

MICHAEL L. CANNON, CIH

EDUCATION

A.B., English, University of North Carolina, Chapel Hill, North Carolina, 1978.

AFFILIATIONS

Certified Industrial Hygienist Comprehensive Practice, ABIH
American Industrial Hygiene Association

CONTINUING EDUCATION

University of North Carolina, Chapel Hill Evening College, 1981 - 1982.

- Analytical Chemistry
- Organic Chemistry

Harvard School of Public Health

- Basic Industrial Hygiene

University of North Carolina—OSHERC

- Basic Industrial Hygiene
- Personal Sampling
- EPA AHERA Inspector Course
- EPA AHERA Management Planner
- NIOSH 582 Sampling and Evaluating Airborne Asbestos Dust

North Carolina State University

- Industrial Ventilation Conference (Advanced, 1987)

AIHC Professional Development Courses

- Radio Frequency/Microwave Radiation Protection
- Indoor Air Quality and Radon
- Prevention, Determination and Remediation of Biological Contamination in Indoor Environments
- Introduction to Chemical/Biological/Radiological Warfare and Consequence Management

Pathcon Laboratories, Norcross, Georgia

- Microorganisms in Indoor Air

Georgia Institute of Technology

- Respiratory Protection for the Asbestos Abatement Industry

Condor Geotechnical Services

- 40-Hour HAZWOPER Evaluation Course

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CAREER HISTORY

FORCON International - Industrial Hygiene Consultant - Provides consulting and expert witness services for environmental & toxic tort claims and litigation requiring industrial hygiene expertise.

4C Occupational Health and Safety Consultants, Blacksburg, Virginia & Atlanta Georgia - *Principal* - Assists major corporations with EPA, OSHA compliance, industrial hygiene, training, program development and workers compensation claims. Provide insurance loss control departments with underwriting risk analysis and industrial hygiene services for their insured's. Consult with law firms as an expert for workers compensation, environmental and general liability suits.

Golder Associates Inc., Atlanta, Georgia - Corporate Health and Safety Officer and Director, Industrial Hygiene - Responsible for corporate health and safety for over 700 employees in the US. Developed a safety and health web page via the company Intranet for communicating company policies and procedures. Reviewed and approved site-specific health and safety plans for RCRA and Superfund projects. Responsible for review of worker's compensation cases. Conducted industrial hygiene and occupational health surveys, health and safety audits, health and safety training, regulatory compliance audits, and personal and area monitoring.

Crawford & Company/The FPE Group, Atlanta, Georgia - Senior Industrial Hygiene Consultant Provided Industrial Hygiene Consulting Services to clients ranging from industrial facilities to insurance companies. Duties included coordination of industrial hygiene and safety services, including the following:

- Establishing departmental goals;
- Developing and implementing marketing strategies;
- Creating and managing industrial hygiene programs for corporations nationwide;
- Conducting in-depth studies to determine company compliance with OSHA/EPA/JCAHO regulations and recommended corrective actions;
- Evaluating engineering controls for employee protection and company compliance;
- Providing expert testimony for health, safety and workers' compensation cases;
- Providing risk assessment and analysis for business planning; and
- Providing safety and health training for management and hourly employees.

Hartford Steam Boiler Inspection & Insurance Co. - Atlanta, Georgia - Southeast Regional Manager, Occupational Health Services (OHS) - Provided Industrial Hygiene and Safety consulting services to clients ranging from industrial facilities to municipalities. Supervised sales and marketing staff for promotion of OHS. OHS revenues exceeded \$1.0 million per year.

Ennis Lumsden, Boylston and Associates, Inc., Chapel Hill, North Carolina

- Manager, Industrial Hygiene Services - Managed a staff of industrial hygiene consultants, including certified industrial hygienists, staff industrial hygienists and industrial hygiene technicians; increased department revenues in excess of \$750,000 per year.

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- Staff Industrial Hygienist - Conducted plant studies independent of direct supervision; was project supervisor for large-scale plant studies.
- Mobile Testing Manager/I.H. Technician - Managed mobile pulmonary function and air monitoring testing staff of 12 safety and health technicians; performed routine air monitoring under the supervision of a CIH.
- Safety and Health Technician. - Conducted plant on-site pulmonary function testing and cotton dust air monitoring

SUMMARY OF EXPERTISE

Over 27 years of environmental occupational health and safety experience as a consultant. Experienced with EPA and OSHA compliance and industrial hygiene issues associated with numerous types of industries and exposures including silica, benzene, hydrogen sulfide/sulfur compounds, inorganic arsenic, hydrogen fluoride, welding fumes, foundry operations, vehicle manufacturing exposures, textile manufacturing/finishing exposures, legionella, mold, asbestos, and many others.

PROJECT RELATED EXPERIENCE — INDUSTRIAL HYGIENE

Carbon Monoxide Exposure Evaluations

Conducted carbon monoxide exposure evaluations at numerous industrial, commercial building and residential locations. These evaluations have been conducted in response to regulatory compliance issues, reports of employee symptoms of carbon monoxide exposure, occupant complaints of exhaust odors and injury/death from carbon monoxide. Industrial evaluations have included air monitoring of propane forklift operations at refrigeration/freezer storage facilities, large scale farm refrigeration/ripening operations, metal fabrication operations, paper mill shipping departments, carpet mill shipping operations, diesel truck manufacturing and lawn mower manufacturing. Commercial and residential building evaluations have included air monitoring for carbon monoxide relative to gas fired heating systems, gas fired hot water systems, gas fired logs and infiltration into buildings from parking garages. Some of the evaluations have been conducted to recreate the accident or conditions that were present that led to injury. In some cases other exposures/conditions such as the use of methylene chloride, the displacement of oxygen and confined spaces were found to play a role in the accident/injury.

Paper and Pulp Industry and Waste Water Treatment Plants-Hydrogen Sulfide/Sulfur Compounds Exposure and Odor Monitoring

Conducted extensive air monitoring for hydrogen sulfide/sulfur compound related to work place exposures and odor complaints at Paper and Pulp mills using both OSHA and EPA methods. Characterized sulfur compound odor issues over the plant site as it related to complaints. Developed action plans and control strategies to reduce work place and odor exposures to these sulfur compounds.

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Conducted evaluation of a wastewater treatment facility in Florida for hydrogen sulfide to determine feasibility of removing walls around the screen room. The wastewater facility was located less than 30 feet from the property boundary to a public school. Recommendations were made regarding emissions control options.

Power Boilers-Inorganic Arsenic Exposure Monitoring

Conducted air monitoring during maintenance outages for boiler tube replacement, ID fan repair and electrostatic precipitator cleaning for inorganic arsenic. Worked with the contractor to develop better control methods including boiler tube wash downs, exhaust ventilation design for torch cutting activities and respiratory protection selection. Services were provided for Georgia Power, Seminole Electric Cooperative and Riverwood International.

Power Boilers, Sand Blasting, Brick Manufacturing, Glass Bead Manufacturing -Crystalline Silica (quartz, tridymite, and cristobalite) Exposure Monitoring

Conducted air monitoring for respirable crystalline silica for fly ash exposures from coal fired power boilers associated with paper mills during normal work activities, e.g. periodic inspections, compressed air lancing and outages. Sand blasting operations at various metal fabrication facilities for surface preparation, the removal of old paint finishes and removal of oxidation (rust). Exposure monitoring was conducted both outside and inside the air-supplied shroud to determine the effectiveness of the sand blasting booth and respirator. Brick manufacturing facilities to document the use of sands containing silica for decorative purposes on the production line. Conducted air monitoring at a glass recycling facility that produced reflective powders for highway paint applications to confirm that no respirable crystalline silica was present as a result of crushing automobile windshields.

Oil Refineries- Benzene and Hydrogen Fluoride Exposure Monitoring

Conducted air monitoring for benzene and hydrogen fluoride during maintenance outages at an oil refinery in the Northeast US. Provided confined space entry monitoring for cracking towers. Recommended nitrogen purging in some cases to inert the atmosphere in the confined space to below the Lower Explosive Limit before entry.

Cluster Disease Studies- Public School and Power Lawn Equipment Manufacturing

Conducted a cluster disease study for potential high rate of cancers among schoolteachers at a public school in East Tennessee. Conducted an inventory of potential carcinogens at the school, reviewed public records for the property to determine previous use, conducted interviews with the administration and faculty, conducted air, surface and water sampling for suspect carcinogens that included but was not limited to radon, methylene chloride, formaldehyde and benzene. Interacted with NIOSH who was studying the prevalence of breast cancers among schoolteachers. Conducted a thorough review of the IARC monographs and cancer rates/mortality statistics for the counties in this region of the state. Determined that there was no significant exposure to

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carcinogens at the school and that the rate of cancer at the school was consistent with the cancer rates for this region of the state.

A cluster of birth defects were reported at a power lawn equipment company in Georgia. Coordinated with NIOSH on behalf of the company to conduct an investigation to determine if there was a link between the work environment and the birth defects cluster. Reviewed the chemical inventory, the material safety data sheets and conducted air monitoring for solvents that were possibly linked to the reported birth defects. NIOSH determined there was no link between the work environment at the power lawn equipment company and the reported birth defects cluster.

Shitake Mushroom Farm-Hypersensitivity Pneumonitis

A Western North Carolina indoor Shitake Mushroom Farm reported an outbreak of respiratory illnesses among its workforce with no etiological agent identified. Represented the company during the assessment conducted by Steve Lenhart of the North Carolina Division of Public Health, Department of Health and Human Services, Health Hazards Control Branch and Eugene C. Cole DrPH from the University of North Carolina, Chapel Hill. Assisted with the collection of air samples during various tasks in Shitake mushroom production and reviewed the data upon completion. Determined that the affected workers had hypersensitivity pneumonitis from fungi released during the cleaning of the red oak tree bark in preparation for injecting the spawn into the log. Medical surveillance, engineering controls and respiratory protection were recommended. The study was published by Lenhart SW, Cole EC [1993]. Respiratory illness in workers of an indoor shiitake mushroom farm. Appl Occup Environ Hyg 8(2): 112-119.

Metal Fabrication Operations- Workplace Noise Exposures, Welding Fume Exposures (metals and gases) and Dermatitis from Cutting Fluids and Coolants

Evaluated air contaminant and noise exposures at large-scale metal fabrication operations. Air contaminant exposures have included metal fume from plasma and laser cutters, welding fume from assembly operations, oil/coolant mists from CNC/machining, solvent exposures from spray painting, total particulates from powder coating and acid/caustic mists from metal treatment operations. These surveys have led to the development of work practice programs, medical surveillance guidelines, hearing conservation programs, effective exhaust ventilation controls and hazard reduction relative to raw material/chemical substitution.

Involved in workers' compensation technical loss analysis to evaluate an outbreak of dermatitis at a facility in North Carolina. Nickel exposure and improper coolant maintenance was determined. Appropriate measures were implemented to reduce exposure through PPE and product substitution.

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Foundry Operations- Lead, Cadmium, Respirable Crystalline Silica, Formaldehyde, Phenol, Heat and Noise Exposures

Evaluated air, noise and heat stress exposures at an iron ductile pipe foundry, a brass foundry, marine parts foundry and an aluminum reprocessing/recycling facility. Air exposures evaluated included respirable crystalline silica, lead, formaldehyde, phenols and metal fume. Engineering controls, work practices and personal protective equipment were evaluated. Improvements to these controls were recommended to minimize work place exposures to air contaminants, noise and heat. Medical surveillance guidelines were provided for related metal fume exposures e.g. lead, cadmium.

The marine parts foundry evaluation was performed on behalf of the worker's compensation carrier to determine if the employee had been exposed to lead and cadmium to cause renal injury. Air and surface testing was conducted to determine workplace exposures. Consulted with the carrier regarding biological monitoring for determination of current blood lead levels and long-term ZPP levels. Determined that his smoking may contribute up to 50% of his blood cadmium levels.

Roof Tile Manufacturing- Workplace Cadmium, Barium, Cobalt, Chromium, Iron Oxide and Respirable Crystalline Silica

Evaluated color mixing, line mixers, and general production labor for exposures to clay roof tile manufacturing operations. Exposures included respirable crystalline silica from process sand mixes and various metals from pigments used to color roof tiles. Recommendations for improving existing exhaust ventilation controls, maintenance of the gas powered floor sweeper, housekeeping improvements and respiratory protection were provided.

Truck, Bus and Emergency Vehicle Manufacturing- Workplace Noise Exposures, Diesel Particulate Monitoring, Coal Tar Pitch Volatiles, Carbon Monoxide, Paint/Cleaning Solvents and Welding/Torch Cutting Metal Fume

Evaluated air contaminant and noise exposures at major truck and bus manufacturing facilities in the Southeast US. Air monitoring has included carbon monoxide, elemental carbon and CTPVs during truck start up and dynamometer testing, welding and torch cutting metal fume and gases in frame manufacturing, paint/cleaning solvents during truck and bus body preparation and solvent exposures during the application of undercoating.

Metal Scrap Yards- Workplace Metal Fume Exposure From Torch Cutting

Conducted air-monitoring surveys to evaluate workplace lead and metal fume exposures. Established lead compliance programs in accordance with OSHA standards including blood lead monitoring. Provided respiratory protection training and fit testing.

Conducted an in-depth study to determine sources of workplace lead exposure; this study included scrap testing, soil testing, comparative air monitoring and torch tip evaluations. Determined that new torch tips with brass inserts could produce concentrations in excess of the OSHA action level.

Textile Manufacturing-Workplace Cotton Dust

Conducted in-depth cotton dust monitoring surveys to evaluate employee exposures and exhaust ventilation controls. These services have included exhaust ventilation control isokinetic air monitoring for determining filtration efficiencies and optimum design criteria. Documented the influence of total dissolved solids from overhead spray humidifiers on cotton dust air concentrations in various departments of the mill. OSHA has utilized his expertise as a third-party consultant to resolve exhaust ventilation problems for companies under citation in both Regions IV and VI.

Textile Finishing

Performed air monitoring to evaluate workplace exposures in dye and finishing operations. Air contaminants have included benzidine-based dyes, phenols, formaldehyde, aromatic and chlorinated hydrocarbons, acids and caustic compounds. These evaluations have been a key element in establishing medical surveillance guidelines, personal protective equipment requirements, and hazard communication programs.

NIOSH Certified Pulmonary Function Technician

In addition to air monitoring for dust related workplace exposures, have conducted over 50,000 pulmonary function tests, which have involved the evaluation of several parameters that have included FEV₁, FVC, FEV₁/FVC ratios, comparison to Knudsen tables to establish percent of predicted values and MEF₅₀ and MEF₂₅. Have administered over 10,000 medical questionnaires for determining respiratory illness history, dyspnea grades and smoking history.

Microelectronics Industry- Tin, Lead, Rosin Core Pyrolysis Products, Volatile Organic Compounds and Inorganic Acid Mists

Conducted air monitoring to evaluate work place exposures to rosin core pyrolysis products and lead from hand and wave solder operations, solvent exposures from ultrasonic vapor degreasers, formaldehyde exposures from solder and assembly operations, and acid mist exposures from cleaning operations. Developed personal protective equipment and work practice procedures to minimize employee exposures to lead from wave solder dross cleaning.

Specialty Plastics Manufacturing- Isocyanates (HDI and Oligomers), Caprolactum, M-pyrol, Formaldehyde and VOCs

Conducted air monitoring during the production of specialty plastic products that included rods and sheets. Resin systems created exposures to caprolactum, M-pyrol, HDI and oligomers, formaldehyde and volatile organic compounds such as benzene and isopropanol. Recommendations were made for improving exhaust ventilation controls and respiratory protection.

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Indoor Air Quality/Sick Building Syndrome Surveys- Fungi, Bacteria, Endotoxin, Volatile Organic Compounds, Nicotine, Formaldehyde and Carbon Dioxide

Conducted comprehensive indoor air quality assessments for commercial banking, insurance companies, hospitals, airline training center, telecommunications companies and computer support service centers. Services have included qualitative and quantitative analysis of building conditions including HVAC system review. Occupant questionnaire and interviews were conducted and evaluated to pinpoint symptoms and potential causes of building-related issues. Air monitoring for VOC's, formaldehyde, carbon monoxide, carbon dioxide, nicotine as a marker for cigarette smoke and bioaerosols was conducted. Information gathered from these evaluations have resulted in remedial actions that have included HVAC system improvement, substitution of janitorial and pest control chemicals, employee work practice improvements, and office ergonomic design modifications.

Indoor Air Quality-Cryptococcus Neoformans and Histoplasma Capsulatum

Conducted worker's compensation investigation for alleged exposure to Cryptococcus Neoformans while working at outdoor worksites that resulted in Cryptococcal Meningitis. Visited outdoor worksites alleged to have bird droppings and collected bulk samples of suspect material for culture. Determined that the outdoor worksites visited were not the source of Cryptococcus Neoformans.

Conducted worker's compensation investigation for alleged exposure to Histoplasma Capsulatum while working at a school that may be related to periodic episodes of bronchitis and pneumonia. Bird droppings were reportedly found inside the cover of the HVAC system on the roof. Surface samples were collected for culture to determine if Histoplasma Capsulatum was present in the classroom.

Indoor Air Quality- Odor Evaluation

Conducted area air monitoring in a multi-building facility to screen for odors using Mini-Cans (vacuum containers) and diffusion badges for formaldehyde. Collected representative 8-hour samples in complaint, non-complaint and HVAC intake areas to characterize odors within the building relative to the installation of floor coverings. Analysis performed using a GC-Mass Spectrophotometer was able to achieve detection levels in the parts per billion range for a library of organic compounds. Compared results to current OSHA permissible exposure limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs[®]), and the American Industrial Hygiene Association's- Odor Thresholds for Chemicals with Established Occupational Health Standards.

Cruise Line Industrial Hygiene- Legionella, Volatile Organic Compounds, Welding Fume Profiles and Wood Dust Exposures

As a part of a risk control team, evaluated potential workplace exposures aboard a major cruise line. Conducted a survey of the potable hot water system (cabin showers) and the hot tubs for

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potential Legionella bacteria. Provided recommendations for managing the potable hot water system and maintenance of the hot tubs. Conducted routine air monitoring for VOCs in maintenance shops/engine rooms, welding fume in various areas of the ship, and wood dusts (teak) in cabin areas. Recommended exhaust ventilation controls, work practices to reduce fume and dust exposures and respiratory protection.

Industrial and Environmental Noise Surveys

Conducted noise surveys for a variety of industries that have included paper and pulp, petrochemical, concrete pipe processing, furniture manufacturing, data processing, textile manufacturing, and transportation services. These surveys have been conducted to determine compliance with OSHA standards for noise and hearing conservation and to provide supporting data for defense in workers' compensation claims. Environmental noise surveys have included construction sites, manufacturing facilities, outdoor entertainment events, and nightclubs. The data gathered for these surveys have been used to determine environmental impact and compliance with federal, state, and local community noise regulations and to provide supporting data in defense of environmental noise complaints.

Residential and Commercial Mold Investigations — Fungi

Conducted over 500 fungi investigations that have included initial assessment to determine the extent of fungi contamination and cause, sample collection and interpretation, mitigation plans and post mold mitigation inspection and sampling. These investigations have included industrial, residential, high rise commercial and office properties.

Asbestos Building Materials Evaluations/Project Management

Conducted comprehensive facility evaluations for asbestos containing building materials for First Union National Bank in North and South Carolina, First Union Mortgage Corporation throughout the U.S., Carolina Telephone and Telegraph, Velsicol Chemical Corporation, The Bibb Company and La-Z-Boy Chair Company.

The data from these surveys was used to establish an abatement timeline and an operations/maintenance program. Conducted training of custodial and maintenance personnel in accordance with OSHA and EPA standards. Acted as owner representative on major abatement projects overseeing contractor activities to assure conformance with project specifications and regulatory compliance.

PROJECT RELATED EXPERIENCE — SAFETY

Safety Audits

Conducted over 800 safety audits to evaluate corporate safety and health programs relative to current loss trends and regulatory compliance. Emphasized management and employee responsibility for achieving improvements in loss ratios.

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Involved with several national self-insured accounts in developing a comprehensive safety/health and loss prevention program. These accounts were managed to achieve low loss rates that in turn had a positive effect on company revenue performance. Designed the program to assign losses to individual departments; this program increased management awareness and improved company loss ratios relative to workers' compensation costs. Companies serviced included chemical manufacturing, paper and pulp, textile, furniture manufacturing, metal fabrication, and general/asbestos abatement contractors.

Safety Training

Conducted safety training relative to company program objectives and regulatory compliance. Training has included 8- and 24-hour HAZWOPER training, lockout/tagout, confined space entry, hazard communication, lab safety, personal protective equipment, and respiratory protection.

PROJECT RELATED EXPERIENCE — RISK ASSESSMENT

Insurance Underwriting Risk Analysis

Performed risk analysis of major corporations and contractors relative to insurance coverages that included general liability, professional liability, pollution liability, products liability, completed operations, inland marine property, and workers' compensation. Companies included petroleum refineries, chemical manufacturers, chemical distributors, hazardous waste processors, TSDF's, transportation firms, asbestos abatement contractors, and lead-based paint abatement contractors. Surveys included an overview of business operations, administrative controls, company experience and specific controls in place for the coverages being evaluated. The report provided an opinion of risk and recommendations for improvement to the insurance underwriter.

Technical Loss Analysis

Evaluated workers' compensation claims relative to occupationally related disease. Provided guidance to claims administrators for determining the validity of the claim. Performed field evaluations where necessary (e.g., air monitoring, surveys, IH audits, etc.) to determine exposure risks. Interfaced with occupational health physicians and attorneys in resolving the claims.

PUBLICATIONS

Asbestos In the Work Place: A Manageable Situation, October, 1987, Hosiery News, National Association of Hosiery Manufacturers

Under the Microscope, Self Managed Audits are an Excellent Tool for Evaluating and Managing EH&S Programs, January, 1998, Occupational Health and Safety Magazine