

dermal burns. These cases suggest that Diphtherine is superior to water decontamination for bromoacetic skin splashes.

## 295. SAFETY PROCEDURES FOR OPERATIONS IN REMOTE LOCATIONS.

T. Mustard, Parsons, Denver, CO

**Situation:** This case study addresses hazards associated with environmental investigations and unexploded ordnance removal projects at remote locations such as military bombing ranges in desert locations or on remote islands and ecological studies in remote mountain ranges. Specific experiences in remotely located sites such as the Mojave Desert, South Dakota Badlands, Aleutian Islands, and the mountains of Colorado are discussed.

**Problem:** Access to these remote work areas required air transportation or extensive cross-country vehicle travel and/or hiking. In some cases work had to be conducted in harsh environments with little water, shade or shelter, and sometimes, severe topography was encountered. Field teams had to be prepared to deal with emergency situations in these environments. Depending on the site, hazards encountered included unexploded ordnance; dust storms and other weather extremes; and snakes, bears, moose, and other biohazards.

**Resolution:** Workers were trained in aircraft and ground vehicle safety, survival procedures, emergency communication, first-aid, and other hazard minimization techniques. Vehicles were equipped with survival gear, food, water, and radios. Coordination with military or civilian air-rescue services was necessary for extraction of critically-injured personnel. All of the projects were conducted with no lost-time incidents.

**Benefit to Others:** Other personnel conducting operations in remote areas will be able to draw on our experiences and implement similar procedures to minimize risk to their teams.

## 296. JOB EXPOSURE PROFILES AND WORK PLACE IMPROVEMENTS IN LEATHER TANNERIES-A CASE STUDY FROM TAMIL NADU, INDIA.

K. Balakrishnan, S. Sambandam, J. Arnold, Sri Ramachandra Medical College & Research Institute, Porur, Chennai, India; J. Hannak, Central Leather Research Institute, Adyar, Chennai, India

The tanning industry in India represents one of the oldest traditional occupational sectors. Nearly 50% of the tanneries nationwide are located in the state of Tamil Nadu. Most tanneries operate out of premises lacking even the most basic facilities required for a safe work environment. However, no systematic studies have been undertaken to establish the status of occupational safety and health in these tanneries.

The present case study documents (i) detailed hazard profiles for each process step, (ii) exposure profiles for select hazards, (iii) a health profile for the workers, (iv) specific workplace improvements implemented in select tanneries, and (v) initiatives to build

local capacities in order to sustain the sector specific occupational safety and health maintenance efforts.

Chemical safety and materials handling was the biggest area of concern and major improvements were made in many tanneries through low-cost, "show-how" programmes. Noise exposures in excess of prescribed standards at most work locations, were reduced by implementing locally designed, low-cost engineering controls. Occupational health monitoring and surveillance programmes were designed with active management participation. Hazard communication and emergency preparedness protocols, which were virtually non-existent, were developed and training administered to sustain the same.

The efforts described in the case study have resulted in a formal co-operative arrangement between the institutions represented by the investigators and the leather industry. Long-term plans to continue these efforts are underway.

Implementing even simplistic occupational safety and health programmes in developing country settings poses formidable challenges including lack of baseline information on hazards/exposures, weak enforcement of even existing legislation and management apathy. The present case study demonstrates what could be accomplished for a largely unorganised sector in modest settings through multiple stakeholder involvement. The study could serve as a model for implementing similar programmes for improving the welfare of working communities in the developing world.

## 297. AN ADVANCED TOOL FOR STREAMLINED INTEGRATED SAFETY MANAGEMENT.

T. Douglas, Alliant Corporation, Knoxville, TN; M. Williams, Williams Engineering Services Company, Inc., Albany, KY

A waste management contractor responsible for management of legacy wastes at federal sites in Tennessee and Kentucky, set standardization of ES&H practices as a business priority. The legacy wastes at each of the sites were similar enough that standardization of ES&H practices would significantly streamline management of worker protection and yield considerable efficiency gains.

Other than a general ES&H manual, no standardization mechanism was in place across the sites. Characterization of the wastes was such that each waste container drawn from inventory posed the possibility of new ES&H challenges that had not been encountered. The ES&H manual was of limited value in providing applied guidance when dealing with unique ES&H challenges that arose frequently.

Alliant Corporation was commissioned with utilizing information technology tools to leverage the ES&H planning conducted at each site and to capture it in a single system that stored the planning output in a retrievable format for subsequent use. A network database applica-

tion called the Activity Hazard Analysis System (AHAS) was developed using Microsoft® Access 2000 and Visual Basic for Applications. AHAS provides an electronic tool that the safety professionals use at each site to define work steps, hazards, hazard controls, and monitoring requirements. AHAS stores and indexes the ES&H planning product in a retrievable format for later use by other safety professionals at the same or different sites. Subsequent users can retrieve an existing Activity Hazard Analysis and use it as a template when planning for similar work.

Sharing this experience provides an applied example of how the work practice standardization concept was evolved into a field-deployed tool. It demonstrates how an ES&H tool can be used to better partner with business by ensuring worker safety is preserved through detailed planning that requires only a portion of the time previously necessary.

## 298. SIMULTANEOUS COMMUNICATION OF STUDY RESULTS TO WORKERS AND MANAGEMENT AT MULTIPLE LOCATIONS.

S. Ahrenholz, T. Kubale, NIOSH, Cincinnati, OH

The Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Health and Safety (NIOSH) Health-Related Energy Research Branch (HERB) conducts a program of independent occupational research at Department of Energy (DOE) facilities throughout the United States. HERB communicates the results of all of its studies to current and former workers at DOE sites. Simultaneous presentation of study results at multiple geographically distant sites needs to occur at or before the time the report is released to the general public.

Numerous challenges are encountered in the process of communicating the results of these epidemiologic studies. Challenges include: simplicity; speed; simultaneous release and communication of study results to workers and management; ability to reach current and former workers; development of a product that may be redistributed without modification; and follow-up by recipients seeking additional information. The first study where these challenges were addressed required the presentation of results from a mortality study involving almost 70,000 women from 12 DOE sites in eight states and four time zones.

Methods used included: a one-page document providing an overview of the study and how more information may be obtained; an e-mail contact list using a common e-mail program that facilitates simultaneous distribution of the document either as an attachment or a fax; conference call capabilities; video conference resources; and relayed distribution by site contacts of the one-page document contents to current and former workers. Additional information was available through NIOSH 800# resources and addresses and phone numbers of study author(s) and NIOSH were provided.

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## ABSTRACTS



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## PF 101 Agricultural Health and Safety

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### 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/m<sup>3</sup>, 10.01 ±8.84 mg/m<sup>3</sup>; endotoxin 6046±6089 EU/m<sup>3</sup>, 5457±5934 EU/m<sup>3</sup> 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 FEV<sub>1</sub>, 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