

FINAL PROGRESS REPORT

**Institute of Occupational and Environmental Health
West Virginia University School of Medicine
Morgantown, WV 26506-9190**

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ABSTRACT

West Virginia has one of the highest burdens of occupational disease and illness in the nation. The objective of the West Virginia University training program is therefore clear: To train skilled professionals who understand work places, recognize and treat occupational disease, and who are prepared for and dedicated to public health aspects of mitigation and prevention. We alone cannot meet the need. Our objective is to prepare professionals who can serve the state and the region. We remain a relatively new public health enterprise, and we must train for a substantial backlog of need.

Demonstrable progress toward this goal has been made. The residency program underwent a review by the ACGME and full accreditation without citation for an increased number of trainees was granted. There is increased interaction through formal linkages between members of the Health Profession core and Safety and Environmental Management cores. Additional integration has taken also taken place with Industrial Hygiene Program and the Safety and Health Extension. The Institute of Occupational and Environmental Health (IOEH) continues to expand its research, teaching and clinical activities.

Safety & Environmental Management : ABSTRACT

The objective of West Virginia University's Safety and Environmental Management (SEM) program is to develop competent safety professionals who will strive to improve safety, health, and environmental conditions in the workplace. West Virginia is one of the most work-disabled states in the nation. Traditionally the population is employed in highly hazardous industries – mining, railroading, logging and timbering, chemical and steel production. Other nearby areas – southwestern Pennsylvania, western Maryland, eastern Kentucky, southwestern Virginia and southern and eastern Ohio have a similar history. As a result, there has been a tremendous local, state, and regional need for improvements in Safety, Health and the Environment (SH&E). While the labor force in most of these industries has decreased over the years, SH&E problems continue to be extremely programmatic.

Progress toward meeting the SEM goal can be identified throughout the program. Initially accredited by the American Society of Safety Engineers in 1993, the SEM program was accredited by the Related Accreditation Committee of the Accreditation Board of Engineering and Technology (RAC-ABET) in 1997. The SEM program continues to improve in quality and reputation as well at the caliber in of the students applying for and entering the program. The SEM program continues to be one of the most prestigious masters level programs in safety management in the U.S. With the combined efforts of SEM and Occupational Health and Occupational Safety (OHOS) programs, the Industrial and Management Systems Engineering (IMSE) department of WVU has gained approval for an Occupational Safety and Health (OSH) doctoral program.

SIGNIFICANT FINDINGS

1. The residency program was reviewed through an ACGME site visit in the summer of 1997, and received full five-year accreditation in the late fall. An increase in the approved complement of residents in the program to eight was granted. No citations were given.
2. Faculty growth continues, by both qualitative and quantitative measures. Key changes to the faculty in the period of this grant included:
 - The previous IOEH director has now become Chair of the Department of Community Medicine. This has meant that IOEH activities can be integrated within the public health activities of the larger department.
 - The IOEH Clinic Director assumed responsibilities for directing the Institute as a whole. A clinician serving in this capacity confirms the strong emphasis on training solid clinicians in IOEH and has also lead to increased clinical outreach activities.
 - A new Associate Residency Director has been recruited who has built upon the established foundation of this grant and has assisted in expanding training opportunities for resident physicians in West Virginia.
3. Resident education and training has grown dramatically with 7 residents graduated during the period of this grant. At present, a full complement of residents (two in PGY-2, three in PGY-3) is enrolled in the program. We have had a very strong set of applications to the residency for positions starting July 2000 of which 4 individuals were accepted in December 1999. We turned away several well-qualified applicants, including a board-certified internist and a physician in the US Air Force. Over the past three years we have graduated between 2-3 trainees year and we expect these numbers to continue into the future. These numbers place us on par with residencies in much larger centers.
4. The program of outreach to small business in West Virginia has been expanded. This program offers a unique educational experience for residents, industrial hygiene and safety students to participate in field investigations on a small scale in settings with a disproportionate level of occupational morbidity, as well as to boost public health within the state.
5. The IOEH continues to attract funding from external sources. Chief among these are the Workers' Compensation Division of the Bureau of Employment Programs, which supports health services and intervention research into compensation programs. Additional funding sources for resident training have been initiated; these sources include the Veterans' Administration Center in Clarksburg, and the Workers' Compensation Division in Charleston.
6. The present MPH program is still relatively young, having matriculated its first combined physician and non-physician class in 1996. Since then, 38 students have graduated. The program was granted full accreditation for 3 years by the Council on Education in Public Health (CEPH) in October 1997. Another CEPH site visit will take place in November 2000 and full accreditation for 5 years is anticipated following this review. The IOEH faculty is active in the MPH program, having primary responsibility for teaching many of the courses, including the core courses of Environmental Health, Epidemiology, and Biostatistics. In addition, elective courses in occupational toxicology, epidemiology, and research are offered by IOEH faculty.

7. The clinical practice through the Institute has grown to be one of the busiest academic occupational medicine clinics nationally, and is a unique resource in its region. A full spectrum of clinical care is offered including acute injury management, complex consultations for toxic exposures or musculoskeletal conditions as well as independent medical examinations and disability assessments. Additionally, the Institute serves as consultant to the Workers' Compensation Fund of the State of West Virginia, and has effected major changes in the way in which work-related injuries and illnesses are managed.
8. An enhancement of ties with NIOSH Morgantown. There are now 10 NIOSH employees with adjunct appointments in IOEH. Two NIOSH medical officers see patients in the IOEH clinic. NIOSH personnel are frequent lecturers in weekly lectures at IOEH, and also supervise MPH students during their practicum projects. Through restructuring, a more in-depth experience is now possible for trainees at NIOSH which includes participation in field investigations, data analysis, and project write-up. Research collaborations have recently been initiated with investigators in the Health Effects Laboratory Division (HELD).

Safety & Environmental Management: SIGNIFICANT FINDINGS

1. The establishment of higher admission standards to conform to those set by RAC-ABET has raised the quality of SEM students and increased program quality.
 - In the fall of 2000, the SEM program was reviewed by both the WVU Graduate Council and by RAC-ABET. A favorable interim report from RAC-ABET was received and [A full 5-year renewal was granted by the WVU Graduate Council]. Full approval/accreditation is expected at the board meeting in July 2001.
 - Requirements for higher Grade Point Averages (GPAs) and stronger science and math backgrounds have resulted in a stronger SEM program and higher quality NIOSH trainees.
2. SEM student involvement in the outreach program to small businesses in West Virginia has provided some SEM students with the opportunity to broaden their educational horizons and provide a valuable service to the state of West Virginia.
 - Since becoming involved in this program, SEM students have worked as interns for WVU's Safety and Health Extension (SHE) program where they meet with managers of small companies around the state to help to establish or upgrade the organization's safety and health status by developing programs, providing training, and conducting audits.
 - SEM students continue to find employment in a variety of SH&E positions in the state and in the eastern United States.

NARRATIVE ACCOUNT OF ACTIVITIES

I. Program Focus and Characteristics:

The program at West Virginia University is focused on regional needs. We are located in a state and region with predominately extractive industries, marginal economies, all-too-frequent unacceptable work practices, limited access to expert health care, and the nation's highest rates of chronic and permanent disability. The program seeks to be a leader in the region in overcoming this situation and placing the state on a par with the rest of the nation.

The Institute of Occupational and Environmental Health (IOEH) at West Virginia University (WVU) was initially conceived to meet a specific need: The training of occupational physicians for this region. While this objective remains vital to the continued economic development of one of the nation's poorest and most work-disabled states and will require a sustained effort, the program at WVU has also considerably expanded its efforts and broadened its objectives during the period of this grant.

The health care resources to meet the founding need do not yet exist. Forty-three of our 55 counties (78%) have within them, or are entirely, federally-designated health professional shortage areas. The road system in these counties does not permit workers routine access to specialized care at distant sites. The only trained occupational physicians in West Virginia who are not tied to industry by in-house employment or service contract are at the IOEH of West Virginia University (three) or else trained by the Institute (three). There is one such practitioner (trained here) in the entire southern part of our state despite the high intensity extractive industry profile in Southern West Virginia. The most recent graduate of the program has taken a position in a equally underserved area in the western part of the state. We perceive serious underrecognition and inadequate prevention and treatment of environmental disease, including workplace-related illnesses, statewide. The need for well-trained physicians specializing in occupational and environmental medicine (OEM), and for primary care physicians having appropriate training in the field to meet the needs of the region cannot be overstated. The purpose of this program is to provide the educational infrastructure to address that need.

The IOEH occupies a unique position of strength with regard to physician training in occupational and environmental health. As part of the School of Medicine of the state university, it has a voice in the curriculum that medical students are required to undertake. IOEH faculty have recently taken on substantial teaching commitments in Public and Occupational Health for a year-long course to second year medical students. Specific teaching in Occupational Health is also provided to the School of Osteopathy by IOEH faculty.

As a consultant to the West Virginia Workers' Compensation Bureau, the IOEH influences policy at the state level. As a state-financed neutral consultant to businesses and worker groups with health and safety needs, we have a presence that is recognized at several levels of the state economy. As the academic analyst of the state's workers' compensation fund, we have developed a thorough understanding of the population aspects of work injury in our state which has guided our research efforts. As the first or second busiest in-house academic occupational medical clinic in the nation, we see the illness and injuries first-hand. The IOEH also consults to state agencies with environmental interests (Poison Control, Lead Poisoning Prevention) to whole towns with environmental problems, and to neighborhoods with concerns about proposed site facilities. Accordingly, the faculty and facilities are well adapted for instruction in occupational and environmental health. The IOEH faculty also share joint appointments with other clinical departments, including family medicine, internal medicine, pediatrics, nursing, and psychiatry, and are

therefore in a position to influence teaching throughout the clinical departments of the School of Medicine. The IOEH faculty takes an active role in providing rounds for family medicine, internal medicine, pediatrics and psychiatry.

Safety & Environmental Management: NARRATIVE ACCOUNT OF ACTIVITIES

I. Program Focus and Characteristics:

The foundations of the SEM program go back to 1970, the time when the Federal Coal Mine Health and Safety Act of 1969 resulted in the creation the Mine Enforcement and Safety Administration (MESA) and the Occupational Health and Safety Act of 1970 created the Occupational Safety and Health Administration (OSHA). These acts, agencies, and the regulations they promulgated, resulted in an increasing demand for Safety and Health practitioners. The SEM program began as an evening program to service working Safety practitioners who needed a more thorough knowledge of safety and health management techniques to survive and advance in their organization.

The nature of the SEM Program has changed dramatically in recent years. With the higher standards of RAC-ABET and with the increased awareness of Safety Health and Environmental (SH&E) hazards in the workplace, it was evident that and greater knowledge of the hazards caused by modern industrial processes and hazardous materials used in these processes, safety professionals with increased knowledge and skill in all three SH&E areas became more desirable, if not necessary.

Early on, the SEM program was expanded by the establishment an off-campus function. This permitted working safety and health practitioners in other areas to take SEM classes. These new locations included Wheeling (Northern Panhandle of WV, Southwestern Pennsylvania, and parts of Eastern Ohio), Parkersburg (mid-Ohio valley portions of WV and Eastern Ohio), and Shepherdstown (WV Eastern Panhandle, central Maryland, and Northern Virginia).

With the merger of the College of Energy and Mineral Resources (COMER) and the College of Engineering (COE), the SEM Program began expanding its offerings to increase both the scope and depth and availability of SEM courses. Daytime classes meeting at 12 noon and 2 PM were added. This permitted traditional students to enroll in the program with more flexibility. In the summer of 1998, the SEM Department was merged with the Industrial and Management Systems Engineering Department that housed the Occupational Health and Occupational Safety (OHOS) program. This provided a better interface between the two programs as well as with Industrial Engineering. As a result, an increasing number of SEM students took OHOS or Industrial Engineering (IMSE) courses and it permitted a better interface between faculty members in these three programs.

In the summer of 1997 SEM faculty began an extended review of required and elective courses. The joining of IMSE and OHOS served to intensify this effort. The outcome was a revamping of SEM courses. Four SEM courses were dropped, six courses were added or heavily revised, and four others were less heavily modified. New classes included a required Environmental Management course and two environmental electives. This led to the development of an Environmental Management Area of Emphasis, that include SEM courses and courses from several other programs including Community Medicine (Environmental Health), Civil Engineering (air pollution) and the College of Law (Environmental Protection Law)

II. Training Goals and Objectives:

The objective of the West Virginia University residency in Preventive Medicine - Occupational Medicine is straightforward. West Virginia is the most work-disabled state in the nation. There is a tremendous local, state, and regional need for objective clinicians, who understand work places and recognize work-related disease, and who are prepared for and dedicated to public health aspects of mitigation and prevention. We at the University, and our trainees now in practice in West Virginia, are the only trained occupational clinicians in the state, independent of those specifically employed by industry or labor operations. Clearly, we alone cannot meet the state clinical needs. Our objective is to prepare clinician-preventionists for the state and the region. We are a relatively new public health enterprise, and our training effort must be sustained for a prolonged period.

The two-year resident training program is designed to meet the requirements of the Accreditation Council for Graduate Medical Education (ACGME) for residency training in occupational medicine. Both the academic and practicum phases are included. The academic phase is offered through the West Virginia University School of Medicine, Department of Community Medicine, where residents take course work towards the Masters Degree in Public Health (MPH). The practicum phase is coordinated by the Institute of Occupational and Environmental Health and includes clinical, corporate, consulting, and research experiences.

Residents accepted into the program must already have a minimum of an ACGME-accredited clinical year. In practice, most successful applicants have more than one year of clinical training with a majority being board eligible or certified in another specialty.

Residents who do not already possess the Master of Public Health (MPH) are required to complete the MPH curriculum in the academic year. The present program is still relatively new, having matriculated its first class in 1996. Since then, a total of 38 students have graduated from the program. The program was granted full initial accreditation for 3 years by the Council on Education in Public Health (CEPH) in October 1997. Another CEPH site visit will take place in November 2000 and full accreditation for 5 years is anticipated following this review. The MPH was developed to meet the needs of West Virginia for trained public health professionals, and the program has the backing of the state Department of Public Health. A steady progression toward web-based course offerings ensures that the program reaches out across the region. Seven such distance courses have been developed during the period of this grant. A substantial financial commitment to the program has been made by the Dean and Vice President of the West Virginia University Health Sciences Center.

During the occupational medicine residency, the resident spends 12 months pursuing academic studies in the MPH program. Core courses in Environmental Health, Epidemiology, Biostatistics, Health Services, and Behavioral Sciences are required of the trainees. A plan of study for residents has been developed which includes coursework in industrial hygiene, occupational toxicology, and epidemiology. Faculty from other schools within West Virginia University, including the Schools Engineering and Pharmacology help to complement the offerings from the Department of Community Medicine, and assist in providing a public health education which is both broad and deep. Personnel from NIOSH Morgantown and from the Bureau of Public Health in Charleston also participate and add real strength to the program. Through the MPH courses, students and residents interact with teachers from several important related disciplines, including

industrial hygiene, ergonomics, and safety. It is our intention that trainees recognize the critical team interactions between occupational physicians and other related disciplines early in their training.

The residency practicum year is devoted to training in the health care of workers and in the specific skills that the resident will need in future practice, including toxicology, worker evaluation and placement, medical surveillance, administrative expertise, and public health intervention. Our practicum year offers several unique opportunities. The clinical practice through the Institute is one of the busiest academic occupational medicine clinics nationally, and is a unique resource in its region. This level of exposure allows us to train well-rounded, proficient clinicians. Accordingly, most of the recent graduates of the program have taken positions with a majority (if not 100%) of clinical work. Additionally, the Institute serves as consultant to the Division of Workers' Compensation of the State of West Virginia, and has effected major changes in the way in which work-related injuries and illnesses are managed. IOEH faculty serve on both the Health Care Advisory Panel as well as the Institutional Review Board of this organization. Major input has included revision of treatment guidelines, education of claims managers and community physicians, and assistance with the development of a medical consulting infrastructure. This effort has involved trainees who gain an intimate knowledge of the role of the physician in this system.

Residents are supervised directly by teaching faculty. Appropriate handling of administrative aspects of work-related disease is emphasized, including a thorough working knowledge of how Worker's Compensation interacts with patient care. Our faculty interacts directly with labor and management at many facilities; this experience enhances the resident's experience.

Residents are expected to develop specific competencies to satisfactorily complete the program. Briefly outlined, these include:

- How to evaluate work-related disease by developing clinical occupational medical skills, both in general assessment of patients, and in the areas of dermatology, infectious disease, orthopedics and rehabilitation, ophthalmology, pulmonary medicine, surgery, and toxicology, as they relate to occupational and environmental illness.
- How to design and establish a medical surveillance program to prevent and detect work-related disease.
- How to establish an occupational health program at an organization, and how to determine the types of occupational medical services necessary there.
- How to conduct a plant walk-through and to interpret the results of industrial hygiene and safety surveys to assess occupational hazards.
- How to recognize when a clinical study should be initiated in an outbreak of occupational illness. An understanding of epidemiology, biostatistics, and applied toxicology is critical. Trainees should recognize the importance of coordinating the efforts of a variety of professionals to conduct these evaluations, and should develop skills appropriate to a team leader.
- How to prepare educational programs to advise employers and employees on preventive measures (work practice controls, engineering controls, and personal protective equipment) in the workplace.
- Familiarity with the legal, ethical, and regulatory issues related to the practice of occupational medicine
- Understanding the standards, including their basis and application, of the Occupational Safety and Health Administration which address occupational health hazards.
- Awareness of the important medical literature related to occupational and environmental medicine and ability to search for, obtain, review, and interpret the results of research studies.
- Familiarity with principles of environmental health, including the health effects of water and air pollution, indoor air pollution, ambient physical hazards, and hazardous waste in the environment, and ability to recommend measures to reduce health risks from the environment

- How to develop research protocols in occupational medicine.

The practicum year experiences are also designed to meet a variety of resident needs, as well as conformation with ACGME requirements to provide experiences within the real world of work. Some have a strong patient management and work-placement emphasis, such as Weirton Steel. Residents who travel to Weirton Steel can expect to become familiar with the diagnosis and management of heat-related illness, ocular foreign bodies, worker evaluation and placement, substance abuse policies, and safety problems. Residents who rotate to this site can expect to fulfill the competencies (listed above) involving clinical occupational medicine, surveillance, and how to conduct a plant walk-through. Other rotations emphasize highly technical aspects of prevention, such as that at Aventis CropScience in Charleston, WV. A resident could expect to become familiar with legal, regulatory, and ethical issues in occupational medicine, as well as becoming competent in the principles of environmental health by virtue of the company's involvement in the environmental health of its area.

A unique rotation opportunity at NIOSH is possible through our close relationship with colleagues at this organization located on campus. This experience emphasizes a substantial direct involvement by the trainees in ongoing projects carried out by NIOSH personnel who are national authorities within the field. Trainees participate in field investigations (usually, but not limited to, Health Hazard Evaluations), data analysis, and project write-ups. The skills needed to investigate an outbreak of occupational disease on a large scale can be developed at this site. In addition, programs in education of and communication to workers, are covered in this setting. Interaction is greatest with the Division of Respiratory Disease Studies, however, with the recent addition of the Health Effects Laboratory Division, trainees are gaining valuable exposure to relevant basic science work in occupational health.

The program of outreach to small business in West Virginia offers a unique educational experience for residents, industrial hygiene and safety students to participate in field investigations on a small scale in settings with a disproportionate level of occupational morbidity, as well as boost public health within the state. This program is offered through West Virginia University's Health and Safety Extension. The State Division of Workers' Compensation, which funds this program, provides lists of employers with fewer than 250 hourly employees for recruitment into the program. These employers are then contacted and offered a voluntary, free service provided by teams of WVU faculty and graduate students including physicians, safety engineers, industrial hygienists, and safety educators. An important aspect of this outreach service is the provision of clinical, safety engineering, industrial hygiene and training expertise in an integrated manner. The service begins with a needs assessment based on an onsite evaluation of the worksite followed by written and verbal recommendations and proposals for improvement. In the first three years of the program, three full days of service have been provided to each worksite. Most of these employers have little or no resources for occupational safety and health. In many cases, they request a more intensive service. Accordingly, this program has recently been expanded to provide as much as 9 days of service for a select number of interested employers. A minimum of 200 regular assessments and 25 intensive assessments will be carried out this calendar year.

The residency director, associate director, and IOEH faculty assist the residents and students in evaluating worksites and preparing case reports and recommendations as a team of multidisciplinary experts. Residents gain practical experience on workplace hazards management from such investigations. This service integrates, to an extent that few programs can match, the attributes of a first-rate occupational clinic with the expertise of industrial hygienists, safety professional, managers, extension faculty, trainers, and others responsible for health and safety in the workplace. The presence of certified industrial hygienists and safety professionals in a state-wide university extension service provides the trainees with extraordinary access and experience.

The faculty also serves as consultant to health and safety concerns of government entities, large and small industries, labor unions, and entire communities. In all rotations of the practicum, the importance of a multidisciplinary approach to solving occupational medical problems is stressed; the resident is expected to interact with managers, technical personnel, other medical professionals, and workers in order to carry out their required program.

There are three things a resident must be and several additional things a resident can be when they leave the program. Residents must first be clinically competent. We select them for this capability, and will not graduate them without it. Residents must also understand the ethical responsibilities of occupational physicians. Residents must understand their public health / population responsibilities, regardless of financial incentives. Third, residents must be able to recognize and analyze workplace public health problems and institute prevention planning. This requires clear analytical and communication skills. Beyond these minimum requirements, we also afford residents opportunities to develop academic research interests, to interact with national figures concerning policy and problem solving, and to work with communities concerning environmental exposure issues. They can learn how to address sociomedical and medical economic problems of government, labor and industry. Residents can become academicians, consultants, or public health experts if they choose.

II. Safety & Environmental Management: Training Goals and Objectives:

The objective of West Virginia University's Safety and Environmental Management (SEM) program is to develop competent safety professionals who will strive to improve safety, health, and environmental conditions in the workplace. West Virginia is one of the most work-disabled states in the nation. Traditionally the population is employed in highly hazardous industries – mining, railroading, logging and timbering, chemical and steel production. Other nearby areas – southwestern Pennsylvania, western Maryland, eastern Kentucky, southwestern Virginia and southern and eastern Ohio have a similar history. As a result, there has been a tremendous local, state, and regional need for improvements in Safety, Health and the Environment (SH&E). While the labor force in most of these industries has decreased over the years, SH&E problems continue to be extremely programmatic.

The Safety and Environmental Management three-semester program is designed to give students from a variety of academic backgrounds the opportunity to enter a new career field or to advance in their current SH&E function. The students in the SEM program take course work related to the management of the safety function, regulations pertaining to safety, health, and the environment, establishing procedures and practices for improved SH&E, improved loss control and risk management. The SEM program is one of very few Master's level programs accredited by RAC-ABET in the United States and the newly developed Ph.D. program (developed jointly with the Occupational Health and Safety program) is a unique program for fostering researchers and academics in the areas of safety management and occupational health.

SEM students are encouraged to expand the breadth of their knowledge by taking health and environmental related courses from such diverse programs as Industrial Engineering, Public Health/Community Medicine, Occupational Health, Civil and Environmental Engineering, and Law. In these courses, they meet and work with students in diverse career fields related to SH&E.

Finally, SEM students are strongly encouraged to gain "field experience" by participating in a practicum (internship) with an SH&E function within an organization. This internship may involve a WVU function – Environmental Health and Safety, Radiation Safety; a governmental research or regulatory agency –

NIOSH, OSHA, MSHA; a state agency; or a private organization in the local/regional area – Swanson Plating, Bombardier, etc.; or elsewhere in the United States – Ford, Toyota, Ryder, etc.

The specific competencies developed in these internships are varied, and may include:

- How to determine the SH&E problems in an organization.
- How to conduct a plant walk-through and to interpret the results of industrial hygiene and safety surveys to assess occupational hazards.
- How to establish an occupational safety and health program at an organization
- Planning and Conducting SH&E training.
- Familiarity with the legal, ethical, and regulatory issues related to SH&E
- Understanding the standards, including their basis and application, of the Occupational Safety and Health Administration and other federal and state agencies that address occupational hazards.
- Familiarity with principles of safety, occupational and environmental health.

PROGRESS, ACCOMPLISHMENTS, GROWTH AND PLANNING

I. Training Status and Program Accreditation: Overall

- A. The residency program was reviewed through an ACGME site visit in the summer of 1997, and received full five-year accreditation in the late fall. An increase in the approved complement of residents in the program to eight was granted. No citations were given.
- B. Resident recruitment to the program has continued to increase, and at present all funded positions have been filled. 7 residents graduated during the period of this grant. A full complement of residents (two in PGY-2, three in PGY-3) is currently enrolled in the program. With the recent approval of an enlarged program by the ACGME and the increased application pressure to the program, the limiting factor in how many trainees are graduated is available funding.
- C. Cross-disciplinary training of Safety and Environmental Management (SEM), Industrial Hygiene (IH) students and occupational medicine residents occurs within the university. SEM and IH students are required to participate in the clinics run by the Institute and attend weekly lectures in IOEH. Residents take courses in worksite evaluation and industrial hygiene, lecture at seminars and training courses, and are involved in other projects of the IH and safety programs, such as the Small Business Health and Safety Outreach. Through the outreach, they provide medical input for the other members of the team and provide worker education on health matters.

Safety & Environmental Management:

I. Training Status and Program Accreditation

- D. Notice of provisional accreditation was received from RAC/ABET in 1998, after the program received its original accreditation from the American Society of Safety Engineers (ASSE) in 1993. The program received its interim site visit from RAC/ABET in the fall of 2000, and full accreditation is expected at the July 2001 board meeting.

- E. A report prior to the first time review of the SEM Masters Program was completed earlier this month, and full, five-year accreditation is expected.

SEM graduates continue to find employment through out the state and eastern United States. For example, two recent NIOSH trainees are working for NIOSH in Morgantown, others are working at Georgia Tech University, Dick Corporation, Phillip Morris, Perdue Farms as well as SH&E consultants.

II. Faculty:

Dr. Alan Ducatman has continued in his role as Residency Director for the occupational medicine training program, and as the principal investigator on this training grant. In addition, he was named Chair of the Department of Community Medicine in 1997. The Institute of Occupational and Environmental Health (IOEH) has been brought administratively within the Department, to enhance interaction with the broader public health community at WVU.

National level faculty responsibilities of the principal investigator include continuation as a trustee of the American Board of Preventive Medicine, grant reviewer for federal agencies, participation as founder, associate or contributing editor for major national occupational medicine journals, and recipient of professional society awards. The other full-time faculty of the IOEH also participate at a high level in national and regional professional activities, including service on the educational committees of national occupational and preventive medicine organizations, participation in the health care advisory functions of the state's workers compensation system, and involvement in the instruction and training of physicians at the state, regional and national levels. Brief faculty biographical sketches follow.

Principal Investigator:

Alan M Ducatman, MD, MSc is Professor of Medicine at West Virginia University and Chair of the Department of Community Medicine in the School of Medicine. As the residency director and PI, he is responsible for the residency program and educational activities of the Department of Community Medicine. In addition, he helped create the state-wide MPH program, and he teaches actively in that program as well as in the medical school curriculum. As consultant to public and private concerns in the state, he has been a strong advocate for workplace public health in state government, business, and labor venues. He is a Trustee of the American Board of Preventive Medicine, and has been the Principal Investigator on grants from NIOSH (Occupational Health and Safety for Small Business), the EPA Hazardous Substance Research Center (Hazardous Substance Management program) and the WV Department of Labor (Trend and Cluster Analysis, Evaluation of Managed Care, Vertically Integrated Services, Point of Sale Drug Utilization Review).

Other Investigators

Chris Martin, MD, MSc joined the IOEH faculty in 1999 after completing the 5-year Canadian residency program in occupational medicine at the University of Alberta in Edmonton, Alberta. He holds specialty credentials in occupational medicine in both Canada and the USA. He is an Assistant Professor in the Department of Community Medicine and, as Associate Residency Director, devotes in

essence his full time to administrative, clinical, and didactic elements of the residency program. He is responsible for the organization of the resident conferences and lectures, communication with practicum preceptors in order to ensure appropriate resident experiences, assistance with research projects, and assurance of adequate performance on the part of residents. He is responsible for scheduling and administration of the resident program of the IOEH's outreach and consulting to small- and medium-sized companies in West Virginia. Additionally, with Drs. Meyer and Ducatman, he teaches the Environmental Health course in the MPH program. Dr. Martin's clinic also serves as a teaching forum for the residents. Dr. Martin has strengthened the existing resident rotation at NIOSH and developed new rotations in Occupational Rehabilitation and Workers' Compensation. An inter-institutional agreement has been established with the University of Alberta and, to date, three residents from that program have benefited from rotations through IOEH.

He has also rapidly distinguished himself as a gifted educator, having taken on course coordination for a year-long second year medical school course, "Public Health and Evidence Based Medicine". He is involved in teaching activities at a regional and national level through the American College of Occupational and Environmental Medicine's (ACOEM) "Basic Curriculum in Occupational Medicine". He sits on the curriculum committees of the MPH program and the School of Medicine, the Health Care Advisory Panel of the Division of Workers' Compensation and the Advisory Committee for the International Health Program of the School of Medicine.

Edward J. Doyle, Jr. MD, MS joined the IOEH faculty in 1995 as clinical director. With Dr. Ducatman's assumption of the position of Chair of the Department of Community Medicine, Dr. Doyle became IOEH director. As Clinical Director of the IOEH, Dr. Doyle has a significant share of the teaching of residents in the clinic setting. He is primarily responsible for the oversight of residents in the Family Medicine and Occupational/Environmental Medicine specialty clinics. Additionally, he assists in providing a smooth interface between the Workers' Compensation Division and the residents, and he has responsibility for training the residents in this complex facet of occupational medicine. He serves on the Institutional Review Board for the Workers' Compensation Division of the state and as a consultant to the Office of Medical Services. He also serves as the head of the Primary Care Physician Education Committee for the Workers' Compensation Division's Coordinated Care Project for the state. He is on the Board of Directors of the American Lung Association of West Virginia and participates as an ALA Media Spokesperson for Clean Air. His clinical and research interests include musculoskeletal injury, cumulative trauma disorders, and the policy issues attending medical management of workers' compensation cases.

John Meyer, MD, MPH left the IOEH in February 1999 to pursue research interests in occupational medical surveillance with Dr. Nicola Cherry's group at the University of Manchester in the UK. However, he continues to work with the IOEH on a part time basis. He teaches, with Drs. Martin and Ducatman, the Environmental Health course in the MPH program. He frequently returns to Morgantown and teaches residents through rounds and his clinic. Dr. Meyer participates in educational programs for occupational medicine residents on a national level, including serving as a peer reviewer for the Occupational Medicine Self-Assessment Program (OMSAP-IV), and as recent president of the Occupational and Environmental Medicine Residency Directors Association. He is on the editorial board of the *OEM Report* and was recently elected Vice-President of the Tri-State Occupational Medicine Association.

Syed Islam, MBBS, DrPH joined the IOEH faculty in 1995. As research director within the IOEH, he plays a major part in assisting residents with study design and analysis of outcome, including statistical

analysis for any research projects that they undertake. Through grants from the West Virginia Workers' Compensation Division, he is responsible for analysis and future planning for the IOEH's services to small- and medium-sized employers within the state, including analysis of the services provided through this venue. Dr. Islam teaches the Epidemiology course within the MPH program, a requirement for all students within the program. He dedicates 25% of his time to resident training. He gives didactic lectures to the residents during the course of their training, and assists with teaching at resident conferences. Dr. Islam is a Fellow of the International Agency for Research on Cancer, and a Member of the Royal Society for Tropical Medicine and Hygiene, the American Heart Association Council on Epidemiology, and the Society for Epidemiologic Research.

Priscah Simoyi, RN MPH is a nursing instructor in the IOEH and the School of Nursing. She is a certified Occupational Health Nurse Specialist (COHN-S) and teaches a course in spirometry with faculty from NIOSH. Ms. Simoyi is active in educational outreach to high school students, nurses and other community groups. She is a member of the UKCC Nurses Association, the American Association of Occupational Health Nursing, the British Occupational Health Society, and the American Industrial Hygiene Association. Her research interests have included minority participation in health care career planning, occupational health and workplace regulations, environmental exposures and international health.

Paul E. Becker, PhD, MS, CIH is team leader of the Health and Safety Extension of the University. The Extension is devoted to identifying, mitigating, and removing workplace hazards. Through the Small Business Health and Safety Outreach, he performs a key role in the training of residents in workplace hazards and their control. Residents are assigned to the Extension as part of their rotation in the IOEH, and are assigned to investigate, consult, and report on small- and medium- sized companies requesting assistance with health and safety problems, or those that have been identified by the Workers' Compensation Division as having excessive claims. Dr. Becker is also a frequent speaker at IOEH occupational health rounds to residents and other students. Dr. Becker is certified by the American Board of Industrial Hygiene. His interests include labor-management relations and safety and health in the construction industry.

Safety and Environmental Management Faculty

Michael Klishis, PhD, SEM Core Director, joined the SEM faculty in 1993 and became the SEM Program Coordinator with the merger of the SEM and Industrial Management Systems Engineering (IMSE) Departments in 1998. Dr. Klishis serves as the coordinator for the SEM portion of the project, recruiting and reviewing applications for the traineeship, and assisting them in finding mentors for their research, and served as a member of many of their project committees. Dr. Klishis teaches two required SEM courses, SEM 352 – Safety and Health Training, and SEM 366 – Loss Control and Recovery. In addition, he teaches an elective SEM 358 – Substance Abuse in the Workplace. Dr. Klishis has extensive research experience in the areas of coal mine safety and training. His research includes two 5-year projects with the former Bureau of Mines [Research to Formalize Health, Safety, and Occupational Training and Compliance and Reduction of Behavior- Related Accidents and Injuries at the Roof Bolting Work Site], as well as research projects on the Prevention of Silicosis in Surface Miners, the Effects of Shift Work on Health and Safety Among Coal Miners, and the Exploration of Stereoscopic Slide Usage for Hazard Recognition Training.

Linda Frederick, PhD, CSP, joined the SEM faculty in 1994. Dr. Frederick's areas of expertise are ergonomics, and safety and health research design and evaluation. As a Safety and Environmental Management faculty member, she participated in the selection of traineeship students, the academic

advising of these students, helped them identify research mentors and served as the chair or member of many of their projects.

David Whaley, PhD, CIH, ROH (Canada) joined the SEM faculty in 1995. Dr. Whaley's areas of expertise are applied toxicology of pollutants in the workplace and environment, pollution prevention and environmental liability management. As a Safety and Environmental Management faculty member, he participated in the selection of traineeship students, helped them identify research mentors, advised them in the areas of toxicology and environmental pollution and served as the chair or member of some of their projects.

Warren Myers, MS, MPH, PhD is Chair of the Department of Industrial and Management Systems Engineering at West Virginia University School of Engineering. Dr. Myers, who teaches in both the industrial hygiene and safety programs at WVU, is responsible in large part for training of the residents in these two disciplines. His didactic teaching includes two courses taken by all residents: one in industrial hygiene and another in workplace evaluation; additionally, residents spend time with him learning techniques of respirator fitting and use. Dr. Myers has extensive research and field experience in industrial hygiene, in particular with exposure assessment of workers to chemical and physical agents. He continues to serve as the Associate Editor for Peer Review for the Journal of the International Society for Respiratory Protection, and as an editorial board member of the Annals of Occupational Hygiene. His professional activities include participation in the American Association for Aerosol Research, the American Conference of Governmental Industrial Hygienists, the American Industrial Hygiene Association, the British Occupational Health Society, and the International Society for Respiratory Protection.

III. Education

- A. **Significant Changes:** The following elements were continued or adopted during the grant period from 1997 to 2000, as the program became increasingly visible and viable:
1. Clinical teaching continues to be first-rate. With approximately 200 to 300 patients seen a month, the clinic can arguably claim now to be the largest and most comprehensive academic and teaching clinic in the United States. Trainees are selected on the basis of their clinical expertise and training in addition to their potential academic capabilities. The response in hiring trainees of the program for clinically related positions has emphasized the importance of their training in this setting.
 2. Coordinated consulting programs with other research and educational partners from West Virginia University, as exemplified by the Small Business Health and Safety Outreach. This program is designed to increase educational experiences for residents in a "real-world" environment. An integrated interdisciplinary team approach is designed to consult and provide initial advice to workplaces with occupational health and safety concerns. The residents gain practical experience on workplace hazards management from such investigations. The residency director, associate director, and IOEH faculty will supervise and coordinate field investigations conducted by residents, and assist the resident in evaluating case reports and preparing recommendations. This service integrates, to an extent that few programs can match, the attributes of a first-rate occupational clinic with the expertise of industrial hygienists, safety professional, managers, extension faculty, trainers, and others

responsible for health and safety in the workplace. The presence of certified industrial hygienists and safety professionals in a state-wide university extension service provides the residents with extraordinary access and experience. This program is designed to give the trainees in occupational medicine, safety, and industrial hygiene experience in the current problems faced by professionals in practice today.

3. Goals and objectives for practicum rotations have been upgraded. The associate residency director has begun adopting a program of competency-based rotation evaluations which address the skills and abilities which are expected to be taught at industrial, clinical, administrative, and research sites to which the residents rotate during the practicum year.
4. Consolidation of relationships with practicum sites has been achieved. The trainees are now offered a core group of high-quality educational sites through which they can achieve the goals of practicum training, and meet the requirements of the ACGME for training within the real world of work. Current sites include:
 - A coordinated consulting service to small businesses in the state as part of team with industrial hygiene and safety professionals.
 - An ore-to-finished-product steel mill in the northern panhandle of the state. This site represents the largest private employer in West Virginia as well as the one of the largest employee-owned corporations in the nation.
 - One of the largest chemical manufacturing concerns in the state, which employs over 3000 workers. This site represents not only a resource for workplace health concerns but a training site for resident involvement in the environmental issues of disaster planning and community response.
 - A federal occupational health and safety research facility, in which residents actively participate in field investigations, data analysis and project write-up.
 - A multidisciplinary occupational rehabilitation facility where residents can interact with physiatrists, psychologists, physiotherapists and vocational rehab professionals.
 - A regional public health agency within the state
 - The state's poison control center
 - A large regional Veterans' Administration center, which provides trainees experience in medical center occupational health.
5. Teaching in occupational and environmental health has been broadened throughout the university as a result of this grant. Faculty and trainees participate in the teaching of medical students throughout the four years of the medical school curriculum. Lectures to first and particularly second-year students have been expanded. Students in both first and third year participate in our clinic, to learn both physical diagnosis and skills in occupational medical assessment. Trainees from the industrial hygiene and safety programs are regularly scheduled in clinic rotations under Drs. Doyle and Meyer, and gain an appreciation for the medical aspects of injury, workplace surveillance, rehabilitation, and work-related disability.

B. MPH Program:

The present program is a newly developed one, which arose from the need to train public health professionals for West Virginia and the surrounding region. Development of the program has the backing of the state Bureau for Public Health and the state legislature. A substantial financial commitment to the program has been made by the Dean and Vice President of the West Virginia University Health Sciences Center. The program matriculated its first combined physician and non-

physician class in 1996, and was granted full accreditation after review by the Council on Education in Public Health (CEPH) in the fall of 1997.

The MPH program was designed around the core public health training initially developed to meet the needs and requirements of occupational medicine training, and the IOEH faculty remain active participants in the program. They continue to bear primary responsibility for teaching many of the courses, including the core courses of Environmental Health, Epidemiology, and Biostatistics. In addition, elective courses in occupational toxicology, epidemiology, population biology and prevention, and research are offered by the IOEH faculty as part of the MPH degree program. Faculty from other schools within West Virginia University, including the Schools of Law, Management, Engineering, and the Graduate Faculty in Arts and Sciences, complement the offerings from the School of Medicine, and assist in providing a public health education which is both broad and deep. Personnel from NIOSH, located in Morgantown, and from the Bureau of Public Health in Charleston also participate and add real strength to the program.

Elective courses include offerings in medical aspects of environmental health, nutrition & chronic disease prevention, ethical and legal issues in public health, advanced study in environmental evaluation occupational toxicology, healthcare finance, industrial ergonomics, industrial hygiene analysis, and the sociology of the workplace. IOEH faculty actively advise resident MPH students about the nature and content of courses, and of their appropriateness to the residents' professional goals. In the MPH courses, students and residents interact with teachers from several important related disciplines, including industrial hygiene, ergonomics, and safety. It is our intention that trainees recognize the critical team interactions between occupational physicians and other related disciplines early in their training. Both the program director and associate residency director serve as MPH advisors to the residents, and provide assistance with designing an appropriate plan of study which will fulfill both training requirements and the resident's interests within the field. The MPH year was designed with the needs of working health care professionals in mind. Because of this, its structure allows the residents to attend departmental conferences and lectures in the IOEH, so that additional didactic material in occupational medicine can be taught.

The MPH practicum is designed to sharpen critical appraisal of workplace public health issues, and to prepare the resident for the "real-life" experiences of the residency practicum year. Residents may initiate and participate in a research project or a preventive intervention. The faculty encourages attempts to address real public health issues of the state and surrounding region. Recently, one resident has extracted data from the published literature regarding the utility and effectiveness of prostate cancer screening in the workplace; a project which had its genesis in an inquiry from a regional company who suspected an increased incidence of disease in its workforce. Another resident has taken the lead on a project involving a large cohort of railroad workers having extensive long term exposure to chlorinated solvents; this project was identified by the Association of Occupational and Environmental Clinics as one of several similar studies which warranted funding and a cooperative effort within that organization. It has also attracted federal funding for a national meeting where the resident's data and findings were presented.

Distance learning has also been a primary initiative of the MPH program. West Virginia continues to adapt to its mountainous and isolating geography with new initiatives in distance learning. The first web-based course to be offered in the MPH program (CMED 350, Environmental Health), launched in the spring semester of 1999, is taught by IOEH faculty. Following the success of this offering, an additional 6 courses are now offered in this format. This has extended our ability to reach students throughout the state and the region.

Safety & Environmental Management: Education

C. Significant Changes: The following elements were continued or adopted during the grant period from 1997 to 2000.

6. A revised Safety and Environmental Management Curriculum. The deletion of several outdated courses, addition of new courses in the area of environmental management, including a required course, a construction safety course, and the revision of several other courses.
7. An increased emphasis on field experience with placements at government agencies, academic units, and private enterprise organizations for SEM students.
8. The shifting of the SEM program from a coursework only program to a program where more students complete problem reports and theses.
9. A higher number of SEM students are taking interdisciplinary coursework, especially from the OHOS and Community Medicine programs.

IV. Research

Current Projects:

The Institute is currently involved in, or has recently published, the following research:

- An investigation of occupational asthma in specialty painters
- A collaboration with NIOSH's Health Effects Laboratory Division to pilot test a battery of investigations for Hand Arm Vibration Syndrome (HAVS).
- An investigation into the prevalence of occupational allergic rhinitis in West Virginia
- A determination of the prevalence of prostate cancer detected through workplace screening
- An investigation into the epidemiology of occupational injuries in young workers.
- A description of the risk factors and incidence for occupational ocular injuries in West Virginia
- A description of the risk factors and incidence for occupational ocular fractures in West Virginia
- An analysis of gender differences for occupational injuries and illnesses
- An investigation into the epidemiology of work-related burns.
- Neuropsychological, neuroimaging, and metabolic abnormalities in a large cohort of railroad workers with chronic long-term exposure to chlorinated solvents
- The effect of work organization and workplace stress on health, including development of early atherosclerosis, and motor vehicle injuries
- Trend and cluster analysis of workplace illness and injury, using the compensation database from the West Virginia Workers' Compensation Division
- An occupational health and safety initiative designed to increase safety and hazard mitigation in small and medium-sized business in the state
- A point of sale drug utilization review for scheduled drugs, to bring about compliance with standard guidelines for prescribing among physicians treating workers' compensation patients
- Evaluation of managed care treatment of occupational injuries and illnesses
- Analysis of injuries to volunteer firefighters

- A policy effort to end environmental tobacco smoke exposures in West Virginia workplaces, and nationally.
- Research to demonstrate the advantages of training through multidisciplinary on-site evaluations.
- A description of national values and trends in occupational medicine training.
- An evaluation of smoking cessation approaches in a work-insured population.

A list of publications by faculty in the past three years appears in **Appendix B**. Five of these publications included major contributions by trainees including a Hazard Identification through work with NIOSH investigators. These publications are also listed separately, with the trainees' names in bold.

Safety and Environmental Management : Research

Current Projects:

The SEM faculty are currently or recently involved in the following research:

- Ship Dismantling, specifically the SH&E hazard exposures when dismantling naval vessels.
- Exposure to silica to surface miners, especially rock drillers.
- The development of an e-learning center for safety and health training.

A list of publications by faculty in the past three years appears in **Appendix B**.

APPENDIX A

Students Trained

<u>Name</u>	<u>Date Graduated</u>	<u>Degree</u>
X Castillo	Aug 1997	Resident Trainee
C Westra	June 1998	Resident Trainee
L Lombardo	June 1998	Resident Trainee
L Karbonit	Oct 1998	Resident Trainee
J Muller	June 1999	Resident Trainee
P Franklin	June 1999	Resident Trainee
G Afaq	June 2000	Resident Trainee
G Buono	Aug 1997	MPH
C Westra	Dec 1997	MPH
L Lombardo	May 1998	MPH
N Reddy	Dec 1998	MPH
P Franklin	Dec 1998	MPH
J Muller	Dec 1998	MPH

Safety & Environmental Management: APPENDIX A
Students Trained

SEM NIOSH Trainees

<u>Name</u>	<u>Date Graduated</u>	<u>Degree</u>
Fratto, Gayle	May-98	MS SM
Chaney, Melissa	May-99	MS SM
McFall, Mark	May-99	MS SM
Keyes, David	May-99	MS SM
Lanham, Erick	May-99	MS SM
Montagino, Tom	May-99	MS SM
Harry, Gordon	Dec-99	MS SM
Skidmore, Paige	May-00	MS SM
Edwards, Elfreda	Aug-00	MS SM
Grooms, Rinda	Trainee	
Kahler, Daniel	Trainee	
Mabee, Judson	Trainee	
Moon, Thomas	Trainee	

APPENDIX B

Core Faculty Publications 1997-2000

Publications by A. Ducatman

Book Chapters

Ducatman AM. Multiple Chemical Sensitivity. in ROM WN (ed). Environmental and Occupational Medicine. 3rd ed. Lippincott-Raven. Philadelphia 1998, Pp 891-904.

Ducatman AM. Chemical exposures and causation. In Kaufman HH, Lewin JL (eds). The Physicians' Perspective on Medical Law. American Assoc Neurological Surgeons, Park Ridge, IL. Pp 263-278.

Papers

Ducatman AM. Cancer Clusters. ATDSR Case Studies in Environmental Medicine. (submitted)

Franklin P, Goldenberg WS, Ducatman AM, Franklin E. Too Hot to Handle: An Unusual Exposure of HDI in Specialty Painters. Am J Ind Med 2000; 37:431-437.

McClellan R, Becker CE, Borak J, Coplein C, Ducatman AM, et al. Multiple chemical sensitivities; idiopathic environmental intollerances. ACOEM Position Statement. J Occup Environ Med 1999; 41: 940-942.

- Westra CS, Ducatman AM, Niewiadomska-Bugaj M, Hobbs GR. An estimate of prostate cancer prevalence for a demographically similar workforce population. *WV Med J* 1999; 95:116-122
- Meyer JD, Becker PE, Stockdale T, Ducatman AM. The West Virginia Occupational Safety & Health Initiative. *Am J Prev. Med.* 1999; 16: 347-350
- Cohen A, Ducatman AM. Employing self-directed computer and printed resources to reform a medical school, epidemiology and biostatistics curriculum. *Medical Education Outline (On-line)* July, 1998. <http://education.hsc.wvu.edu/cmed350>
- Magnetti SM, Wyant W, Greenwood J, Roder N, Linton J, Ducatman AM. Injuries to volunteer fire fighters in West Virginia. *J Occup Env Med* 1998; 41 No. 2: 104-110.
- Westra C, Simoyi P, Islam S, Haque A, Meyer J, Doyle E, Ducatman, AM. Evaluation of occupational injuries among young workers in West Virginia. *Human Eval. Risk Assess* 1998; 4: 1405-15.
- Bucklew NS, D'Alessandri R, Ducatman AM. The mentoring of the department chair: a new partnership model between the health sciences and business administration. *Issues in the Cornerstone of Higher Education*, 1998; 48:71-55 Vol. 48, pp. 71-75.
- Meyer JD, Islam SS, Ducatman AM, McCunney RJ. Prevalence of small lung opacities in populations unexposed to dusts: a literature-analysis. *Chest* 1997; 111: 404-410.
- Frumkin H, Ducatman AM, Kirkland K. Solvent exposure among railroad workers: report of a conference. 1997; 39(10):926-30
- Meyer JD, Islam SS, Ducatman AM, McCunney RJ. Radiographic opacities in populations unexposed to dusts: a meta-analysis and review. *Chest* 1997; 111:404-410.

Publications by C Martin

Book Chapters

Martin CJ, Meyer JD. Bacteria. in Wald P, Stave G, eds. Physical and Biological Hazards of the Workplace. Philadelphia. John Wiley. in press

Papers

Islam S, Doyle EJ, Velilla A, Martin CJ, Ducatman AM. Epidemiology of compensable work-related ocular injuries: Incidence and risk factors. *J Occup Env Med* 42(6); 575-581; 2000 .

Martin CJ, Le XC, Guidotti TL, Yalcin S, Chum E, Audette RJ, Liang C, Yuan B, Zhang X, Wu J. Zinc exposure in Chinese foundry workers. *Am J Ind Med* 35:574-580;1999.

Guidotti TL, Martin CJ. Evaluation of the worker with suspected occupational lung disease, *Isr J Occup Health* 2:129-144; 1998. (Also in: *Occupational Medicine: State of the Art Reviews* 13(2):279-288.)

Guidotti TL, Audette RJ, Martin CJ. Interpretation of the trace element profile for workers occupationally

exposed to metals. *Occup Med* 47(8):497-503;1997.

Martin CJ, Guidotti TL, Langard S. Respiratory hazards of welding. *Clin Pulm Med* 4(4):194-204;1997.

Publications by J Meyer

Book Chapters

Martin CJ, Meyer JD. Bacteria. *in* Wald P, Stave G, eds. Physical and Biological Hazards of the Workplace. Philadelphia. John Wiley. in press

Meyer JD. Occupational Tuberculosis. *in* Couturier A, ed. Handbook of Occupational Infectious Disease. Beverly, MA. OEM Press. 2000.

McCunney, RJ, Meyer JD. Occupational Exposure to Noise. *in* Rom W, ed. Environmental and Occupational Medicine. 3rd edition. Philadelphia. Lippincott-Raven. 1998.

Meyer JD. Taking the Board Exam in Occupational Medicine. *in* McCunney, RJ, Rountree P, eds. Occupational and Environmental Medicine: Self-Assessment Review. Philadelphia. Lippincott-Raven. 1998.

Meyer JD. Paramedical Personnel and Ambulance Attendants. *in* Stellman JM ed. ILO Encyclopaedia of Occupational Health and Safety, 4th edition. Geneva. International Labour Office. 1997.

Papers

Meyer JD, Chen Y, Holt DL, Beck MH, Cherry NM. Occupational contact dermatitis in the UK: A surveillance report from EPIDERM and OPRA. *Occup Med*. 2000; 50: 265-273

Cherry N, Meyer JD, Adishes A, Brooke R, Owen-Smith V, Swales C, Beck MH. Surveillance of occupational skin disease: EPIDERM and OPRA. *Br J Dermatol* 2000; 142:1128-34

Meyer JD, Holt D, Cherry NM, McDonald JC. SWORD '98: Surveillance of work-related and occupational respiratory disease in the UK. *Occup Med*. 1999; 49: 486-489

Cherry NM, Meyer JD, Holt DL, Chen Y, McDonald JC. Surveillance of work-related diseases by occupational physicians in the UK: OPRA 1996-99. *Occup Med*. in press

Meyer JD, Holt D, Chen Y, Cherry NM, McDonald JC. SWORD '99: Surveillance of work-related and occupational respiratory disease in the UK. *Occup Med*. in press

McDonald JC, Meyer JD, Holt DL, Chen Y, Cherry NM. Disease surveillance by occupational physicians. *Occupational Health Reviews*. in press

Meyer JD, Becker PE, Stockdale T, Ducatman AM. The West Virginia Occupational Safety and Health Initiative: A new model for occupational medicine residency training in a new marketplace. *Am J Prev Med* 1999; 16: 347-350

- Meyer JD, Muntaner C. Injuries in home health care workers: An analysis of occupational morbidity from a state compensation database. *Am J Ind Med* 1999; 35: 295-301
- Simoyi P, Islam S, Haque A, Meyer J, Doyle E, Ducatman A. Evaluation of occupational injuries among young workers in West Virginia. *Human Ecol Risk Assess* 1998; 4: 1405-1415
- Muntaner C, Nieto FJ, Cooper L, Meyer J, Szklo M, Tyroler HA. Occupational stress and atherosclerosis; Findings from the ARIC study. *Am J Prev Med* 1998; 14: 9-18.
- Meyer JD, Islam SI, Ducatman AM, McCunney RJ. Pulmonary opacifications in populations unexposed to dusts: A literature analysis and review. *Chest*. 1997; 111: 404-410.

Abstracts

- Meyer JD, Chen Y, Holt DL, Cherry NM. What can surveillance schemes tell us? Skin and respiratory sensitising agents reported to SWORD and EPIDERM: 1996-98. UK Health and Safety Executive Workshop: Can the skin act as a route for respiratory sensitisation? Sheffield. Health and Safety Executive Publication HEF/00/02. 2000
- Meyer JD, Chen Y, Holt DL, Beck MH, Cherry NM. Occupational contact dermatitis in the UK: The EPIDERM and OPRA surveillance schemes. British Epidermo-Epidemiology Society. 21 Jan. 2000.
- Shum KW, Meyer JD, Chen Y, Cherry NM, Gawkrödger DJ. Occupational contact dermatitis caused in part by nickel: Cases reported to EPIDERM over a five-year period. British Contact Dermatitis Research Group, British Association of Dermatologists. 18 Nov 1999 *Br J Dermatol* (in press)
- Meyer JD, Muntaner C. Injuries in home health care workers: An analysis from a state compensation database. *J Occup Environ Med* 1998; 40: 1027
- Lombardo LJ, Meyer, JD, Haut MW, Islam SS, ul-Haque A, Ducatman AM. Health effects of solvent exposure in railroad workers. *Frontiers in Occupational Medicine; American Occupational Health Conference*. 1997. *J Occup Environ Med*. 1997; 39: 362

Other articles, editorials, and letters

- Meyer JD. Strengthening clinical predictive abilities for diagnosing carpal tunnel syndrome: No substitute for a good history and physical. *OEM Report* 2000; 14: 49-53
- Meyer JD. Injection therapies for upper limb disorders: Solving only half the problem. *OEM Report* 2000; 14: 1-5
- Meyer JD. Exercise programs for low back pain: Is belief in recovery the real treatment? *OEM Report*. 1999; 13: 85-89.
- Meyer JD. Mad cow disease and blood donors: The FDA ban on donation from travelers to the United Kingdom. *OEM Report*. 1999; 13: 69-73.
- Meyer JD. Carpal tunnel syndrome: Prevalence and pathogenesis. *OEM Report*. 1999; 13: 49-53.

Lombardo LJ, Meyer JD. Should hepatitis B infected health care workers perform invasive procedures?
OEM Report. 1997; 11: 41-43

Abstracts

Lombardo LJ, Meyer, JD, Haut MW, Islam SS, ul-Haque A, Ducatman AM. Health effects of solvent exposure in railroad workers. *Frontiers in Occupational Medicine; American Occupational Health Conference*. 1997. *J Occup Environ Med*. 1997; 39: 362

Safety & Environmental Management: APPENDIX B

Core Faculty Publications 1997 - 2000

Publications by M. Klishis

- Winn, G.L., Klishis, M.J., Grayson, R.L., and Althouse, R.C. (1998) Using Customized Database to Target Problem Area in Small Coal Mines. *Professional Safety*.
- Grayson, R.L., Althouse, R.C., Winn, G.L., and Klishis, M.J. (January 1998). A New Injury Analysis Methodology for Developing Prioritized Workplace Intervention Strategies. *Applied Occupational Environmental Hygiene*.
- Grayson, R.L., Althouse, R.C., and Klishis, M.J. (1998). Microanalysis of Roof Bolter Injuries. *Applied Occupational Environmental Hygiene*.
- Winn, G.L., Bucy, D.S. and Klishis, M.J. (1997). Forms and Functions. *Security Management*, 41 (6), 93-96.

Publications by L. Frederick

- Winn, G.L., Frederick, L.J. and Becker, P.E. (2000) Adding Construction to the Academic Safety Curriculum. *Professional Safety*, July, 16-18
- Winn, G.L., Frederick, L.J. and Church, G. (1999) Unions and Behavior-Based Safety: Always the Odd Couple. *Professional Safety*, December
- Frederick, L.J. and Winn, G.L., (1999) Characteristics Employers are Seeking in Today's Safety Professional. *Professional Safety*, February

Publications by D. Whaley

- David A. Whaley, Michael D. Attfield, Erik J. Bedillion, Kenneth M. Walter and Quilong Yi, 2000. Regression method to estimate provisional TLV/WEEL-equivalents for non-carcinogens. *Annals of Occupational Hygiene* accepted for publication
- David A. Whaley and Shayla S. Barrett, 2000. Field Trials - Measuring progress in pollution prevention using a chemical hazard score. *Drug and Chemical Toxicology* accepted for publication, Volume 23 Issue 4
- David A. Whaley, Thomas P. Meloy, Shayla S. Barrett, Erik J. Bedillion, 1999. Incorporation of potential for multimedia exposure into chemical hazard scores for pollution prevention. *Drug and Chemical Toxicology* 22(1): 241-273.
- Whaley DA and DE Della Giustina, November 1998. Developing an environmental management curriculum. *Professional Safety* (American Society of Safety Engineers) 43(11): 18-21.



DEPARTMENT OF HEALTH & HUMAN SERVICES

Memorandum

Date March 30, 2001
From Principal Engineer, OEP
Subject Final Progress Report for entry into NIOSHTIC/NTIS for
NIOSH Training Grant No. T01 CCT 310455
To William Bennett, IRB, EID (C-28)

The enclosed report has been received from the Program Director to document work performed during the specified grant project period. The following information applies to the designated Training Project Grant (TPG):

Title: New Directions in Occupational Health

Project Director: Alan M. Ducatman, M.D., MSc
Institute of Occupational and Environmental Health
West Virginia University
Morgantown, WV 26506-9190

Grant No.: T01 CCT 310455

Project Period: 7/1/97 - 6/30/2000

Please place the report in DIDS and I also recommend it for entry into NIOSHTIC and submission to NTIS.

Thanks for your assistance.

A handwritten signature in black ink, reading "John T. Talty".

John T. Talty, P.E., DEE

cc: S. Board/B. Kuchinski, OEP

Enclosure

fpr.wvu.imc