

HEALTH BULLETIN

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Occupational Exposure to Epoxy Resins, Hardeners and Solvents

A new study of workers at the Department of Energy's Oak Ridge Gaseous Diffusion Plant (ORGDP) was published in the December 1992 issue of the Journal of Applied Occupational and Environmental Hygiene (7:826-834, 1992). The purpose of the study was to determine if workers exposed to certain chemicals in centrifuge rotor manufacturing and testing processes had higher rates of cancer or other diseases than other workers at the plant. Between 1963 and 1985 centrifuge rotors were manufactured from fiber reinforced epoxy resins and were built on automated machines controlled manually by operators. These workers were potentially exposed to several types of chemicals and solvents used in the process.

All workers whose jobs were likely to involve routine exposure to epoxy resins, amine hardeners, or solvents in centrifuge rotor manufacturing or testing processes were identified from plant employment records. These centrifuge plant workers are referred to as the "exposed" group. Employees who did not work in the centrifuge rotor manufacturing area were eligible to be in the comparison group ("unexposed"). To ensure that the two groups were comparable with respect to other factors (see epidemiologic note) that could influence disease rates, the "unexposed" workers in the comparison group were matched to the centrifuge workers by age, race, sex, and date of hire. Each "exposed" and "unexposed" worker was interviewed by telephone to collect information on his complete job history, lifetime occupational exposures, smoking habits, alcohol consumption, and other factors related to health. A total of 263 centrifuge workers and 271 "unexposed" workers were interviewed.

The centrifuge workers were more likely than the "unexposed" group to report having worked with benzene, chromium, radioactive materials, trichloroethylene (TCE), phenol, and methylene chloride. These exposures could have occurred in any job at ORGDP or during employment elsewhere.

The centrifuge workers were more likely than the "unexposed" group to report having experienced symptoms like dizziness and numb or tingling limbs. These symptoms have frequently been reported in the scientific literature to occur among workers who have high exposures to solvents. The centrifuge workers were more likely than the "unexposed" group to report experiencing skin rashes, which are known to be associated with epoxy resin exposure. The centrifuge workers were more likely than the

"unexposed" workers to have had kidney stones.

Five of the centrifuge workers were diagnosed by their physicians as having bladder cancer, while none of the workers in the "unexposed" group reported having bladder cancer. The five bladder cancers occurred 10 to 20 years after beginning work in the centrifuge process. Although one of the epoxy resins used in the early years of the centrifuge process at ORGDP may be associated with bladder cancer, none of the five workers had any job that required "hands-on" work with this or any other epoxy resin materials. However, four of these workers reported having been exposed to solvents. All five of the workers were former or current smokers. With the information available for this study, the researchers were unable to identify a specific cause for the bladder cancers.

No other conditions were reported to occur with significantly greater frequency among the centrifuge workers than among the "unexposed" group. Because the cause of the bladder cancers is unknown, it will be necessary to continuously monitor these centrifuge workers for the occurrence of cancer and to continue to investigate the types of exposures the workers with cancer might have had in common. Martin Marietta Energy Systems has initiated a comprehensive screening program for former workers in the centrifuge process. Under a Memorandum of Understanding, further epidemiologic studies of these workers will be managed by the National Institute for Occupational Safety and Health.

Epidemiologic Note:

Disease rates vary by many different factors like age, sex, ethnic background, and others. For example, cancer rates are higher in adults over the age of 50 years than in younger adults. When a factor is related both to the disease and to the exposure of interest, it is called a "confounder." For example, age is related to disease rates and is also related to certain employment factors like the number of years employed. If an exposed group and a comparison group are different with respect to one or more of these "confounders" it is difficult to determine whether differences in disease rates are due to the exposure or to the "confounder." To control for the effects of these confounders, epidemiologists use several techniques. One technique is to "adjust" for the confounders in the analyses. For example, the rate of disease for each age group in the exposed group is compared with the corresponding rates by age group in the comparison group. Another technique is to select a comparison group with the same distribution by the confounding factors (e.g., age, sex, race) as the exposed group. This is called "matching."

This Health Bulletin is one in a series of routine publications issued by the Office of Health to share data from health studies throughout the DOE complex. The authors' conclusions do not necessarily reflect those of the Department. For more information contact: Dr. Terry L. Thomas, Director, Health Coordination and Communication Division, Office of Epidemiology and Health Surveillance, U.S. Department of Energy, Washington, D.C. 20585; Telephone (301) 903-5328.