

materials, and continue to evaluate the engineering control to further reduce potentially hazardous RF exposure.

15. MAGNETIC-FIELD EXPOSURES OF GARMENT WORKERS: RESULTS OF PERSONAL AND SURVEY MEASUREMENTS AND A PILOT INTERVIEW STUDY. M. Shum, M. Kelsh, Exponent, Inc., Menlo Park, CA; T. Bracken, T. Dan Bracken Associates Inc., Portland, OR; J. Sahl, J. Sahl Associates, Upland, CA; K. Ebi, L. Kheifits, EPRI, Palo Alto, CA

In this study, the exposure of garment workers to electromagnetic fields (EMF) was studied to determine the feasibility of using this large population of mostly female workers in a future epidemiological study of EMF and breast cancer incidence. Utility workers would be the ideal cohort for this study, but the population of female workers is too small to be representative. Mean personal and survey exposures ranged from 0.4 to 31 mG at three different facilities: a used sewing machine shop, a sample sewing facility, and a pants facility. Survey measurements were comparable or lower than the personal exposure measurements. Measurements taken when machines were idling were higher or comparable to measurements taken when workers were actively sewing. The mean personal exposures while sewing machines were idling ranged from 1.3 to 11.7 mG. These exposures are comparable to those experienced by utility workers. A trained interviewer/translator interviewed 25 Chinese garment workers at the pants facility in order to determine the possibility of reconstructing historical exposures to garment industry workers. From these initial interviews, the majority of workers is able to answer questions related to duration and activities, but is not able to answer questions related to machinery. As this population was exclusively Chinese, results of future interviews/questionnaires of other ethnic groups may differ. Based on these preliminary results, a historical exposure assessment could be completed with information about duration of exposure and current exposures. A more refined reconstruction of historical exposure does appear feasible due to an inability to extract information regarding machines from this population of workers. However, this large population of female garment workers makes this group an ideal cohort for a future epidemiological study of EMF exposure and breast cancer incidence.

16. DETERMINATION OF THE ULTRAVIOLET POWER OUTPUT OF A SUBMERSIBLE GERMICIDAL LAMP USING IN-SITU CHEMICAL ACTINOMETRY. M. Phillips, T. Havel, University of Oklahoma Health Sciences Center, Oklahoma City, OK

Germicidal ultraviolet (UV) lamps have long been used for water disinfection. Recent experimental work suggests that submersible UV lamps can also be effective at disinfecting metalworking fluids (MWF). The effectiveness of an UV disinfection apparatus depends on the power output of the lamp, the residence time of the fluid, and the geometry of the system. Accurate determination of a lamp's radiant power output requires a 4-pi measurement geometry, which may be difficult to achieve. In this study, a chemical actinometry method developed by Rahn was adapted for use in situ measurements of the output of a submerged UV lamp. An actinometric solution of potassium iodide and potassium iodate in borate buffer was introduced into a circulating apparatus used for MWF disinfection experiments. The solution is opaque to 254 nanometer (nm) radiation but transparent at wavelengths longer than 330 nm. The photochemically induced formation of triiodide was quantified by measuring the absorbance at 352 nm of aliquots of the actinometric solution taken during irradiation. The absorbance of an aliquot was proportional to the radiant energy emitted by the lamp; a conversion factor was determined by calibrating the absorbance of the actinometric solution exposed to the UV source in a flat-faced cuvette in air against UV radiant exposure measurements made with a NIST-traceable radiometer. The UV radiant power of the lamp was determined to be 10 watts, which was consistent with the manufacturer's estimate and with the results of crude irradiance measurements. We have demonstrated that chemical actinometry can provide a simple to perform, geometrically appropriate 4-pi measurement of the germicidal UV output of submersible lamps.

17. ULTRAVIOLET RADIATION EXPOSURE DURING GEL ELECTROPHORESIS VISUALIZATION USED FOR THE DETECTION OF PROTEINS, DNA AND RNA IN RESEARCH LABORATORIES. F. Akbar-Khanzadeh, M. Jahangir-Blourchian, M. Valigosky, Medical College of Ohio, Toledo, OH

Ultraviolet Radiation (UV) is commonly used in laboratories as a transilluminator to visualize proteins, DNA, RNA, and their precursors in a gel electrophoresis procedure. This study was initiated to evaluate whether or not this procedure has the potential to overexpose workers to UV. A UV radiometer (International Light Inc., Model IL1400A) connected to one of three detectors of UV-A (Model SEL033), UV-B (Model SEL 240) and

UV-C (Model 240) was used to determine UV levels in front of 17 sets of UV transilluminators. The effective irradiance (mW/cm²) of UV-A ranged from 60-2142 (mean of 649) at 2.5 cm, 24-1925 (422) at 10 cm, 2-575 (168) at 25 cm, 1-215 (77) at 50 cm, and 0-52 (16) at 100 cm. The effective irradiance (mW/cm²) of UV-B ranged from 0-3870 (mean of 741) at 2.5 cm, 0-3190 (470) at 10 cm, 0-954 (214) at 25 cm, 0-317 (65) at 50 cm, and 0-110 (10) at 100 cm. The effective irradiance (mW/cm²) of UV-C ranged from 5-1400 (mean of 392) at 2.5 cm, 1-500 (177) at 10 cm, 0-630 (113) at 25 cm, 0-170 (34) at 50 cm, and 0-10 (2) at 100 cm. A total of 91 workers were exposed to these levels of UV from a few minutes to a few hours per day. All UV transilluminator sets were originally equipped with a UV blocking cover, but in most cases the cover was broken, out of place, or not utilized as intended. The workers generally used protective eyewear and surgical gloves, but often the skin of their arms, neck and face were directly exposed to UV. The results of this research as compared with current guidelines suggest that during the application of UV transilluminators, the potential for UV overexposure, particularly through the skin, is real.

18. MEASUREMENTS OF COSMIC RADIATION EXPOSURES OF COMMERCIAL FLIGHT CREW. M. Waters, T. Bloom, B. Grajewski, NIOSH, Cincinnati, OH

Introduction: A flight crew are exposed to elevated levels of cosmic ionizing radiation of galactic and solar origin and are among the more highly exposed occupational groups to ionizing radiation in the US, with annual doses ranging from 0.2-5 mSv. Cosmic radiation (CR) dose depends primarily on altitude and geomagnetic latitude. The purpose of this study was to measure CR doses on flights as a function of altitude, distance flown, latitude and longitude and to compare these measurements to doses estimated using an empirical model (CARI) developed by the Federal Aviation Administration.

Methods: Flight segments (n=17) included north-south, east-west, trans-arctic circle and trans-equatorial flights within 3 flight duration categories. CR measurements were made with two tissue-equivalent proportional counters (TEPC), recording the full lineal energy spectrum (0.2-1000 keV/um) every minute from gate departure to gate arrival. CR dose estimates were computed using CARI-3C for the same city pairs as the survey flights.

Results: Measured doses ranged from 0.64-15.6 uSv/flight. CARI estimates of equivalent dose were generally lower than the measurements for the same flight segments. The percent difference (n=17) ranged from +11% to -46% for flights <2 hours, -1.5% to -56% for flights between 2-8 hours long, and -14% to -44% for flights >8 hours. No trend in % difference between measured and estimated doses by flight time was found. With respect to flight

latitudes, the measured and estimated doses were in fairly good agreement for trans-equatorial flights but the % difference increased for higher latitude flights.

Conclusions: Few cosmic radiation measurement data exist for commercial aircraft routes. TEPC dose measurements tend to be greater than those estimated by the CARI model. Differences in measured versus modeled data should be considered when estimating doses CR with the CARI model for epidemiologic studies.

PF 104. Regulating the Right Hazards Rightly

Papers 19-24

19.

WHEN OSHA CAME TO HELP: LESSONS FROM A HAZARDOUS WASTE SITE AUDIT PROGRAM. R.

Wright, Jr., U.S. Army Corps of Engineers, Washington, DC; C. Duffield, U.S. DOL/OSHA, Washington, DC; D. Keyes, ATL International, Inc., Germantown, MD

Shortly after OSHA's HAZWOPER standard became effective, EPA enlisted OSHA's help in evaluating health and safety practices at Superfund sites. Since the Army Corps of Engineers manages many Superfund sites for EPA, the Corps has been the beneficiary of several OSHA site audits. Early OSHA findings suggested the need for changes not only in health and safety practices, but also in site communications. Changes made by the Corps in response to OSHA's findings resulted in more effective approaches to site PPE, monitoring, emergency response, and written programs across Corps-managed hazardous waste sites.

20.

HAZARDOUS WASTE CLEANUP AND EMERGENCY RESPONSE: WHEN MULTI-AGENCY COLLABORATION IS EFFECTIVE. M. Garrahan, U.S.

DOL/OSHA, Washington, DC; R. Turpin, U.S. EPA, Edison, NJ; D. Thornton, U.S. EPA, Washington, DC; D. Treanor, International Union of Operating Engineers, Washington, DC; N. Baird, ATL International Inc., Germantown, MD

When OSHA's HAZWOPER standard became effective, its scope encompassed scores of workers across the country, from hazardous waste site cleanup workers to emergency responders. In addition, multiple Federal agencies needed to implement or ensure implementation of its provisions. The initial response of several Federal agencies and labor organizations was to meet to discuss effective HAZWOPER implementation at hazardous waste sites. The initial purpose of the group was problem-solving for member organizations: identifying complex health and safety issues and working towards their resolution. Now, more than a decade later, the

OSWER/Labor Union Health and Safety Task Force still meets. The group's focus has expanded in recent years to cover the complexities of hazardous substance emergency response in an era of chemical and biological terrorist incidents and cleanup of illegal drug "Superlabs." The role of the group has shifted from problem-solving for member organizations alone, to problem-solving and outreach for the range of workers and organizations affected by the standard. And the membership of the group has broadened to include private sector representation. This presentation examines the evolution of the Task Force. It describes how specific efforts to engage each member organization, to keep abreast of current compliance issues, and to develop tangible products that benefit a broad range of individuals regulated under the standard have produced a viable, multi-agency collaboration. The presentation describes specific Task Force work products that resulted from multi-agency collaboration, and the communications and management strategies that seem most effective in producing them and sustaining the viability of the organization.

21.

INTERNATIONAL TRUCK & ENGINE CORPORATION: A CASE STUDY OF U.S. EPA'S COLLABORATION WITH INDUSTRY TO REDUCE THE USE OF LEAD.

T. McDaniel, International Truck and Engine Corporation, Springfield, OH; J. Haff, U.S. EPA, Chicago, IL

The United States Environmental Protection Agency has long had a priority of reducing lead in the environment and the workplace. Plans to reduce the volume and toxicity of all hazardous wastes have been a requirement from the early days of the Resource Conservation and Recovery Act. Continuing with the 33/50 Program in 1988, the U.S. EPA worked with industry to educate, inform, promote and communicate the benefits of pollution prevention. Now in 2001, the U.S. EPA is ready to launch a new initiative to encourage the reduction of persistent, bioaccumulative and toxic (PBTs) chemicals, specifically lead. Through an array of partnership programs known collectively as Partners for the Environment, U.S. EPA is demonstrating that voluntary goals and commitments are good for the environment and good for business. Working in collaboration with waste minimization and pollution prevention experts and industry leaders, a new generation of lead reducing initiatives is underway. International Truck and Engine Corporation has been involved in reducing lead from their Springfield Operations since the 33/50 Program days and is continuing to pursue reductions today. The benefits are measurable. Lead-containing hazardous and nonhazardous wastes, lead discharges to the stream and airborne lead exposures to employees have all been reduced. These initiatives have resulted from the combined efforts of countless indi-

viduals who have worked to understand the problems and desired to make changes for a better workplace.

22.

ARE WE PAYING TOO MUCH TO REDUCE RADIOLOGICAL RISK? H. Inhaber, Risk Concepts, Las Vegas, NV

The U.S. Department of Energy (DOE) is conducting the largest remediation or cleanup in history, on dozens of present or past nuclear weapons sites. According to "Accelerating Cleanup: Paths to Closure", the major document outlining DOE plans, the total cost of the cleanup, extending out to 2070, will be \$147 billion. A major objective is to reduce risks, primarily radiological, to the public. However, DOE has committed to extensive cleanup even when the risk to human health and the environment is vanishingly small. Some believe that it is ethically bound to do so regardless of how tiny the risks of these contaminants. But eliminating environmental hazards that pose virtually no risk to people or the environment poses real risks, primarily non-radiological, to remediation workers.

This study shows that spending to reduce risks to the public is about 5,000 of times higher than that for workers (non-radiological) risks. This poses another ethical dilemma: Are some risks "more equal" than others? Should more effort be spent on reducing real workers risk than hypothetical public risks that take place hundreds or thousands of years in the future?

In addition, where contaminated materials removed from a contaminated site are shipped across the country, ordinary citizens are at risk, since they travel the same roads. Accidents involving heavy trucks claimed about 5,300 lives in 1997. This panel will discuss how a balance can be achieved between the needs and risks of (a) local communities near DOE sites, (b) remediation workers and (c) taxpayers who may be misallocating spending.

In summary, this is the first study to intercompare the risks of an entire Department of Energy site. Results indicate that many more resources are allocated to radiological as opposed to non-radiological risks.

23.

UNDERSTANDING GROSS ALPHA AND GROSS BETA AMBIENT AIR CONCENTRATIONS AT LOS ALAMOS NATIONAL LABORATORY. C. Eberhart, J. Dewart, E. Gladney, Los Alamos National Laboratory, Los Alamos, NM

Radon and its decay products are the predominant sources of radioactivity in the ambient air. Only three of these radionuclides (lead-210 which decays to bismuth-210 and then to polonium-210) remain present in particulate matter samples for more than several days after collection due to the 22-year half-life of lead-210. Specific measurements of these radionuclides are not typically conducted because it is generally accepted that gross beta

The Premier Conference for Occupational and Environmental Health
and Safety Professionals

POWERFUL PARTNERSHIPS

Leveraging the power of collaboration to expand knowledge



ABSTRACTS



American Industrial Hygiene Conference & Expo

Cosponsored by AIHA and ACGIH®

June 1–6, 2002, San Diego Convention Center, San Diego, California

NIOSH LIBRARY SYSTEM

ALICE HAMILTON LIBRARY
4676 COLUMBIA PARKWAY
CINCINNATI, OH 45226

2002 Abstract Index by Session Topic



Platform Session Topic	Abstract No.	Platform Session Topic	Abstract No.
Aerosols	157-164	Management/Leadership	224-231
Agricultural Health and Safety	1-6	Occupational Epidemiology	25-31
Air Sampling Instrument Performance	79-86	Occupational Ergonomics: Training and Risk Assessment	7-12
Bioaerosols	165-173	Occupational Medicine/Occupational Epidemiology	148-156
Biological Monitoring	56-66	Personal Protective Clothing and Equipment	133-139
Community Environmental Health and Safety Issues and Social Concerns	121-126	Regulating the Right Hazards Rightly	19-24
Computer Applications in Industrial Hygiene	270-280	Respiratory Protection	185-195
Construction and Equipment	218-223	Risk Assessment in Industry and of Terrorism's Aftermath	196-202
Contaminant Control	140-147	Testing for Air Quality in the Garage	73-78
Current Topics in Noise and Hearing Loss	32-38	Toxicology and Toxicology Models (BPBK and QSAR)	47-53, 53,1-55
Dermal Exposures	174-184	Ventilation	95-102
Ergonomics Intervention	67-72		
Exposure Assessment Strategies I	39-46	Poster Sessions	Abstract No.
Exposure Assessment Strategies II	210-217	Poster Session 501	327-356
Gas & Vapor Detection	127-132	Poster Session 502	357-384
Health Care	112-120	Poster Session 503	385-413
Indoor Environmental Quality	242-250	Poster Session 504	414-442
Industrial Hygiene General Practice	251-262		
International Occupational Hygiene	232-241	Case Study Sessions	Abstract No.
Investigating Community Air Quality	203-209	Case Study 301	281-292
Ionizing and Nonionizing Radiation Risks: Measuring the Exposure	13-18	Case Study 302	293-303
Laboratory Health and Safety	87-94	Case Study 303	304-310
Lead I	103-111	Case Study 304	311-314, 317-318
Lead II	263-269	Case Study 305	319-326

PF 101 Agricultural Health and Safety

Papers 1-6

1. RELATIONSHIPS BETWEEN WORK EXPOSURE AND RESPIRATORY OUTCOMES IN POULTRY WORKERS.

S. Kirychuk, J. Dosman, P. Willson, L. Dwernychuk, University of Saskatchewan, Saskatoon, SK, Canada; J. Feddes, A. Senthilselvan, C. Ouellette, University of Alberta, Edmonton, AB, Canada

A pilot study was conducted on 74 poultry barn workers in Western Canada during the winters of 1998-2000. General respiratory health, current, chronic and work related respiratory symptoms; general work duties, and work-site factors were ascertained, pre-exposure, by questionnaire. Personal airborne exposure levels and changes in symptoms and lung function were measured across the work-shift for all workers. Workers were classified according to the type of poultry operation (floor based, n=53; cage based, n=13) in which they worked. There was no significant difference in daily hours spent in the barn between those who worked with caged poultry (5.41±2.35 hours) and those who worked with floor-based poultry (4.42±2.48 hours). Age of birds was 47.10±58.36 days for floor based versus 155.91±63.01 days for cage based facilities.

There were no significant differences in personal environmental measurements between cage-based and floor-based facilities (ammonia 13.22±13.70 ppm, 17.34±16.35 ppm; total dust 5.74±4.85mg/m³, 10.01 ±8.84 mg/m³; endotoxin 6046±6089 EU/m³, 5457±5934 EU/m³ respectively). There were no significant differences in across work-shift change in pulmonary function indices between workers from cage and floor-based operations. For the entire sample total dust dose (work hours/day x total dust) significantly correlated with across-shift change in FEV₁, whereas endotoxin dose and ammonia dose did not. Stocking density was significantly correlated with average ammonia (ppm, p=0.002) and ammonia dose (ppm x work hours/day; p=0.004) in floor based operations and with total dust (particles/ml, p=0.002) in cage based populations. Stocking density was also significantly correlated with chronic cough (p=0.003) and across work-shift cough (p=0.05) and chest tightness (p=0.06) for workers from floor based operations; and with phlegm when working (p=0.018) and chest tightness across the work-shift (p=0.004) for workers from cage based operations. Type of poultry production operation and therefore type of work exposures appear to significantly impact symptoms experienced by workers exposed to these atmospheres.

2. DUST GENERATION SYSTEM FOR AGRICULTURAL SOIL DUST. K. Lee, R. Domingo-Neumann, R. Southard, UC Davis, Davis, CA

Agricultural workers are prone to exposure to mixed dust of inorganic and organic compounds. Diverse working conditions and operations in agriculture make direct measurements of the mixed dust exposure difficult. This study was conducted to develop a new dust generation system to determine possible exposure potency indicators of soil samples. The dust generator consists of a blower, a rotating chamber and a settling chamber. The rotating chamber has inner baffles to provide sufficient agitation of the samples while the chamber is rotating. A blower provides air into the rotating chamber, and the suspended dust is moved to the settling chamber through a perforated pipe. A small fan inside the settling chamber helps maintain suspension of the dust. Various size fractions of dust are sampled on filters suspended in the chamber via outlet ports and attached pumps. Air pressure is released through a filter plate mounted on the wall of the settling chamber. Various operating conditions were evaluated: air intake from blower, speed of rotation, soil mass and sampling time. To evaluate the characteristics of dust from the system, we collected dust samples from agricultural fields while the soil was prepared for