

Member companies of the Refractory Ceramic Fiber Coalition (RCFC) have implemented a comprehensive Product Stewardship Program (PSP) to assist in the evaluation, control, and reduction of workplace exposure to airborne refractory ceramic fibers (RCF).

Program recommendations are intended to help ensure proper handling, manufacture, storage, use, and disposal of RCF products. The PSP consists of seven key elements including: health effects research; communications; special studies; product research; workplace monitoring; study of workplace controls; and exposure assessments. A key element of the PSP involves workplace monitoring for airborne RCF.

Exposure samples collected as part of a voluntary consent agreement between RCFC and U.S. EPA were grouped into eight functional categories. The data from individual work tasks, comprising the functional categories, were disaggregated to identify high exposures. In striving for continuous improvements in reducing workplace exposures, as the RCFC member companies have formulated and implemented an Airborne Fiber Reduction Strategy for both manufacturing facilities and RCFC customers. Presented are some of the individual strategy elements and results of implementation in reducing airborne RCF exposures.

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EXPOSURE ASSESSMENT METHOD USED IN AN EPIDEMIOLOGICAL STUDY OF OCCUPATIONAL RISK FACTORS FOR PROSTATE CANCER. L. Eklund, J. Rosbott, R. Severson, R. Wabeke, Karmanos Cancer Institute, Detroit, MI

Prostate cancer (PC) is the most commonly diagnosed cancer among men in the United States today. It has not, to date, been considered to be an occupationally related cancer and there has been little effort devoted to searching for possible associations in this regard. A case-control study has been initiated to investigate occupational chemical risk factors for PC in the Detroit metropolitan area. This area is one of the most heavily industrialized regions of the United States with some of the highest PC rates in the world.

To determine occupational risk factors a method of expert review of occupational information is used to assess occupational exposures for each cancer patient and healthy control. This method has been developed and successfully applied by Dr. Siemiatycki in Montreal, Canada. The expert review involves a retrospective semiquantitative exposure assessment conducted by experienced industrial hygienists. The occupational information is obtained from a questionnaire completed during a personal interview conducted with each study subject.

Industrial hygienists examine questionnaires and translate each job into a list of exposures. Assigning exposures is done by means of a chemical coding checklist, which contains 305 compounds. Each chemical thought to be present is considered within the following major dimensions: (1) reliability — degree of confidence that the exposure actually occurred (possible, probable, definite); (2) concentration — low, medium, or high level of exposure; (3) contact — inhalation, cutaneous, or both routes of exposure; (4) frequency — duration of exposure per workday. The above exposure assessment parameters are ranked numerically. The described method has been used for about a

year by the industrial hygiene team. It appears to be a more comprehensive and objective approach to retrospective exposure assessment compared to the job exposure matrix method and other available exposure assessment techniques.

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A RETROSPECTIVE JOB EXPOSURE MATRIX FOR ESTIMATING EXPOSURE TO 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN. L.A.

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A job exposure matrix was developed to estimate cumulative 2,3,7,8-tetrachlorodibenz-p-dioxin (TCDD) exposure for a subcohort of 3538 workers at 8 of the 12 U.S. plants that produced 2,4,5-trichlorophenol or one of its derivatives between 1942 to 1984. These exposure estimates will be used in exposure-response analyses in an update of a 1991 NIOSH cohort mortality study.

The exposure matrix was developed to account for job, plant, and era dependent differences in TCDD exposure. The TCDD exposure estimates are based on (1) the concentration of TCDD in micrograms per gram present in process materials; (2) the duration of exposure to TCDD contamination, expressed as a fraction of a work day; and (3) a qualitative contact factor (0.05-1.5) to account for the extent of worker contact with the TCDD contaminated material. These three factors are multiplied together to yield a daily TCDD exposure score. The sum of the daily exposure scores constituted an individual's cumulative exposure score.

Daily TCDD exposure scores range from 0.001 to 1250. Cumulative TCDD exposure scores are distributed from 0.002 to 1,651,611 exposure score days. The TCDD cumulative exposure score, which incorporates both duration and level of exposure, provides a means for ranking workers for evaluating the relationship between TCDD exposure and mortality in a retrospective cohort study analysis.

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ASSESSMENT OF AMMONIA EXPOSURE DURING ANIMAL BEDDING CHANGE AND COMPARISON OF AMMONIA CONCENTRATION IN DIFFERENT TYPES OF BEDDING. M. Akram, E. Christman, Columbia University, New York, NY

This report summarizes the results of tests made to evaluate the potential for employee exposure to ammonia emanating from different types of bedding used in rat and mice cages by animal care facilities. The tests were undertaken after employees in the animal care facility expressed concern about potential exposure due to ammonia odor and associated health effects.

We used Draeger indicator tubes and passive diffusion dosimeters to measure the ammonia air concentrations over a period of time in a room housing rats and mice in the Columbia University Health Sciences Division. The animals were housed in typical shoebox cages each containing 1-2 rats or 3-5 mice. Each cage was equipped with a wide bar lid that held a water bottle and a container for pelleted feed. The cages were held in typical stainless steel shelf racks. The food and water were supplied to the animals ad lib.

Two types of bedding, alpha dry wood chips or corn cob chips, were used. All the cages were filled with the same type of bedding at any given time. The test result showed that the breathing zone air concentrations of ammonia (generated as the excreta of the animals decomposes) was 1-2 ppm. The concentration was approximately four-to-six times greater when the corn cob bedding was used rather than the alpha wood chips. Although the personal exposure levels, 0.4 to .75 ppm, calculated as an eight-hour TWA, are well below the OSHA PEL (25 ppm), they are within the published odor thresholds for ammonia (0.043 to 53 ppm) resulting in odor complaints and exposure concerns. These results suggest that consideration of the type of animal bedding used in these facilities should include employee concerns about odor and potential exposure.

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COMPARISON OF HIGHEST SHORT-TERM EXPOSURE INTENSITY AND CUMULATIVE EXPOSURE METRICS IN A CASE-CONTROL STUDY OF SILICOSIS. G. Liu, P. Succop, C. Rice, University of Cincinnati, Cincinnati, OH

This report summarizes the result of an exposure-response analysis for developing silicosis with respect the highest silica exposure task metric. Previous study of cases only demonstrated that the highest job exposure intensity during the work history was an important determinant in the development of silicosis. This is the first investigation of any relationship between silicosis and the highest exposure task (HET) metric. Two-hundred sixteen cases and 672 controls were selected from the North Carolina dusty trades files. The environmental sampling data, historical occupational data, and chest X-ray readings were collected from 1935 to 1980. Four exposure groups were defined for each metric, intensity of HET, and cumulative exposure. The correlation coefficient between the two metrics was 0.10. The means for each group were statistically different ($p < 0.05$) from adjacent groups for each metric. The lowest exposure group is the referent. The odds ratio for groups 1, 2, and 3 vs. referent for both metrics were calculated using the Cochran-Mantel-Haenszel procedure. The odds ratio for HET metric were 1.21 (95% CI=0.77-1.88), 3.02 (95% CI=1.89-4.84), and 4.65 (95% CI=2.89-7.47), respectively. The odds ratio for cumulative exposure were 0.75 (95% CI=0.49-1.13), 1.91 (95% CI=1.26-2.88), and 3.65 (95% CI=2.10-6.34), respectively. The odds ratios using the HET metric were approximately 1.5 times higher than that of the cumulative metric; however, the difference was not statistically significant. These results indicate that control of highest exposure may reduce the risk of silicosis.

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DEMONSTRATION OF NIOSH DIFFUSIVE SAMPLER EXPOSURE SYSTEM. J.H. Shafer, M. Parker, C. Manning, Assay Technology, Inc., Palo Alto, CA

Two years ago a universal exposure and validation system (EVS) was developed for NIOSH by Assay Technology. A description of the EVS and preliminary qualification data were presented at the 1996 AIHCE. Since then final design and testing have been completed. "As built" specifications are as follows.

Chamber Capacity: Can simultaneously

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Abstracts

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