

SCERC Annual Summary Report

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SCERC Summary

The Southern California Education and Research Center (SCERC) is located at the University of California, Los Angeles (UCLA) and the University of California, Irvine (UCI). The SCERC represents a coordinated, interdisciplinary set of professional education, continuing education, research and outreach activities that have had and will have a positive impact on the region's and nation's occupational health and safety practice. The administrative and planning and evaluation core and three of the four training programs are based at UCLA, including Industrial Hygiene (IH), Occupational and Environmental Health Nursing (OEHN), and Continuing Education (CE). The administrative core includes the Outreach and Pilot Project (PP) programs which function across both campuses. The Occupational Medicine Residency (OMR) is based at UC Irvine. The Targeted Research Training (TRT) program is jointly administered between UCLA and UCI. The TRT program focuses on work organization research and occupational epidemiology, the latter organized in collaboration with the epidemiology and public health programs at UCLA and UCI. CE, Outreach, PP and the TRT programs cut across the academic training programs and other allied occupational health- and safety-related disciplines. Degrees offered by ERC programs include MPH, MSc, MSN, PhD, DrPH, and OM residency certificates.

The ERC operates in concert with the UCLA and UCI Centers for Occupational and Environmental Health (COEH). These are state supported centers for research and teaching in occupational safety and health. Together the ERC and COEH represent a unique and effective partnership between state and federal funding.

The major goals of the SCERC are to: 1) educate professionals in the various disciplines of occupational safety and health (OSH), 2) provide continuing education to OSH professionals, 3) facilitate OSH activity through outreach to regional institutions and organizations, 4) foster OSH research, 5) provide OSH expertise to organizations and agencies in need, 6) facilitate marshaling of community resources to address and solve OSH problems, 7) respond through educational programs and research to the changing nature of OSH problems, and 8) educate stakeholders including business, labor, and vulnerable worker populations. The SCERC is significant in that it serves a heavily populated region with a diverse workforce in need of trained OSH professionals.

Relevance

The regional need for training in occupational health is particularly great because of the large population and concentration of industry in Southern California. California is the most populous state in the nation and is a leader in virtually every measure of agricultural and industrial production. Our center addresses that need by educating professionals and academic leaders in the fields of occupational medicine, industrial hygiene, occupational health nursing, and occupational epidemiology through academic programs and continuing education; conducting research in occupational health and safety and related areas; providing outreach and resources to educational and professional organizations, and by educating non-academic stakeholders including business, labor, and vulnerable worker populations.

Key Personnel

Table1. Southern California Education and Research Center key personnel

Name	SCERC Role	Email	Phone Number
Baker, Dean	Dep Ctr Dir, PD TRT	dbaker@uci.edu	949-824-8641
Ben-Levi, Cass	PD CE & Outreach	cbenlevi@ucla.edu	310-890-4066
Boomus,	PD OM	cboomus@uci.edu	949-824-5170
Krause, Niklas	PI, Ctr Dir, PD PPRT	niklaskrause@ucla.edu	310-562-6243
Que Hee, Shane	PD IH	squehee@ucla.edu	310-206-7388
Robbins, Wendie	PD OEHN	wrobbins@sonnet.ucla.edu	310-825-8999

ERC Website

<https://erc.ucla.edu/>

Highlights and Accomplishments

A. Industrial Hygiene Program

This is a summary of the students' and faculty' major accomplishments.

Scholarships and Fellowships

Two masters students were awarded with scholarships or fellowships. Ivan Torres (2nd year MS student) received the Southern California/Orange County Sections American Industrial Hygiene Association Scholarship 2017. Diana Nguyen (1st year MPH Student) and Jimmy Phong (2nd year MPH student), received Tony Norton Memorial Fellowship 2017.

Students' Project Awards

Ivan Torres (2nd year MPH student) was awarded with the American Society of Safety Engineers Foundation Rixio Medina & Assoc Hispanics in Safety; California Certified United Program Agency Student Project Award 2017

Presentations

1. **Song J**, Que Hee S. Comparison of permeation of 2-butoxyethanol through single, double, and triple layers of disposable nitrile gloves. American Industrial Hygiene Conference & Exposition, June 5-7, 2017 (poster). She received an award from the Personal Protection Committee.
2. **Yu N**. Shu S, Lin Y, Zhu Y. Measuring and reducing fine and ultrafine particles inside Los Angeles taxis. AIHce conference, Seattle WA, June 4-7, 2017 (Poster). She received the Aerosol Committee award.

Publications

Student (bolded)/faculty (underlined) publications that impacted peer-reviewed Journals.

1. Lin Y, Qiu X, **Yu N**, Yang Q, Araujo JA, Zhu Y. Urinary metabolites of polycyclic aromatic hydrocarbons and the association with lipid peroxidation: A biomarker-based study between Los Angeles and Beijing. *Environmental Science & Technology*. 2016 Apr 05;50(7):3738-45. PubMed PMID: 26913796. Epub 2016/02/26. eng.
2. **Mathews AR**, Que Hee SS. Quantitative leak test for microholes and microtears in whole gloves and glove pieces. *Polym. Test*. 2016 Sep; 54:244–249.
3. **Mathews AR**, Que Hee SS. Whole glove permeation of cyclohexanol through disposable nitrile gloves on a dextrous robot hand and comparison with the modified closed-loop ASTM F739 method 1. no fist clenching. *Journal of Occupational and Environmental Hygiene*. 2017 Apr;14(4):243-51. PubMed PMID: 27754775. Epub 2016/10/19. eng.
4. **Mathews AR**, Que Hee SS. Whole glove permeation of cyclohexanol through disposable nitrile gloves on a dextrous robot hand: Fist clenching vs. non-clenching. *Journal of Occupational and Environmental Hygiene*. 2017 Apr;14(4):252-7. PubMed PMID: 27754818. Epub 2016/10/19. eng.
5. **Banaee S**, **S SQH**. Permeation of limonene through disposable nitrile gloves using a dextrous robot hand. *Journal of Occupational Health*. 2017 Mar 28;59(2):131-8. PubMed PMID: 28111415. Pubmed Central PMCID: PMC5478526. Epub 2017/01/24. eng.

Faculty, Student and SCERC Involvement in EHSentials 2017

EHSentials 2017 UCLA, A Symposium devoted to the Latest EHS Trends, issues, strategies, and solutions affecting Healthcare Facilities Today, Covell Commons, May 11 2017. Co Sponsored by the UCLA IH Program, Kaiser Permanente and BSI. Professors Que Hee and Robbins spoke to a symposium audience of 100 that also included some UCLA IH students. The Continuing Education Program of the SCERC facilitated registration and UCLA logistics.

B. Occupational and Environmental Health Nursing Program

Accomplishments of OEHN NIOSH trainees, alumni and faculty in promoting worker health and safety in 2016-17 spanned professional service, scholarship, and academia/industry partnerships. The OEHN program graduated four NIOSH trainees with a Master of Science prepared as nurse practitioners with OSH expertise. An alumna

of our PhD program was promoted from lecturer in UCLA American Indian Studies to a tenure track position in the UCLA School of Nursing. Not only does this broaden our OEHN research program with a new area focused on health and safety in subsistence farming, but responds to the critical need for the next wave of OEHN faculty nationally.

Four faculty and alumni provided leadership as Board members of the California State Association of Occupational Health Nurses (President, President Elect, Secretary, and Government Affairs Chair). At the national level, a PhD trainee was elected to the AAOHN Western Mountain Region Election Committee; two faculty and one PhD trainee held appointments on the Editorial Review Panel for *Workplace Health and Safety*; and at the 2017 AAOHN Global Summit an alumna who currently heads global employee health for a leading pharmaceutical research and development company, was asked and agreed to join the AAOHN leadership group focused on best practices in global OSH. Faculty members partnered with industries in the region on research projects: effects of work commutes on health and productivity of workers (university employer); and proactive injury prevention (major food distribution company). In response to demands by employers in our region and advice from our OEHN Practice Expert Group, this year OEHN successfully expanded our program to enroll Family Nurse Practitioner (FNP) students in addition to students in Adult-Gerontology Primary Care (A-G Primary Care Nurse Practitioners). Trainees from this FNP expansion will graduate June 2018.

Presentations

1. **Curtis D.** The relationship between workplace racism and obesity in African American women: A pilot study. Western Institute of Nursing Conference. Denver, Co April 19-22, 2017 (poster)
2. **Curtis D.** Preliminary findings: Relationship of work place racism and obesity in African American women: A pilot study. Mount St. Mary's, Department of Nursing, May 2017
3. Robbins WA. Genta, E. OEH&S best practices to support relationship-based care. EHSentials 2017, Environmental Health and Safety Symposium for Healthcare, UCLA, May11, 2017
4. **Stone DS, Robbins W.A.** History, passion, performance: Together towards tomorrow, round table facilitators, and research collaborative. American Association of Occupational Health Nurses 2017 National Conference: New Orleans, LA, April 24, 2017
5. **Stone DS.** Successful leadership strategies in occupational and environmental health nursing. Orange County Chapter of The American Association of Occupational Health Nurses, Invited Podium Speaker, Santa Ana, CA, September 10, 2016

Publications

1. **Adewumi-Gunn TA,** Ponce E, Flint N, Robbins W. A preliminary community-based occupational health survey of black hair salon workers in south Los Angeles. *Journal of Immigrant and Minority Health / Center for Minority Public Health.* 2016 Nov 01. PubMed PMID: 27804012. Epub 2016/11/03. eng.

2. **Samuel-Nakamura C**, Robbins WA, Hodge FS. Uranium and associated heavy metals in Ovis Aries in a mining impacted area in northwestern New Mexico. International Journal of Environmental Research and Public Health. 2017 Jul 28;14(8). PubMed PMID: 28788090. Pubmed Central PMCID: PMC5580552. Epub 2017/08/10. eng.
3. **Samuel-Nakamura C**, Hodge, FS, Valentine JL, Robbins W. Heavy metal contamination in thelesperma megapotamicum. Journal of Toxicology and Environmental Health Sciences. 2017 Vol. 9:14. DOI: 10.5897/JTEHS2017.0380
4. **Stone DS**, Ganz PA, Pavlish C, Robbins WA. Young dult cancer survivors and work: A systematic review. Journal of Cancer Survivorship: Research and Practice. 2017 May 06. PubMed PMID: 28478587. Epub 2017/05/10.
5. **Stone, D**. Human papillomavirus vaccination: An opportunity for ambulatory care nurses to promote health and wellness. AAACN ViewPoint 2017 39 (2), 4-8.

C. Occupational Medicine Residency Program

A substantial Southern California shortage of OM specialists is being filled by our graduates. Gillian Nelson, who graduated 2016, is practicing occupational medicine full time in Southern California, has passed her boards, and is board certified. Sanjiwani Meharda, who also graduated 2016, is practicing occupational medicine full time at Kaiser Permanente in the Inland Empire, has passed her boards, and is board certified. Julia Garcia, who graduated 2017, is practicing occupational medicine part time at the Federal Occupational Health Clinic in San Diego, is board eligible, and is currently studying to take her board exams this October, the first time she is eligible to do so.

We have had two Full-Time Outservice Training recipients from the Navy, Joseph Vo and Samir Mukherjee. Only two are awarded by the Navy nationally for Occupational Medicine each year, and UCI was fortunate enough to receive one from each of the two academic years.

Joseph Vo graduated 2017 and is assigned to the Navy Environmental and Preventive Medicine Unit Five. The mission of this unit is to provide specialized public health support to naval assets in the Pacific region and to deploy Forward Deployable Preventive Medicine Units (FDPMU) around the world. He is the Occupational Medicine subject matter expert and provides consultation to naval forces in the Pacific region that have occupational medicine-related questions. He is also slated to become the department head for Fleet Support that provides industrial hygiene and environmental medicine support to the Pacific region and has been assigned to be the Preventive Medicine Officer for next year's FDPMU team. This team responds at short notice to any preventive medicine requests from the Navy or Marine Corps. These requests support a wide range of activities including warfighting efforts and supporting disaster relief efforts.

Presentations

1. **Vo J**. Effects of ozone and particulate matter on the formation of atherosclerosis in APO E knockout mice. Western Occupational Medicine Health Conference in Las Vegas, NV. Sept 17, 2017 (poster)

2. **Mukherjee S.** Recurrent neurologic deficits in an F/A-18D pilot after hypobaric decompression injury. COEH Grand Rounds, University of California, Irvine. Jan 10, 2017
3. **Mukherjee S.** Stroke: How can you protect yourself. Community Outreach Program in Poway, CA. March 12, 2017

Publication

1. Robinson T, Evangelista JS, 3rd, Latham E, **Mukherjee ST**, Pilmanis A. Recurrence of neurological deficits in an F/A-18D pilot following loss of cabin pressure at altitude. *Aerospace Medicine and Human Performance*. 2016 Aug;87(8):740-4. PubMed PMID: 27634610. Epub 2016/09/17. eng.

D. Targeted Research Training Program

The TRT program continued to be highly successful in providing research training to doctoral students who conduct research in NORA priority areas. The program provided support for doctoral-level research training at UCLA in occupational epidemiology, industrial hygiene in collaboration with the IH program, and occupational and environmental health nursing in collaboration with the OEHN program. The program also supported research training in work organization at UCI.

The SCERC faculty developed new courses and enhanced existing courses to increase interdisciplinary research training. Examples include the SCERC “Interdisciplinary Occupational Health Practice” courses EHS-230 A-C and the Occupational Epidemiology course taught by Dr. Krause at UCLA, as well as new courses on Occupational Health Psychology and Psychosocial Occupational Epidemiology taught by Dr. Choi at UCI.

Presentations

1. **Yu N**, Shu S, Lin Y, Zhu Y. Measuring and reducing fine and ultrafine particles inside Los Angeles taxis. AIHce Conference, Seattle WA, June 4-7, 2017. (Poster)
2. **Curtis D.** The relationship between workplace racism and obesity in African American women: A pilot study. Western Institute of Nursing Conference. Denver, Co April 19-22, 2017 (poster)
3. **Brogmus, G.** Understanding low back pain and reducing the associated disability. The Oregon Governor's Occupational Safety & Health Conference (GOSH). Portland, OR, March 8, 2017.
4. **Brogmus, G.** and Guzman, J. Ergonomics: From research to reality- prevention through design. National Restaurant Association Conference. Chicago, IL, February 9, 2017.
5. **Brogmus, G.** Controlling chronic back pain through control of early morning flexion. UCLA Ergonomics Webinar, December 13, 2016.

6. **Brogmus, G.** Improving ridiculously heavy lifting tasks. UCLA Ergonomics Webinar, October 11, 2016.
7. **Brogmus, G.** Occupational causes of back pain - asking the right questions. UCLA Ergonomics Webinar, July 12, 2016

Publications

1. **Banaee S, S SQH.** Permeation of limonene through disposable nitrile gloves using a dextrous robot hand. *Journal of Occupational Health*. 2017 Mar 28;59(2):131-8. PubMed PMID: 28111415. Pubmed Central PMCID: PMC5478526. Epub 2017/01/24. eng.
2. **Mathews AR, Que Hee SS.** Whole glove permeation of cyclohexanol through disposable nitrile gloves on a dextrous robot hand and comparison with the modified closed-loop ASTM F739 method 1. no fist clenching. *Journal of Occupational and Environmental Hygiene*. 2017 Apr;14(4):243-51. PubMed PMID: 27754775. Epub 2016/10/19. eng.
3. **Mathews AR, Que Hee SS.** Whole glove permeation of cyclohexanol through disposable nitrile gloves on a dextrous robot hand: Fist clenching vs. non-clenching. *Journal of Occupational and Environmental Hygiene*. 2017 Apr;14(4):252-7. PubMed PMID: 27754818. Epub 2016/10/19. eng.
4. **Mathews AR, Que Hee SS.** Quantitative leak test for microholes and microtears in whole gloves and glove pieces. *Polymer Testing*. 2016 Sep; 54:244-249
5. **Wang A, Arah OA, Kauhanen J, Krause N.** Shift work and 20-year incidence of acute myocardial infarction: Results from the Kuopio ischemic heart disease risk factor study. *Occupational and Environmental Medicine*. 2016 Sep;73(9):588-94. PubMed PMID: 27032692. Epub 2016/04/02. eng.
6. **Wang A, Arah OA, Kauhanen J, Krause N.** Effects of leisure-time and occupational physical activities on 20-year incidence of acute myocardial infarction: Mediation and interaction. *Scandinavian Journal of Work, Environment & Health*. 2016 Sep 01;42(5):423-34. PubMed PMID: 27367151. Epub 2016/07/02. eng.
7. **Choi S, Kang D, Park D, Lee H, Choi B.** Developing asbestos job exposure matrix using occupation and industry specific exposure data (1984-2008) in republic of Korea. *Safety and Health at Work*. 2017 Mar;8(1):105-15. PubMed PMID: 28344849. Pubmed Central PMCID: PMC5355542. Epub 2017/03/28. eng.
8. **Choi B, Choi S, Jeong J, Lee J, Shu S, Yu N, et al.** Ambulatory heart rate of professional taxi drivers while driving without their typical psychosocial work stressors: A pilot study. *Annals of Occupational and Environmental Medicine*. 2016;28:54. PubMed PMID: 27761266. Pubmed Central PMCID: PMC5054562. Epub 2016/10/21. eng.

E. Pilot Project Program

Our PPRT Program has been very successful during 2016-17 in supporting high-quality pilot projects. We received letters of intent from nine potential applicants; five of them were invited and submitted a pilot project. Award recipients were students (4), and new investigators (1). Trainees were from the Southern California ERC (3), and the Northern California ERC (2). All projects addressed priority research areas as identified in the National Occupational Research Agenda (NORA). A total of \$72,781 in support was awarded.

Table 2. Southern California Education and Research Center Pilot Project trainees supported during FY 2016-17

Name (Degree)	Institution (Department)	Research Project Title
Logan Thomas Van Engelhoven (MS, PhD cand)	UC Berkeley (Mechanical Engineering)	"Evaluation of a shoulder support exoskeleton on static and dynamic overhead tasks"
Nathan Poon (MS, PhD student)	UC Berkeley (Mechanical Engineering)	"Evaluation of a trunk supporting exoskeleton for reducing risk for back injury due to fatigue"
Robert Canales (PhD)	U. of Arizona (Community, Environment & Policy Department)	"Methodologies for analysis of continuous time series measurements relevant for occupational health"
Teni Adewumi-Gunn (MS, PhD cand)	UCLA (EHS)	"Development and Implementation of a personal protective equipment training program for cosmetologists"
Vikram Haridass (PhD student)	UCI (Epidemiology)	"Occupational cancer risk in California teachers and risk modification by history of anti-inflammatory, anti-hypertensive, anti-cholesterol medication use"

F. Outreach

In 2016-17 the Outreach Program finalized an agreement with the University of California Office of the President to co-sponsor UCOP's two-day Risk Summit (attended annually by more than 600 University of California Health and Safety professionals) as well as on-line workplace safety courses through UCOP's EH & S Professional Education Center. The CE Program will initially provide CEUs (continuing education units) for Registered Environmental Health Specialists (REHS) and will add other accreditations such as Board of Registered Nursing (BRN) contact hours over time. In addition, the SCERC is part of a consortium of University of California workplace health and safety programs that includes UCOP, UC Berkeley's ERC, UC Riverside, and the OSHA Training Institute Education Center at UC San Diego.

This year the ERC and Industrial Hygiene program partner with BSI Group to offer the EHSentials Environmental health and Safety Symposium for Health Care. There were a total of 49 attendees including 6 faculty. In 2016, we partnered with the California Industrial Hygiene Council to co-sponsor its annual conference.

While some of the attendees of these events are eligible for CE accreditation, many of the attendees are not, yet their knowledge and skills are enhanced through Outreach.

In addition to the 15 trainees' papers shown in the different program sections, ERC faculty authored 15 papers in peer reviewed journals without trainee involvement.

Additional Publications by SCERC Faculty (without Trainee Co-authors only):

1. Choi S, Kang D, Park D, Lee H, Choi B. Developing asbestos job exposure matrix using occupation and industry specific exposure data (1984-2008) in republic of Korea. *Safety and Health at Work*. 2017 Mar;8(1):105-15. PubMed PMID: 28344849. Pubmed Central PMCID: PMC5355542. Epub 2017/03/28. eng.
2. Echeverria-Palencia CM, Thulsiraj V, Tran N, Ericksen CA, Melendez I, Sanchez MG, Walpert D, Yuan T, Ficara E, Senthilkumar N, Sun F, Li R, Hernandez-Cira M, Gamboa D, Haro H, Paulson SE, Zhu Y, Jennifer A. Jay JA. Disparate antibiotic resistance gene quantities revealed across 4 major cities in California: A survey in drinking water, air, and soil at 24 public parks. *ACS Omega* 2. 2017; May 2:2255-63.
3. Ferrario MM, Landsbergis P, Tsutsumi A, Li J, Hynek P, Krause N, et al. Work environment: An opportunity for ground-breaking collaborations in cardiovascular disease prevention. *European Journal of Preventive Cardiology*. 2017 May;24(2_suppl):4-6. PubMed PMID: 28440685. Epub 2017/04/26. eng.
4. Fischer HJ, Zhang Q, Zhu Y, Weiss RE. Functional time series models for ultrafine particle distributions. *Annals Appl Stat*. 2017; April 11:297-319.
5. Holtermann A, Krause N, van der Beek A, Straker L. The physical activity paradox: Why does occupational physical activity not confer the cardiovascular health benefits that leisure time physical activity provides? *Br J Sports Med*, 2017 (accepted)
6. Korshoj M, Krause N, Clays E, Sogaard K, Krustup P, Holtermann A. Does aerobic exercise increase 24-hour ambulatory blood pressure among workers with high occupational physical activity?- a RCT. *American Journal of Hypertension*. 2017; Apr 01;30(4):444-50. PubMed PMID: 28203695. Epub 2017/02/17. eng.
7. Krause N, Arah OA, Kauhanen J. Occupational and leisure time physical activity, fitness, coronary heart disease, and 22-year mortality: Results from the Kuopio ischemic heart disease risk factor study. *Eur J Preventive Cardiology*. 2017;24(2S):11-2.
8. Krause N, Arah OA, Kauhanen J. Physical activity and 22-year all-cause and coronary heart disease mortality. *American Journal of Industrial Medicine*. 2017 Sep 20. PubMed PMID: 28940659. Epub 2017/09/25. eng.

9. Luderer U, Myers MB, Banda M, McKim KL, Ortiz L, Parsons BL. Ovarian effects of prenatal exposure to benzo[a]pyrene: Roles of embryonic and maternal glutathione status. *Reprod Toxicol* 2017 April;69:187-95.
10. Wang T, Quiros DC, Thiruvengadam A, Pradhan S, Hu S, Huai T, Lee ES, Zhu Y. Total particle number emissions from modern diesel, natural gas, and hybrid heavy-duty vehicles during on-road operation. *Environmental Science & Technology*. 2017 Jun 20;51(12):6990-8. PubMed PMID: 28530097. Epub 2017/05/23. eng.
11. Chen Y, Shu, L, Qiu-Z, Lee DY, Settle SJ, Que Hee S, Telesca D, Yang X, Allard P. Exposure to the BPA-substitute bisphenol S causes unique alterations of germline function. *PLoS Genetics*. 2016 Jul;12(7):e1006223. PubMed PMID: 27472198. Pubmed Central PMCID: PMC4966967. Epub 2016/07/30. eng.
12. Lin Y, Qiu X, Ma Y, Wang J, Wu Y, Zeng L, Hu M, Zhu T, Zhu Y. A novel approach for apportionment between primary and secondary sources of airborne nitrated polycyclic aromatic hydrocarbons (NPAHs). *Atmospheric Environment*. 2016; 138: 108–113.
13. Mishra B, Ortiz L, Luderer U. Charged iron particles, components of space radiation, destroy ovarian follicles. *Human Reproduction*. 2016; Aug;31(8):1816-26. PubMed PMID: 27251203. Pubmed Central PMCID: PMC4974665. Epub 2016/06/03. eng.
14. Shih IF, Liew Z, Krause N, Ritz B. Lifetime occupational and leisure time physical activity and risk of parkinson's disease. *Parkinsonism & Related Disorders*. 2016 Jul;28:112-7. PubMed PMID: 27177695. Pubmed Central PMCID: PMC4914446. Epub 2016/05/15. eng.
15. Tian X, Zhu Y, Mu, L, Zhang, Z-F, Liu, S: Emerging trend in particulate matter induced lung injuries in 21st century - the effects of ambient fine, ultrafine and engineered nanoparticles. *National Science Review*, 2016; 3: 416-429.

G. Continuing Education

CE courses were attended by more than 1,400 trainees. The trainees were comprised of physicians (9%), nurses (17%), industrial hygienists (12%), safety engineers and other safety professionals (24%), and other or not identified (37%). “Others” are often workers and supervisors assigned safety responsibilities but are lacking in credentials and training.

Trainees came from a wide variety of sectors: private industry (28%), government at all levels (14%), academic institutions (34%), non-profit organizations (9%), and other or not identified (16%).

Courses ranged from one-hour webinar sessions on ergonomics to 5-day courses such as the Comprehensive Industrial Hygiene Review. Other professional review courses included Associate Safety Professional (ASP), Occupational Health and Safety Principles and Nursing Certification (twice per year), Certified Hazardous Materials Manager (CHMM), and Certified Hazardous Materials Practitioner (CHMP). Nearly all

courses are accredited for American Board of Industrial Hygiene (ABIH), American Society of Safety Engineers (ASSE), California Board of Registered Nursing (BRN) and Registered Environmental Health Specialist (REHS) accreditation. A limited number of courses also qualified for Continuing Medical Education (CME) accreditation.