



Glossary of Terms

Cohort: Population of individuals who share a common characteristic, such as employment at a particular factory.

Confounders: Risk factors that are associated with both disease and exposure in the source population.

External Radiation: Radiation which is given off by a nuclear or X-ray source outside the body.

Genito-Urinary: Pertaining to the genital and urinary organs.

Healthy Worker Effect: Occurs when fewer deaths are observed for workers in an industry compared to the U.S. population; usually due to the selection of healthy employees from the population and the exclusion of the severely ill and chronically disabled from employment.

Mortality Among Female Nuclear Weapons Workers

Investigator: Gregg S. Wilkinson, M.A., Ph.D., Professor, Department of Social and Preventive Medicine, State University of New York at Buffalo.

Study Population: A total of 67,976 women who worked at any of the following 12 Department of Energy sites before January 1, 1980: Oak Ridge (X-10, Y-12, K-25), Los Alamos National Laboratory, the Zia Company, Rocky Flats, Hanford, Mound, Savannah River, Fernald, Pantex, and Linde (closed in 1949).

How This Study Was Done: This study examined the occurrence of deaths among female nuclear weapons workers who worked at any of the 12 sites included in the study. The number of deaths that occurred among these workers was compared with the number of deaths expected to occur based on the mortality experience of the United States female population. The study also attempted to determine if there is a relationship between exposure to ionizing radiation and deaths due to certain diseases. The study report and findings were externally peer reviewed.

Study Findings: For most causes of death, including cancers related to ionizing radiation, fewer female workers died than would be expected based on the U.S. female population. For the entire study population, researchers expected 18,106 deaths from the start of operations through 1993, but found only 13,671 deaths. At all of the sites, the number of deaths were either similar to or lower than expected. These findings are not unusual for worker populations (due to the healthy worker effect).

There were certain causes of death that occurred more frequently than expected:

- More female workers died from mental disorders than expected (92 deaths expected, 135 deaths found). More female workers died from certain genito-urinary diseases than expected (89 deaths expected, 115 deaths found). More female workers died from ill-defined conditions than expected (182 deaths expected, 296 deaths found). The explanation of these findings is difficult because mental disorders, genito-urinary diseases, and ill-defined conditions are broad categories.

Further NIOSH Information:

- For a copy of the abstract or the final technical report for this study, call:

1-800-356-4674

- For a summary of NIOSH research involving Department of Energy workers, visit online at:

www.cdc.gov/niosh/oeindex.html

Additional Information:

- For information about medical monitoring for former Department of Energy workers, visit online at:

tis.eh.doe.gov/workers/program.html-ssi

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Additional analyses of 21,440 female workers monitored for external radiation at the sites (excluding Linde and Mound) were conducted to explore the relationship between ionizing radiation and deaths from specific causes.

- An increase in leukemia mortality was observed among female workers who were more highly exposed to external radiation.
- It appears that there may be increases for all cancers combined, breast cancer, and hematologic cancers among female workers who were more highly exposed to external radiation.

Study Limitations:

- The fact that fewer deaths than expected were found raises the concern that undercounting of deceased female workers occurred.
- Recorded doses for external radiation are potentially subject to error because of inconsistent dose monitoring practices across sites, especially during the early years of operation, and because certain types of radiation such as neutrons were not measured very well in the past.
- Potentially important confounders such as lifestyle factors (e.g., smoking), radiation due to medical procedures, age-at-exposure, and other workplace exposures could not be evaluated.

Important Announcements

Dr. Wilkinson will discuss study findings in a live satellite presentation from Washington D.C. on Thursday, June 29, 2000, at 1:00 p.m., EDT. Broadcast of this presentation will be held in Room 111 of the Health and Safety Building and the Services Building Conference Room. Presentation will be videotaped and made available at the site. For more information please contact DOE site representative, Gary Stegner at (513) 648-3153.

Questions concerning this study should be directed to NIOSH and Dr. Wilkinson at (513) 841-4400. Questions regarding proposed DOE compensation programs need to be directed to the DOE site representative listed above.

NIOSH/HERB Contact Points for further information...

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