R.V., Radomsky M.C., Flick J.P., “Personal Protective Equipment Guidelines for Emergency Responders”, Proceedings of the XVIIth World Congress on Safety and Health at Work, 18-22 September 2005; Orlando, FL.
3. Zellers E.T., Groves W.A.,2 Frye G.C. “Analyzing Organic Vapors In Exhaled Breath Using A SAW Sensor Array With Preconcentration”. Proceedings from the Electrochemical Society Meeting; 2 September 1997; Paris, France.

**PARTS OF BOOKS**

1. Groves, W. A. Surface Acoustic Wave (SAW)-Based Instrumentation for Field Detection of Gases and Vapors. In P. A. Smith & G. W. Cook (Eds.), Important Instrumentation and Methods for the Detection of Chemicals in the Field, 2nd Ed.
2. Groves W.A.,1 Surface Acoustic Wave (SAW) – Based Instrumentation for Field Detection of Gases and Vapors, Book Chapter, Important Instrumentation and Methods for Detection of Chemicals in the Field, American Industrial Hygiene Association (AIHA), Real-Time Detection Systems Committee.
3. Groves W.A.,1 “Sensors in the Measurement of Toxic Gases and Vapors in the Air”. In *Encyclopedia of Analytical Chemistry: Instrumentation and Applications*, R. A. Meyers (Ed.), John Wiley & Sons, 2000, pp. 4760-4783.

**NATIONAL COMMITTEE REPORTS**

1. National Research Council and Institute of Medicine. 2007. Agriculture, Forestry, and Fishing Research at NIOSH. Committee to Review the NIOSH Agriculture, Forestry, and Fishing Research Program. Rpt. No. 4. Reviews of Research Programs of the National Institute for Occupational Safety and Health. Washington, D.C.: The National Academies Press.

**RESEARCH REPORTS TO SPONSORS**

1. Groves, W.A., Kecojevic, V., Ghamari, M. AFC417-39 - A Holistic Approach to Reducing Coal Worker’s Pneumoconiosis (CWP) using Integrated Monitoring and Response Systems for Respirable Dust in Surface Mines and Facilities, Alpha Foundation, Interim Report Year One, June 30, 2018, 21 pages, PI.
2. Groves, W.A., Marpo, B. Effect of Sample Holder on Measurement of Organic Vapors using Sorbent Tubes, CDC/NIOSH/HELD, Final Report, submitted July 1, 2010, 31 pages, PI.
3. Groves, W.A., Development of Intervention Models, Hydro-One Corporation, Delivery of Software / Spreadsheet-Based Safety Intervention Tool, Final Conference June 21, 2010, PI.
4. Groves, W.A., Lin, Ming-I, “Physiologic Sampling Pump for Exposure Assessment”, Monthly Progress Reports, 1/06-9/07, PI.
5. Kecojevic, V, Groves, W.A., Risk Assessment for Equipment-Related Fatalities in Mining. Final Report. Sponsor: Western U.S. Mining Safety and Health Training and Translation Center / NIOSH. Submitted: 11/2007, Co-Investigator.
6. Groves, W.A., Reynolds SJ, “System for Measuring Workplace Protection Factors”, CDC/NIOSH, SERCA Grant 5K01 OH00177, Final Report, December 2003, PI.
7. Ramani, RV, Radomsky, MC, Flick, JP, Groves, WA, “A Compilation of Personal Protective Equipment Guidelines for Emergency Responders”, Final Report on Requisition Number 02NPTAT2201, National Personal Protective Technology Laboratory, CDC/NIOSH, May 2003, Co-Investigator.
8. Groves, W.A., Reynolds SJ, “System for Measuring Workplace Protection Factors”, CDC/NIOSH, SERCA Grant Annual Report, June 2001, 13 pp., PI.
9. Groves, W.A., Reynolds SJ, “System for Measuring Workplace Protection Factors”, CDC/NIOSH, SERCA Grant Annual Report, July 2000, 9 pp., PI.

**PAPERS PRESENTED AT TECHNICAL AND PROFESSIONAL MEETINGS**

1. W. Groves,1 B. Pullampally, Physiologically-Based Pharmacokinetic (PBPK) Modeling for Evaluating the Effect of Dermal Absorption of Vapors on the Measurement of Workplace Protection Factors (WPFs), American Industrial Hygiene Conference and Exposition (AIHCE), May 18, 2011, Portland, OR.
2. B. Marpoe, W. Groves,3 E. Lee, M. Harper, J. Slaven, Laboratory Comparison of Photo- Ionization Detector (PID) and Sorbent Tube Sampling for Measuring m-Xylene and n- Hexane, American Industrial Hygiene Conference and Exposition (AIHCE), May 17, 2011, Portland, OR.
3. W. Groves,3 E. Lee, M. Harper, J. Slaven, Effects of Sorbent Tube Sample Holders on Organic Vapor Measurements, B. Marpoe, May 7, 2010, Morgantown, WV
4. E. Lee, L. Lee, M. Flemmer, J. Slaven, M. Harper, M. Lin, W. Groves,2 A New Sampling Method Using Physiologic Sampling Pump, 2010 AIHCE, May 24, 2010, Denver CO
5. W. Groves,3 E. Lee, M. Harper, J. Slaven, Effects of Sorbent Tube Sample Holders on Organic Vapor Measurements, B. Marpoe, 2010 AIHCE, May 26, 2010, Denver, CO
6. M. Lin, W. Groves,3 A. Freivalds, E. Lee, M. Harper, Predicting Human Pulmonary Ventilation Using Artificial Neural Network, Human Factors and Ergonomics Society 54th Annual Meeting (HFES 2010), September 29, 2010, San Francisco, CA.
7. Pullampally B.J., Groves W.A.,3 "Effect of Dermal Absorption of Vapors on the Measurement of Workplace Protection Factors", Graduate Student Poster Session, 2008 American Industrial Hygiene Conference and Exhibition, Minneapolis, MN. June 1-4, 2008. Outstanding Poster Award, AIHA Exposure Assessment Committee.
8. Lin M, Groves W.A.,3 Freivalds A., Lee E., Harper M., Lee L., Slaven J., “Prediction of minute ventilation using a portable respiratory inductive plethysmograph (RIP) system and physiological characteristics”, Graduate Student Poster Session, American Industrial Hygiene Conference and Exposition; 2007 June 3-7; Philadelphia, PA.
9. Lin M., Groves W.A.,3 Freivalds A., Lee E., Harper M., Lee L., Slaven J., “Prediction of minute ventilation using a portable respiratory inductive plethysmograph (RIP) system and physiological characteristics”, Poster presented at the Twenty-second Annual Graduate Exhibition, 2007 March 25; Penn State University, University Park, PA.
10. Pullampally B.J., Groves W.A.,3 "Effect of Dermal Absorption of Vapors on the Measurement of Workplace Protection Factor for Respiratory Protective Equipment", Poster presented at the Twenty-second Annual Graduate Exhibition, 2007 March 25; Penn State University, University Park, PA.
11. Pullampally B.J., Groves W.A.,3 "Effect of Dermal Absorption of Vapors on the Measurement of Workplace Protection Factor for Respiratory Protective Equipment", EMS Graduate Student Council Poster Exhibition, 2007; Penn State University, University Park, PA.
12. Kecojevic V., Komljenovic D., Groves W.A.,2 “Risk analysis of equipment-related fatalities in U.S. mining operations”, 15th International Symposium on Mine Planning and Equipment Selection (MPES 2006), 19-22 September 2006; Torino, Italy
13. Groves W.A., 1 Ramani R., Radomsky M., Flick J. Compilation of PPE Guidelines for Emergency Responders. Poster presented at the World Safety Congress, 2005 September 20; Orlando, Florida.
14. Agraz-Boeneker R., Groves W.A.,2,3 Haight J.M. An Examination of Observations and Incidence Rates for a Behavior Based Safety Program, Graduate Student Poster Session, American Industrial Hygiene Conference and Exposition; 2005 May 21-26; Anaheim, CA.
15. Agraz-Boeneker R., Groves W.A.,2,3 Haight J.M. An Examination of Observations and Incidence Rates for a Behavior Based Safety Program, Poster presented at the Twentieth Annual Graduate Exhibition, 2005 March 20; Penn State University, University Park, PA.
16. Kamalakannan B., Groves W.A.,2,3 Freivalds A. Predictive models for estimating metabolic and physical workload based on individual’s recorded heart rate and physical characteristics.\*  Graduate Student Poster Session, American Industrial Hygiene Conference and Exposition; 2004 May 12; Atlanta, GA, \*Best Graduate Student Modeling Poster Award, AIHA Exposure Assessment Strategies Modeling Subcommittee
17. Kamalakannan B., Groves W.A.,2,3 Freivalds A. A protocol to correlate heart rate and work rate. Poster presented at the Nineteenth Annual Graduate Exhibition, 2004 March 28; Penn State University, University Park, PA.
18. Groves W.A.,1 Agarwal D., Chandra M., Reynolds J. Evaluation of a new fluorometric method for ammonia analysis in ambient air. American Industrial Hygiene Conference and Exposition; 2003 May 12; Dallas, TX.
19. Ramani R., Flick J., Radomsky M., Groves W.2 Review of PPE Guidelines from World Trade Center Events. RAND-NIOSH Health and Safety Guidelines for Emergency Workers Project Meeting, 2003 April 28; Washington, D.C.
20. Agarwal D.R., Chandra M.J., Reynolds S.J., Groves W.A.3 A fluorometric method for ammonia analysis in ambient air. Graduate Student Poster Session (505). American Industrial Hygiene Conference and Exposition; 2002 June 5; San Diego, CA.
21. Groves W.A.,1 Reynolds S.J. An integrated sampling system for measuring workplace protection factors for gases and vapors. American Industrial Hygiene Conference and Exposition; 2002 June 5; San Diego, CA.
22. Groves W.A.,1 Achutan P.C. Laboratory and field evaluation of a surface acoustic wave microsensor array for measuring perchloroethylene in breath. American Industrial Hygiene Conference and Exposition; 2000 May 23; Orlando, FL.
23. Reynolds S.J., Groves W.A.,2 Pesticide exposure assessment using a fluorescent dye/video imaging technique. 12th Annual Meeting of the North American Agro-medicine Consortium, Pesticide Exposure: Toxicology, Epidemiology, and Risk Assessment Session, 1999 September 27; Raleigh, NC.
24. Groves W.A.,1 Reynolds S.J., Dosemeci M., Prince J.R., Alavanja M.C. Validation of a dermal pesticide exposure assessment algorithm using video imaging--feasibility study and pilot project. American Industrial Hygiene Conference and Exposition; 1999 June 7; Toronto, Ontario.
25. Groves W.A.,2 Conrad C., Reynolds S.J. Development of a personal sampling system for measuring respirator workplace protection factors for ammonia in livestock production facilities. Fourth International Symposium: "Rural Health and Safety in a Changing World"; 1998 Oct 20; Saskatoon, Saskatchewan, Canada.
26. Wilson B.E., Groves W.A.,2 Reynolds S.J. Evaluation of operator exposure during in-field anhydrous ammonia applications. Fourth International Symposium: "Rural Health and Safety in a Changing World"; 1998 Oct 19; Saskatoon, Saskatchewan, Canada.
27. Groves W.A.,1 Reynolds S.J. Preliminary development and testing of a personal sampling system for measuring respirator workplace protection factors for gases and vapors. American Industrial Hygiene Conference and Exposition; 1998 May 14; Atlanta, GA.
28. Zellers E.T., Groves W.A.,2 Frye G.C. Analyzing organic vapors in exhaled breath using a SAW sensor array with preconcentration. Electrochemical Society Meeting; 1997 Sep 2; Paris, France.
29. Groves W.A.,1 Zellers E.T. Development of a surface acoustic wave microsensor array for measuring organic vapors in exhaled breath and ambient air -- selection and characterization of the preconcentrator adsorbent. American Industrial Hygiene Conference and Exposition; 1997 May 21; Dallas, TX.
30. Park J., Groves W.A.,2 Hsu T., Zhang G.Z., Zellers E.T. Developing a decision logic for designing microfabricated vapor sensor arrays. American Industrial Hygiene Conference and Exposition; 1997 May 22; Dallas, TX.
31. Frye G.C., Colburn C.W., Kottenstette R., Raman N.K., Brinker C.H., Groves W.A.,2 Zellers E.T. Coatings and sampling systems for trace detection of VOCs using saw sensors. Electrochemical Society Meeting, 1996, San Antonio, TX.
32. Zellers E.T., Groves W.A.2 Rapid analysis of organic vapors in exhaled breath using a SAW resonator array. Federation of Analytical Chemistry and Spectroscopy Societies (FACSS) Conference; 1995 Oct 17; Cincinnati, OH.
33. Groves W.A.,1 Zellers E.T. Use of a microsensor array to measure low-ppm concentrations of perchloroethylene, trichloroethylene, and methoxyflurane in spiked breath samples. American Industrial Hygiene Conference and Exposition; 1995 May 25; Kansas City, MO. (Selected best abstract/platform presentation.)
34. Groves W.A.,1 Zellers E.T. An investigation of organic vapor losses to condensed water vapor in Tedlar® bags used for exhaled-breath sampling. American Industrial Hygiene Conference and Exposition; 1994 May 26; Anaheim, CA.
35. Groves W.A.,1 Hahne R.M., Levine S.P., Schork M.A. A field comparison of respirable dust samplers. American Industrial Hygiene Conference and Exposition; 1993 May; New Orleans, LA.

1 Principal author 2 Co-author 3 Principal author’s supervisor

**PARTICIPATION IN SEMINARS, WORKSHOPS, ETC.**

1. Groves, W. A., Occupational Injury and Illness in the Gas and Oil Extraction Industry, Invited Presentation, Short Course, CNOOC Petroleum Geologists and Engineers, Friday January 18, 2013, Atherton Hotel, State College, PA
2. Groves W.A.,1 “Surface Acoustic Wave (SAW) Technology”, in Professional Development Course #705, Current Direct Reading Technology for Chemical, Biological, and Radiological Agents. American Industrial Hygiene Conference and Exposition, 2005 May 21-22; Anaheim, CA.
3. Groves W.A.,1 “Surface Acoustic Wave (SAW) Technology”, in Professional Development Course #704, Current Direct Reading Technology for Chemical, Biological, and Radiological Agents. American Industrial Hygiene Conference and Exposition, 2004 May 8-9; Atlanta, GA.
4. Groves W.A.,1 “Weapons of Mass Destruction-An Industrial Health and Safety Perspective”, Earth and Mineral Sciences Exhibition (EMEX), College of Earth and Mineral Sciences, Penn State University, March 29, 2003.
5. Groves W.A.,1 “Cutting Edge Technology for Gas and Vapor Detection--Selection and Operation of Portable Direct Reading Instruments”, Professional Development Course, American Industrial Hygiene Conference and Exposition, 2001 June 2; New Orleans, LA.
6. Groves W.A.1 “An Overview of Dust Toxicology and Exposure Assessment”, Fifth Annual Mining Health and Safety Seminar, 2000 November 8; Bedford, PA.
7. Groves W.A.,1 “Cutting Edge Technology – SAW, CHEMFET, and Biological Sensors, Selection and Operation of Portable Direct Reading Instruments”, Professional Development Course, American Industrial Hygiene Conference and Exposition, 2000 May 20; Orlando, FL.
8. Groves W.A.,1 “Development and Application of Instrumentation for Chemical Exposure Assessment”, Industrial Health and Safety Seminar; Department of Energy and Geo-Environmental Engineering; Pennsylvania State University; 1999, May 10; State College, PA.
9. Groves W.A.,1 Grey A.B., Lee J.A., O'Shaughnessy P.T., “Analysis of VOCs in Drinking Water Using a Surface Acoustic Wave Microsensor Array”, Occupational and Environmental Health Seminar, 1999 Mar 30; University of Iowa, Iowa City, IA.
10. Groves W.A.,1 Zellers E.T., “Development of A Surface-Acoustic-Wave Microsensor Array for Measuring Organic Vapors in Exhaled Breath and Air”, Occupational and Environmental Health Seminar; 1998 Apr 7; Institute for Rural and Environmental Health, Iowa City, IA.

**INVITED PRESENTATIONS**

1. Central Pennsylvania Safety Association (CPSA) and local sections of the American Industrial Hygiene Association (AIHA) and American Society of Safety Engineers (ASSE) Professional Development Conference, "Improving Industrial Hygiene Exposure Judgments using Bayesian Decision Analysis", Nittany Lion Inn, University Park, PA, April 6, 2016.
2. Groves, W.A.,1 Evaluating the Effectiveness of Respirators, Invited lecture – EME 590 Colloquium, April 2, 2009, Department of Energy and Mineral Engineering, College of Earth and Mineral Sciences, Penn State University, University Park, PA.
3. Groves, W.A.1 Workplace Protection Factors (WPFs) for Air Purifying Respirators –Measurement Challenges for Organic Vapors, Invited lecture - EHS 668 Professional Seminar in Occupational Health, April 10, 2009, University of Michigan School of Public Health, Ann Arbor, MI
4. Groves, W.A.1 Cutting Edge Technology for Organic Vapor Detection. Central Pennsylvania Safety Association, Professional Development Conference, Penn Stater Conference Center, 2006 April 6, University park, PA.
5. Groves W.A.1 Sensor Applications in Industrial Health and Safety. E Sc 514 / E Mch 514 Graduate Seminar, Penn State University, 2005 December 7, University Park, PA.
6. Groves W.A.,1 Ramani R., Radomsky M., Flick J. PPE for Emergency Responders. Personal Protective Equipment session. World Safety Congress, 2005 September 20; Orlando, Florida.
7. Groves W.A.,1 Reynolds S.J. An Integrated Sampling System for Measuring Workplace Protection Factors for Gases and Vapors. Exposure Assessment Branch, Health Effects Laboratory Division (HELD), NIOSH, 2004 July 23; Morgantown, WV.
8. Groves W.A.,1 Conrad C., Reynolds S.J. Sampling system for measuring respirator workplace protection factors for gases and vapors. Iowa-Illinois local section meeting of the American Industrial Hygiene Association, 1999 Feb 11; Iowa City, IA.

1 Principal author 2 Co-author 3 Principal author’s supervisor

**FUNDED PROJECTS, GRANTS, AND CONTRACTS**

**In Progress**

1. Alpha Foundation, A Holistic Approach to Reducing Coal Worker’s Pneumoconiosis (CWP) using Integrated Monitoring and Response Systems for Respirable Dust in Surface Mines and Facilities, Principal Investigator, $487,020, November 10, 2017.
2. NIOSH/CDC, Johns Hopkins NIOSH Education and Research Center Pilot Project, Evaluation of Airborne Hazards Associated with Harvesting, Storage, Transportation and Processing of Solid Biomass from Switchgrass and Miscanthus, Co-Principal Investigator (PI Dennis Murphy), $15,000, November 2015.

**Completed**

1. Effect of Sample Holder on Measurement of Organic Vapors using Sorbent Tubes, CDC/NIOSH/HELD, March 2009-September 2009, no-cost extension through September 2010, $43,163, Principal Investigator, completed 2010.
2. Development of Intervention Models, Hydro-One Corporation, August 1, 2008-July 31, 2010, $70,000, Principal Investigator, completed 2010.
3. Physiologic Sampling System for Exposure Assessment – Phase II, CDC/NIOSH/HELD, Contract, September 2006-August 2008, no-cost extension through 2009, $59,648, Principal Investigator.
4. Respirator Fit Testing, TSI Corporation, $10,000, Equipment donation for Industrial Hygiene Teaching Laboratory, January 2009.
5. Risk Assessment for Equipment-Related Fatalities in Mining, Western U.S. Mining Safety and Health Training and Translation Center, November 2006-October 2007, $35,000, Co-Investigator.
6. Physiologic Sampling System for Exposure Assessment – Phase I, CDC/NIOSH/HELD, Contract, January 2006-September 2006, $20,000 Principal Investigator.
7. System for Measuring Workplace Protection Factors, CDC/NIOSH Special Emphasis Research Career Award (SERCA), January 2000 – October 2003, $150,000, Principal Investigator.
8. A Fluorometric Method for Ammonia Analysis, Wilson Research Initiation Grant, College of Earth and Mineral Sciences, The Pennsylvania State University, May 2001-June 2002, $4,270, Principal Investigator.
9. Fluorescent Electronic Nose Finds Environmental Exposure, NIEHS, SBIR Phase I Grant, Submitted November 2000, $8,000, Consultant.
10. Field Evaluation of a Dermal Pesticide Exposure Assessment Algorithm, University of Iowa Environmental Health Sciences Research Center Pilot Grant Program, April 1998-March 1999, $14,870, Principal Investigator.
11. Analysis of Volatile Organic Contaminants in Drinking Water Using a Surface-Acoustic-Wave Microsensor Array, University of Iowa Center for Health Effects of Environmental Contamination Pilot Project, January 1998-December 1998, $19,772, Co-Principal Investigator.
12. Field Analysis of Perchloroethylene in Breath Using a Surface-Acoustic-Wave Microsensor-Based Instrument, University of Iowa Environmental Health Sciences Research Center Pilot Grant Program, April 1997-March 1998, $14,600, Principal Investigator.

**Proposed (declined)**

1. NETL / UCFER, "Measuring Methane Emissions for Natural Gas Gathering Pipelines, and For Plugged and Abandoned Oil and Gas Wells, Co-Principal Investigator" (Wang, PI), $475,000, September 2016.
2. Alpha Foundation, "Integrated Monitoring and Response Systems for Respirable Dust in Surface Mines and Facilities", Principal Investigator, $440,000, February 2016.
3. Smart Mines, Alpha Foundation for the Improvement of Mine Safety and Health, Inc., Antonio Nieto, PI, W.A. Groves, Co-PI, 10%, $592,000, 3/14/13.
4. Fully Integrated Modeling of Hydraulic Fracture Propagation, Fluid Cleanup and Long-term Gas Recovery in Shale Reservoirs, Co-Investigator, 2012 DOE RPSEA, $991,800, Co-Investigator
5. Risk Assessment of "Miscellaneous" Equipment -Related Fatalities in U.S. Mining, National Institute for Occupational Safety and Health Grant Program (R01), 9/08-8/11, $476,153, Co-Investigator.
6. Mine Disaster Prevention Through Systems Safety Analysis, Design and Engineering, National Institute for Occupational Safety and Health Grant Program (R01), 7/08-6/11, $568,582, Co-Investigator.
7. Penn State Industrial Health and Safety Program, CDC/NIOSH, Training Program Grant (TPG), July 2006-June 2011, $227,112, Co-Investigator.
8. A Novel Instrument for Measuring Workplace Protection Factors (WPFs) for Gases and Vapors, CDC/NIOSH, R01, 12/1/06-11/30/09, $438,111, Principal Investigator
9. Realistic Respirator Cartridge Breakthrough Testing, George H. Deike Research Grant Proposal, 2005-2007, $45,000, Principal Investigator.
10. IED Modeling and Simulation for the Development of Protective Structures, Navy Counter IED Basic Research Program, July 2005 – June 2008, $340,764, Co-Investigator.
11. Realistic Respirator Cartridge Breakthrough Testing, CDC/NIOSH, Investigator-initiated new grant (R01), December 2004 – November 2007, $576,994, Principal Investigator.
12. Fluorescent Electronic Nose Finds Environmental Exposure, NIEHS, SBIR Phase II grant, January 2005 – December 2007, $193,636, Co-Investigator.
13. Penn State Industrial Health and Safety Program, CDC/NIOSH, Training Program Grant (TPG), July 2005-June 2010, $227,112, Co-Investigator.
14. "Wireless Sensors for Exposure Assessment and Control", NIOSH/CDC, NIOSH Exploratory/Developmental Grant Program, Principal Investigator, $398,750, 10/1/04.
15. “Surface-Sensitive Laser Array Detects Breath Alcohol”, NIH/NIAAA SBIR Phase II Proposal, Co-Principal Investigator, collaboration with ARCOVA, $183,400, 12/17/04.

**Submitted Grants Involving the Scholarship of Learning**

1. EGEE 110 Safety Science – online version. Development of new e-course to enhance the 2012 EMS summer course offerings for resident student instruction, Office of the Associate Dean for Undergraduate Education and the John A. Dutton e-Education Institute, College of Earth and Mineral Sciences, $15,000 (in progress 2012).
2. “Breathing Machine for Realistic Respirator Cartridge Breakthrough Testing”, National Instruments Student Partnership Program, $500; 2006.
3. "Penn State Industrial Health and Safety Program", Training Program Grant - Grants for Education Programs in Occupational Safety and Health, CDC/NIOSH, $47,544, Co-Principal Investigator, submitted 7/1/04 (declined-resubmitted).
4. "President's Fund for Research.", support for engaging undergraduate students in research, EMS, Principal Investigator, $600 (completed).
5. "IHS 445 Industrial Hygiene and Toxicology", InSPIRE Academy Application, Schreyer Institute for Teaching Excellence, $2,750 (completed)
6. “Implementation of Inquiry- and Creativity-Based Activities in Undergraduate Industrial Health and Safety Courses using Web-Based Content”, Gladys Snyder Education Grant, $4,900, submitted 7/2/05 (declined).

**GRADUATE THESES SUPERVISED, TYPE OF DEGREE, AND YEARS GRANTED**

**PhD (Completed)**

*The Pennsylvania State University*

1. Ming-I Lin, “Physiologic Sampling Pump for Exposure Assessment”, Admitted to the Industrial Engineering PhD Degree program in Fall 2004. Completed degree requirements 12/09. Co-advised with Dr. Andris Freivalds, Professor of Industrial and Manufacturing Engineering.

**MS (Completed)**

*The Pennsylvania State University*

1. James Gazza, “Characterization of airborne ozone concentrations in a bottled water manufacturing facility”. Completed MS degree May 2013.
2. Brian Marpoe, “Effects of Sample Holders on Activated Carbon Sorbent Tubes When Measuring Organic Vapor Concentrations”. Degree completed August 2, 2010.
3. Sunghae Park, “A Comparison of Regression Models for Incident Rate Prediction in a Canadian Power Company”, Degree completed July 22, 2010.
4. Bob Pullampally, “Effect of Dermal Absorption of Vapors on the Measurement of Workplace Protection Factors for Respiratory Protective Equipment”, 2007.
5. Remigio Agraz-Boeneker, “An Examination of Observations and Incidence Rates for a Behavior-Based Safety Program”, 2005. Admitted to the Industrial Health and Safety MS Degree program in Fall 2003.
6. Balaji Kamalakannan, “A Protocol for Estimating Employee Work Rate Based on Recorded Heart Rate for Employees Wearing Respirators”, 2004. Admitted to the Industrial Engineering MS Degree program in Fall 2002. Advised with Dr. Andris Freivalds, Professor of Industrial and Manufacturing Engineering.
7. Divya Agarwal, “A Fluorometric Method for Ammonia Analysis”, 2004. Admitted to the Industrial Engineering MS Degree program in Fall 2001. Advised with Dr. M. Jeya Chandra, Professor of Industrial and Manufacturing Engineering.

*University of Iowa*

1. Alexis B. Grey, “Development of a Surface-Acoustic-Wave Microsensor Array for Measuring Volatile Organic Compounds in Drinking Water”, MS Thesis, Industrial Hygiene, published July 1999.

**MEMBERSHIP ON GRADUATE DEGREE CANDIDATE’S COMMITTEES**

**PhD (Completed)**

*University of Iowa*

1. Harisha Kinilakodi, Development and Application of the Safe Performance Index as a Risk-Based Methodology for Identifying Major Hazard-Related Safety Issues in Underground Coal Mines, Energy and Mineral Engineering, September 2012.
2. P. Chandran Achutan, “Evaluation of solanesol as a marker for environmental tobacco smoke in indoor environments”, Industrial Hygiene, Fall 2001.
3. James M. Starr. “Investigation of potential exposure to aflatoxin B₁ in soil and soil dust using SFE and ES-API/HPLC”, Occupational and Environmental Health, Spring 1998.

*The Pennsylvania State University*

1. Safa Eslambolchi, PE, “Analysis of The Changes in The Operational Structures and Safety Measures of U.S. Underground Coal Mines Across Different Mine-Size Categories”, PhD Program, August 18, 2016

**MS (Completed)**

*The Pennsylvania State University*

1. Mevlut Furkan Mol, “Analyzing Particulate Emissions Caused by Disposal and Transportation of Drill Cuttings From Marcellus Shale Wells In Pennsylvania”, MS degree, December, 2018.
2. Bruno Muncher, "Economic Assessment and Mine Production Optimization of an Open-Pit Gold Mine Operation in Peru, Based on the Iterative Cutoff Grade Analysis Approach", MS Degree, February 2016.
3. Firdevs Illci, " Detailed Characterization and Hazard Level Analysis of the Ambient Fine and Ultrafine Particulate Mixture at a Construction Site", M.S. in Energy and Mineral Engineering November 4, 2015.
4. Jason York, "Evaluating the Performance and Accuracy of Forecasting Incident Rates for Mining Operations", M.S. in Energy and Mineral Engineering, October 1, 2015.
5. Mariya Skocik, "Effects of Spatial Heterogeneity on Calcite Dissolution Rates Energy and Mineral Engineering", Energy and Mineral Engineering, March 2104.
6. Megan Orsulak, Risk and Cost Analysis of Safety Violations in Pennsylvania Coal Mines, MS in Mining Engineering, April 23, 2010.
7. Abdul Majeed Aziz, Modeling the CO2 Footprint of the U.S. Coal Mining Industry and the Potential Economic Costs of CO2 Legislation, MS in Petroleum & Mineral Engineering with Option in Mining and Mineral Process Engineering, December 2009.
8. Md Nor Zainalabidin, “Risk Assessment and Management for Equipment-Related Fatalities”, Mining Engineering, 2007
9. Ruben Andres Terrazas Prado, “Multi-Attribute Fuzzy Methodology for the Selection of a Mining Shovel”, Mining Engineering Program, Spring 2007.
10. Jae Hoon Lee, “The Study of Relationships Between Safety Culture and a Safety Program”, Industrial Health and Safety Program, M.S., Spring 2007.
11. Abdullah AL-Mutairi, “Loss prevention forecasting through artificial neural networks”, Industrial Health and Safety Program, M.S., Spring 2006.
12. Andrew B. Seal, “An evaluation of task-based noise-exposure assessment methods for the reduction of hazardous noise exposures of underground coal miners”, Environmental Pollution Control, Spring 2001.

*University of Iowa*

1. Stanislav S. Borin, Description and analysis of environmental factors affecting sick building syndrome in a study of six office buildings in the Midwestern United States”, Industrial Hygiene, Spring 1999.
2. Brock E. Wilson, “Evaluation of operator exposure during in-field anhydrous ammonia applications”, Industrial Hygiene, Spring 1998.

**RECORD OF MEMBERSHIP IN PROFESSIONAL SOCIETIES**

1. American Conference of Governmental Industrial Hygienists Member 1998-present
2. American Industrial Hygiene Association  Member 1989-2017
3. American Academy of Industrial Hygiene Member 1990-2012
4. American Society of Safety Engineers Member 1998-present
5. Central Pennsylvania Safety Association (CPSA) Member 2016-present

**RECORD OF COMMITTEE WORK**

1. College of Earth and Mineral Sciences Faculty Advisory Committee (FAC), 2008-2011.
2. Dept. of Energy and Mineral Engineering Promotion and Tenure Committee, 2009-2011.
3. Dept. of Energy and Mineral Engineering Search Committee, Mining Program Faculty Openings, 2008-present.
4. Dept. of Energy and Mineral Engineering Search Committee, Environmental Health and Safety Engineering Faculty position, 2009-2010.
5. Dept. of Energy and Mineral Engineering Recruiting Committee, 2008-present.
6. General Clinical Research Center Advisory Committee (GCRCAC), 2007-2008.
7. Graduate Education and Research Committee, Department of Energy and Geo-Environmental Engineering, 2000-2008.
8. Strategic Planning Committee, Department of Energy and Geo-Environmental Engineering.
9. Petroleum and Mineral Engineering Program Committee, Department of Energy and Geo-Environmental Engineering, 2004-2006.
10. Interdisciplinary Research Committee, Department of Energy and Geo-Environmental Engineering, 2004.

**RECORD OF ADMINISTRATIVE SUPPORT**

1. Program Chair, Environmental Systems Engineering Program, Department of Energy and Mineral Engineering, 2017-present
2. Chair, Environmental Systems Engineering Faculty Search Committee, Department of Energy and Mineral Engineering, 2017-2018.
3. Graduate Program Chair, Industrial Health and Safety (IHS) MS Degree Program, 2002-2007.

**LABORATORY RENOVATION / DESIGN**

1. Supervised design and renovation of one IHS research laboratory (229 Hosler) and the IHS Teaching Laboratory (130 Hosler). Completed 2002.

**OTHER SERVICE**

1. Judge for Annual Graduate Exhibition, April 2003, March 2005.
2. Participated in TOTEMS Move-in Day, assisted College of Earth and Mineral Sciences freshmen moving into dorms, Fall 2003, 2005.
3. Girls Utilizing Technology and Science (GUTS), Introduction to Industrial Health and Safety Measurements, 20 students, 90-minute session, July 2003.
4. State College High School Visit, Learning to Count Asbestos Fibers, 23 Students, 2-40-minute sessions, March 2002.
5. Earth and Mineral Sciences Exhibition (EMEX)
6. College of Engineering Open House, EGEE Booth, October 2001.

**SERVICE TO THE PROFESSION**

**Participation on National Committees**

1. Member, Independent Committee to Review the NIOSH Agriculture, Forestry, and Fishing Research Program, May 31-June 2, 2012, Washington, D.C.
2. Member, American Society of Agricultural and Biological Engineers (ASABE) X607 Development Committee, Fan Ventilation of Confined-Space Manure Storage for Safe Entry, 2008-present.
3. Member, Committee to Review the NIOSH Agriculture, Forestry, and Fishing Research Program, National Research Council, The National Academies, Washington, D.C., December 2006 – 2008.

**Board of Directors**

1. Elected to American Conference of Governmental Industrial Hygienists (ACGIH) Board of Directors, 2016. Serving three-year term as Director, 2016-2018.

**Reviewer for Refereed Journals**

1. The American Industrial Hygiene Association Journal
2. The Analyst, Royal Society of Chemistry
3. Journal of Environmental Monitoring
4. Applied Occupational and Environmental Hygiene
5. Journal of the International Society for Respiratory Protection
6. Journal of Occupational and Environmental Hygiene
7. Lab on a Chip
8. Chemical Communications
9. Analytica Chimica Acta
10. Fuel Processing Technology

**Editorial Review Board Member**

1. Journal of Occupational and Environmental Hygiene, 2003 – present.
2. Journal of the International Society for Respiratory Protection, 2003 – 2013

**Certification Review Board Member**

1. Certified Mine Safety Professional Certification Board (CMSPCB), 2004-2012.

**External Advisory Board**

1. NIOSH Research Grant (R01), “Respiratory Protection against bioaerosols in agriculture”, Tiina Reponen, PI, University of Cincinnati, Cincinnati, OH. 2007-2009.

**ABET Commission Member**

1. AIHA Alternate Member of the ABET Applied Science Accreditation Commission (ASAC), 2105-2017.

**ABET Program Evaluator**

1. ABET Applied Sciences Accreditation Committee (ASAC), Industrial Hygiene Program Evaluator (PEV), Air Force Institute of Technology, Wright-Patterson AFB, OH, October 18-20, 2015.
2. ABET Applied Sciences Accreditation Committee (ASAC), Industrial Hygiene Program Evaluator (PEV), University of North Florence, AL, October 12-14, 2014.
3. ABET Applied Sciences Accreditation Committee (ASAC), Industrial Hygiene Program Evaluator (PEV), Colorado State University, Fort Collins, CO, November 17-19, 2013.
4. ABET Applied Sciences Accreditation Committee (ASAC), Industrial Hygiene Program Evaluator (PEV), University of Cincinnati, Cincinnati, OH, October 14-16, 2012.
5. ABET Applied Sciences Accreditation Committee (ASAC), Industrial Hygiene Program Evaluator (PEV), University of Oklahoma Health Sciences Center Site Visit, Oklahoma City, OK, October 9-11, 2011.
6. ABET Applied Sciences Accreditation Committee (ASAC), Industrial Hygiene Program Evaluator (PEV), Montana Tech Site Visit, Butte, MT, October 23-27, 2010.
7. ABET Program Evaluator (PEV) Training, June 19-20, 2010, Louisville, KY.
8. ABET Site Visitor (observer), University of Southern Florida, Industrial Hygiene Program, October 7-9, 2007.
9. Nominated to ABET Program Evaluator Program (PEV), AIHA, Industrial Hygiene, 2006

**Book Reviews**

1. "Practical Guide to Respirator Usage in Industry", Second Edition, by G.S. Rajhans and B. P. Pathak, published by Butterworth Heinemann. Reviewed for the American Society of Safety Engineers (ASSE) technical publications group, 2004.

**Papers Reviewed for Award**

1. NIOSH Alice Hamilton Award, Engineering Controls Category, Reviewer, 2017.
2. NIOSH Alice Hamilton Award, Engineering Controls Category, Reviewer, 2016.

**External Reviewer - Software**

1. CDC/NIOSH EVADE 2.0 Software Program, November 2016.

**Peer Reviewer of Grants**

1. Ad-Hoc member, NIOSH / CDC Occupational Health Study Section, Chicago, IL, October 31-November 1, 2017.
2. Ad-Hoc member, NIOSH / CDC Occupational Health Study Section, Alexandria, VA, June 20-21, 2017.
3. NIOSH / CDC Review Panel, “State Occupational Health and Safety Surveillance (SBS) PAR-14-275", Alexandria, VA, December 2-4, 2014.
4. USDA-SBIR Air, Water and Soils Program, 2013
5. NIH/NIEHS Study Panel, Limited Competition: Planning Grants for Hubs of Interdisciplinary Research and Training in Global Environmental and Occupational Health (GEOHealth) (P20), June 24-26, 2012, Raleigh-Durham, NC.
6. DOE-SBIR-STTR Energy Efficiency and Renewable Energy (EERE), 2012
7. U.S. Dept. of Agriculture Small Business Innovation Research (SBIR) program, Revision of Phase I SBIR Proposal, “Field Detection and Quantification of Pesticides in Agricultural Runoff”, 2011.
8. Special Emphasis Panel/Scientific Review Group 2010/01 ZOH1, State-based occupational safety and health surveillance, Centers For Disease Control & Prevention, National Institute for Occupational Safety and Health, Office of Extramural Programs, 12/03/2009-12/04/2009, Alexandria, VA.
9. U.S. Dept. of Agriculture Small Business Innovation Research (SBIR) program, Phase I SBIR Proposal, “Field Detection and Quantification of Pesticides in Agricultural Runoff”, 2009.
10. South Carolina Experimental Program to Stimulate Competitive Research (EPSCoR) and Institutional Development Awards (IDeA) programs, “"Novel Multi-Dimensional Sensors for the Analysis of Human VOCs", 2008.
11. DOE SBIR Phase I Proposal 49a-83015, "Monitor for NAPL Plume Tracking", 2007.
12. DOE SBIR Phase II Proposal 76321-II, " Sonde Deployable Carbon Dioxide Sensor", 2005.
13. Penn State University, College of Earth and Mineral Sciences, Wilson Research Initiation Grant, 2002.
14. Department of Energy (DOE) Laboratory Technology Research (LTR) program managed by the Office of Science, 2001.
15. Internal Grants Program, Deep South Center for Occupational Health and Safety (NIOSH/CDC), School of Public Health, University of Alabama at Birmingham, Birmingham, AL, 2001.

**Active Participation in Professional Societies**

**American Industrial Hygiene Association (AIHA)**

1. Member, Real Time Detection Systems Committee (formerly Gas and Vapor Detection Systems Committee), 2006-2017.
2. Member, AIHA / ABET Academic Accreditation Committee, 2006-2017.
3. Session Arranger, Real Time Detection Systems, Real-Time Detection Systems Committee, AIHCE, June 1-5, 2015, Salt Lake City, UT.
4. Session Arranger, Real Time Detection Systems, Real-Time Detection Systems Committee, AIHCE, May 31-June 5, 2014, San Antonio Texas
5. Session Arranger, Field Detection, Sampling and Analysis: Real Time Detection Systems, Real-Time Detection Systems Committee, AIHCE, May 18-23, 2013, Montreal, QE, CA
6. Session Arranger, PO 35 Field Detection, Sampling and Analysis: Real Time Detection Systems, Real-Time Detection Systems Committee, AIHCE, June 16-21, 2012 (session arranging begins November 2011), Indianapolis, IN.
7. Session Arranger, PO 111 Field Detection, Sampling and Analysis: Real Time Detection Systems, Real-Time Detection Systems Committee, AIHCE, May 18, 2011, Portland, OR
8. Poster Session Judge, Real Time Detection Systems Committee, AIHCE May 2011, Portland, OR.
9. Session Arranger, PO 12B Field Detection, Sampling and Analysis: Real Time Detection Systems, Real-Time Detection Systems Committee, AIHCE 2011 May 14-19 (session arranging begins November 2010).
10. Session Moderator, PO 113 Real-Time Detection, Real Time Detection Systems Committee, AIHCE 2010, Tuesday, May 25, 2010, Denver, CO.
11. Session Arranger, PO 113 Real Time Detection, Real Time Detection Systems Committee, AIHCE 2010, Tuesday May 25, 2010, Denver CO.
12. Poster Session Judge, Real Time Detection Systems Committee, AIHCE May 2010, Denver, CO.
13. Session Arranger, PO13 Real Time Detection, Real Time Detection Systems Committee, AIHCE 2010, Tuesday May 25, 2010, Denver CO (session arranged in Fall 2009).
14. Session Moderator, PO 233 Modern Real-Time Tools for Greatly Improved Exposure Assessment Quality, Real Time Detection Systems, AIHCE 2009, Tuesday, June 2, 2009, Toronto, ON Canada.
15. Session Moderator, PO 133 Field Detection and Analysis, Real Time Detection Systems, AIHCE 2009, Wednesday, June 3, 2009, Toronto, ON Canada.
16. Poster Session Judge, Real Time Detection Systems Committee, AIHCE 2009, Toronto, ON Canada.
17. Co-Instructor for Gas and Vapor Detection Systems Committee Professional Development Course #705, Current Direct Reading Technology for Chemical, Biological, and Radiological Agents. American Industrial Hygiene Conference and Exposition, 2005 May 21-22; Anaheim, CA.
18. Co-Instructor, Gas and Vapor Detection Systems Committee Professional Development Course #704, Current Direct Reading Technology for Chemical, Biological, and Radiological Agents. American Industrial Hygiene Conference and Exposition, 2004 May 8-9; Atlanta, GA.
19. 2003 American Industrial Hygiene Conference and Exhibition, Professional Development Course Technical Auditor, “Validation of Industrial Hygiene Air Sampling and Analysis Methods”.
20. 2002 American Industrial Hygiene Conference and Exhibition, Gas and Vapor Detection Systems Committee, Judge for Outstanding Technical Session Presentation Award.
21. Gas and Vapor Detection Systems Committee, Corresponding member, 2002-2005.
22. 2001 American Industrial Hygiene Conference and Exhibition, Gas and Vapor Detection Systems Committee, Judge for Outstanding Technical Session Presentation Award.
23. Co-Instructor for Gas and Vapor Detection Systems Committee Professional Development Course, American Industrial Hygiene Conference and Exposition, 2001 June 2; New Orleans, LA.
24. 2001 American Industrial Hygiene Conference and Exhibition, Technical Reviewer/Judge for combined Gas and Vapor Detection Systems, Aerosol Technology, Air Sampling Instruments, and Sampling and Laboratory Analysis Committees Poster Session.
25. Gas and Vapor Detection Systems Committee, Immediate Past-Chair, 2001-2002.
26. Gas and Vapor Detection Systems Committee, Chair, 2000-2001.
27. 2000 American Industrial Hygiene Conference and Exhibition, Gas and Vapor Detection Systems Committee Roundtable Co-Organizer, “Tomorrow’s Cutting-Edge Technology for Gas and Vapor Detection in Industrial Hygiene”.
28. Gas and Vapor Detection Systems Committee, Vice-Chair, 1999-2000.
29. 1998 American Industrial Hygiene Conference and Exhibition, Professional Development Course Technical Auditor, “Selection and Operation of Portable Direct Reading Instruments”.
30. 1998 American Industrial Hygiene Conference and Exhibition, Gas and Vapor Detection Systems Committee Roundtable Co-Chair, Co-Organizer, “Bridging the Gap: Translating Gas and Vapor Detection Needs to Reality”.
31. 1997 American Industrial Hygiene Conference and Exhibition, Gas and Vapor Detection Systems Committee Roundtable Co-Organizer, “Chemical Instrumentation of the 21st Century”.
32. American Industrial Hygiene Association, Gas and Vapor Detection Systems Committee, Secretary, 1997-1999.
33. American Industrial Hygiene Conference and Exhibition, Gas and Vapor Detection Systems Committee Technical Session Co-Chair, Co-Arranger, 1995-1997.

**DESCRIPTION OF NEW ACADEMIC PROGRAMS DEVELOPED**

1. *M.S. Degree Program in Industrial Health and Safety:* Developed in 2001 with the proposal submitted to the Graduate School in the Fall of 2001. This new degree program will provide graduate training in Industrial Health and Safety (IHS) with an emphasis on the engineering aspects of this discipline. The M.S. graduate program is complementary to the existing undergraduate Industrial Health and Safety program and provides flexible and varied alternatives for students seeking additional training and research experience in the field of health and safety. The program is designed to provide a fundamental core of course-based IHS training while allowing for specialization in related areas through the selection of relevant elective courses and a research project.

Students completing the requirements for the Master’s degree will have demonstrated competency in the core areas of industrial health and safety and an ability to function at a professional level. Core competency will be acquired through completion of coursework in occupational safety and health, and through participation in a capstone course examining contemporary issues in the field of IHS. Integrative and collaborative skills will be developed through the completion of team projects, the development of written and oral presentations, and the completion of the master’s research project and thesis. Specialization and a broader understanding of how IHS fits into the larger context of engineering and other disciplines will be achieved through the selection of a cohesive set of elective courses.

**DESCRIPTION OF NEW ACADEMIC COURSES DEVELOPED**

1. *IHS 447 – Industrial Hygiene Measurements (4 credits)*: Developed and taught for the first time in Fall of 2000 (as IHS 497A). IHS 447 is a core-course for the undergraduate IHS program which can also be taken by graduate students for credit. This course provides an overview of the most common industrial hygiene measurement techniques used to evaluate exposure to chemical, physical, and biological agents in the workplace. The course is a combination lecture / laboratory consisting of classroom presentation of theory relevant to industrial hygiene sampling and analytical techniques followed by laboratory exercises providing opportunities to apply theory and gain hands on experience with the instrumentation commonly employed in industrial hygiene practice.

2. *IHS 510 – Occupational Health (3 credits):* Developed in 2001 and submitted with the IHS M.S. degree program proposal in Fall of 2001. IHS 510 is a core-course for graduate students in the MS degree program and was taught for the first time in the Fall of 2004. This course provides an introduction to Occupational Health with an emphasis on practical aspects that can be applied by Industrial Health and Safety professionals. Topics include the history of occupational health in the U.S., general concepts and definitions, a description of the roles of different occupational health professionals, a review of hazardous workplace exposures, occupational disorders by organ system, and recognition and prevention of occupational disease.

3. *EME 510 – Health and Safety Engineering (3 credits):* Developed in 2008 and offered for the first time in Spring 2009, this course was designed to replace IHS 510-Occupational Health which was a core-course for the IHS MS Degree Program. After the closing of the IHS MS Degree Program which was first replaced by a graduate degree in Petroleum and Mineral Engineering (PME) with an option in IHS, and later the department-wide Energy and Mineral Engineering (EME) graduate degree with an option in Environmental Health and Safety Engineering (EHSE), it was desired that an engineering focused core course be developed to replace IHS 510 Occupational Health. This course focuses on Process Safety Management and includes coverage of Source Models, Exposure Models, Toxic Release and Dispersion Models, and Ventilation Control of exposures to chemical hazards.

4. *EGEE 110 – Safety Science (3 credits):* Developing online version of this successful general education course for delivery in Summer 2012. Environmental Health and Safety is an applied field that draws on many disciplines including engineering, science, psychology, statistics, and management fields. For an understanding of how humans interact with their working and living environment, one has to understand the basic sciences of physics, biology, chemistry, mathematics and psychology as well as traditional engineering disciplines. The proposed online version of the general education course EGEE 110 is intended to provide students with a basic understanding of how these science and engineering principles can be applied to environmental health and safety problems in everyday life.

**DESCRIPTION OF NEW METHODS OF TEACHING**

**ESTABLISHED COURSES**

*1. IHS 445 – Industrial Hygiene and Toxicology (3 credits):* This IHS undergraduate core-course was revised and updated in the Spring of 2000. The objective of the course is to provide an introduction to the fields of industrial hygiene and toxicology including the recognition, evaluation, and control of workplace exposures to chemical, physical, and biological agents, and the toxicological effects these different agents on the body’s organ systems.

*2. IHS 440 – Industrial Ventilation (3 credits):* This IHS undergraduate core-course was revised and updated for offering in the Spring of 2002. Course content includes an introduction to the use of ventilation for the control of industrial contaminants. Measurements used to evaluate system performance, and the design and operation of different types of ventilation systems including isolation, local exhaust, and dilution are examined and demonstrated in lectures and laboratories.

*3. IHS 520 - Contemporary Issues in Industrial Health and Safety (3 credits*): This course provides students majoring in Industrial Health and Safety an overview of approaches to evaluating the industrial environment, including industrial processes, hazards, labor, and corporate structure, so that hazard control programs and feasible implementation plans can be formulated. The course consists of: (1) presentations by faculty and students on specific topics in industrial health and safety, (2) visits to several different industrial sites, and (3) preparation of individual written reports.

*4. IHS 450 – Environmental Health and Safety (3 credits*): This course provides an overview of toxicology, exposure assessment, industrial hygiene, environmental laws, and contemporary issues in environmental health and safety. IHS 450 was originally a core-course for the undergraduate IHS degree program and will become a required course for the Environmental Systems Engineering degree program. Environmental health and safety is a segment of public health that encompasses assessing, understanding, and controlling the impact of people on the environment and the impacts of the environment on people. This course will provide a broad overview of environmental health and safety topics selected to prepare students for professional health and safety practice, and to introduce students from other disciplines to important concepts that will increase understanding of the numerous and complex interactions we have with our environment.