ardous chemicals or by careful in-house design of exhaust ventilation systems. The results also stress the need for employers to routinely monitor employees' exposures and implement control measures when necessary.

265.

A HAZARD EVALUATION OF *CRYPTOCOCCUS NEOFORMANS* AND *HISTOPLASMA CAPSULATUM* EXPOSURE AT A SILICA PLANT IN RESPONSE TO A CASE OF CRYPTOCOCCAL MENINGITIS. B. King, D. Trout, S. Lenhart, NIOSH, Cincinnati, OH.

NIOSH researchers conducted a health hazard evaluation (HHE) at a facility that produces ground silica for paints, glass, and various other sand products. The evaluation was in response to a request made by the company management regarding potential employee exposures to the fungi *Cryptococcus neoformans* and *Histoplasma capsulatum* associated with large accumulations of bird manure. An employee who had worked at the plant had been diagnosed with cryptococcal meningitis. These concerns centered around an old screen tower at the plant. The screen tower, built in 1937, is a seven-story building, which the plant had used infrequently after a new tower was built in the 1950s. Due to holes in the walls and ceiling used as entry points, the old screen tower had become a roosting site for pigeons and other birds. The result was the build-up of several inches to a foot of guano on the top floors of the building. During the evaluation, the NIOSH investigators performed a walk-through of that building and others of concern at the plant. Additionally, meetings were held with employees, union officials, and management to answer questions and address concerns. Informational material, including the NIOSH-produced CDC guidelines, "Histoplasmosis: Protecting Workers at Risk," was distributed. The NIOSH investigators concluded a potential health hazard existed in the old screen tower, although it was impossible to directly relate the current illness of the employee with a specific occupational exposure at the site. Recommendations were provided for both immediate and long term measures which the company could implement for prevention of employee exposure to these fungi. These included the use of personal protective equipment such as full facepiece, powered air-purifying respirators (PAPRs), disposable coveralls and gloves during work in the screen tower, re-evaluation of current work duties in the building, and removal or isolation of the guano.

266.

A FOLLOW-UP STUDY OF VISION DISTURBANCES AMONG WORKERS AT A PRINTING COMPANY. G. Burr, M. Methner, E. Page, NIOSH, Cincinnati, OH.

Background. NIOSH received a request for a health hazard evaluation from a label printing company where employees in the Line Division of the plant were experiencing intermittent blurred vision, but workers in an adjacent area (the Prime Division) were not experiencing visual disturbances. In 2001, following medical questionnaires, eye exams, and extensive industrial hygiene monitoring for two types of tertiary amine compounds, dimethylaminoethanol (DMAE) and dimethylisopropanolamine (DMIPA), NIOSH investigators associated amine exposure with visual and ocular changes. In 2002, following various production changes by the company, NIOSH investigators conducted a follow-up survey to collect additional air samples and to interview employees on the extent of any visual problems. **Methods.** A total of 108 and 125 full-shift personal breathing-zone air samples for these amines were collected in the initial and follow-up studies, respectively. Air samples were collected on XAD-7 sorbent tubes and analyzed by gas chromatography/flame ionization detection. **Results.** In the Line Division, while mean time-weighted average (TWA) concentrations of DMAE declined from 2.3 to 0.76 mg/m^3 between the initial and follow-up surveys, mean TWA DMIPA concentrations declined sharply from 7.8 mg/m^3 to trace amounts (<0.36 mg/m^3). In the Prime Division, between the initial and follow-up surveys, mean TWA concentrations of DMAE remained essentially unchanged (3.2 vs. 3.1 mg/m^3) while concentrations of DMIPA declined from 1.9 mg/m^3 to trace levels. In contrast to the initial survey, none of the employees reported visual disturbances during the follow-up study. **Conclusions.** Exposure to both the tertiary amines DMAE and DMIPA was initially associated with visual and ocular changes. Following production changes by management in an effort to lower amine concentrations, NIOSH investigators, in a follow-up survey which included additional air samples and employee interviews, concluded that DMIPA had been responsible for these visual disturbances.

267.

WORKERS' EXPOSURES TO HEXAVALENT CHROMIUM, AND OBSERVED EXPOSURE-CONTROL TECHNOLOGIES, IN A LARGE INDUSTRIAL BOILER-REFURBISHING OPERATION USING ATOMIZED ALLOY-SPRAY "METALLIZATION" COATING PROCESS. L. Blade, NIOSH, Cincinnati, OH; J. Catalano, Battelle, Seattle, WA.

The National Institute for Occupational Safety and Health (NIOSH) conducted 21 field surveys in selected industries, to characterize workers' exposures to hexavalent chromium-containing airborne particulate and evaluate existing exposure-control technologies. Hexavalent chromium (Cr[VI]) is a respiratory irritant, and chronic inhalation may cause lung cancer. Primary evaluation methods included collection of full-shift, personal breathing-zone (PBZ) air samples for Cr(VI), measurement of ventilation-system performance parameters, and recording of descriptive information about processes, work practices, and personal protective equipment. One field survey evaluated the refurbishment of a large industrial boiler at a paper mill. Inside the multi-story combustion chamber of the boiler, abrasive blasting was used to remove corrosion from the surfaces of the steam tubing surrounding the chamber and prepare the surfaces for the application of a metal-alloy protective coating. The application of this coating was performed with a "metallization" process, which uses an electric arc to melt the metal alloy, provided as a wire feed to a hand-held spray-application unit, and compressed air to atomize the molten alloy and propel it onto the surface. Process conditions oxidize some of the metallic chromium in the alloy to Cr(VI), and generate fumes, creating a potential for inhalation exposures to workers. Workers' PBZ exposures during 300-minute spray-application periods, measured outside their respirators, exceeded 1100 micrograms of Cr(VI) per cubic meter of air (μg/m^3), far exceeding the 1 μg/m^3 NIOSH recommended exposure limit (REL). The NIOSH assigned protection factor of the painting-type supplied-air respirator hoods used is only 25. Full-shift PBZ exposures to workers who remained outside the chamber during spraying, and did not wear respirators, ranged up to 47 μg/m^3, exceeding the REL. NIOSH researchers believe that both better ventilation and more-protective respirators are needed to improve worker protection.

268.

GUIDELINES FOR TROUBLE-SHOOTING HIGH LEAD EXPOSURE PROBLEMS IN INDOOR FIRING RANGE. A. Khan, NIOSH, Cincinnati, OH.

The National Institute for Occupational Safety and Health (NIOSH) was contacted by a federal agency regarding concerns about potential lead exposures to its officers in its newly designed indoor firing range. NIOSH researchers investigated the lead exposure problems and narrow down the causes for the lead exposures in the range to two problems. Range overhead garage door was a major source of leakage into the facility, and the downrange airflow velocity at the firing line was inadequate. A smoke generation machine confirmed that lanes closest to the overhead door had more eddies and back-flow, causing turbulence near the shooters and flow of lead contaminated air back to the shooter. Upon the recommendation of NIOSH researchers, the overhead door was removed and the wall was completely sealed with concrete blocks. The airflow velocity measured at the firing line when the system was operating under maximum capacity was inadequate. NIOSH researchers recommended upgrading the ventilation of the range by replacing the existing 30HP with 50HP electrical motors. The air velocity measured at the firing line with the upgraded ventilation was found to be much

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