



# National Institute for Occupational Safety and Health Announcement of Findings

March 2005

## Glossary of Terms

**Healthy Worker Effect:** Fewer deaths are observed among workers when compared to the U.S. population. This is usually due to the employment of healthy workers and the exclusion of the severely ill and chronically disabled from employment.

**Cohort:** A group of persons identified by common characteristics who are selected into a study group and studied over a period of time.

**Confidence Interval (CI):** Confidence intervals reflect uncertainty in the stated standardized mortality ratio. Larger intervals indicate greater uncertainty.

**Standardized mortality ratio (SMR):** Ratio of the number of deaths observed in the study group to the number of deaths expected based on rates in a comparison population.

**Lagged analysis:** A data analysis technique that ignores more recent exposures since chronic diseases such as cancer take long periods to develop, in which case earlier exposures are possibly more relevant.

## Mortality Update for the Pantex Weapons Facility

### Investigators

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### Study Population

The current NIOSH study included 4,668 males and females of all races ever employed at the Pantex facility between the start of operations in 1951 and December 31, 1978. Cause of death was collected for 1,031 former employees who had died prior to December 31, 1995.

Since the current study used employment records obtained from a previous study, complete work history information was available only for the 2,721 workers who died or terminated employment before 1979. Length of employment analyses were limited to these “early-term workers.” All other analyses included the full NIOSH cohort.

### How This Study Was Done

This study compared deaths among Pantex workers with deaths expected to occur based on United States population death rates. Additional analyses evaluated whether risk of death from specific diseases was related to length of employment.

Based on a site summary report of the Pantex Plant by the Agency for Toxic Substances and Disease Registry (ATSDR), deaths from leukemia, malignant pleural mesothelioma, and cancers of the lung, bone, prostate, brain, breast, thyroid and all cancers combined were of particular interest.

### Study Findings

Approximately 78% of the cohort of 4,668 workers was still alive through the study end date, December 31, 1995. Deaths from all causes combined were significantly less than expected in the full NIOSH cohort when compared to the United States population (SMR=0.81, 95% CI=0.76-0.86, 1,031 deaths), but was very close to expectation in the early-term subcohort (SMR=0.98, 95% CI=0.92-1.05, 800 deaths). Lower mortality in the full cohort is consistent with the “healthy worker effect” which is found in many occupational epidemiologic studies.

Deaths from “all cancers combined” were also below expectation in the full NIOSH cohort (SMR=0.78, 95% CI=0.69-0.88, 258 deaths) and in the early-term subcohort (SMR=0.86, 95% CI=0.74-1.00, 178 deaths). No

deaths from bone or thyroid cancer occurred. Lung cancer mortality was below expectation in both the full NIOSH cohort and the early-term subcohort.

Brain cancer mortality, reported as elevated in a previous study of Pantex workers, was below expectation in the full cohort (SMR=0.51, 95% CI=0.17-1.19, 5 deaths) and in the early-term subcohort (SMR=0.67, 95% CI=0.18-1.71, 4 deaths).

*Length of Employment Analyses of the Early-Term Subcohort:* Leukemia mortality was elevated in the early-term subcohort (SMR=1.47, 95% CI=0.73-2.63, 11 deaths) but showed no increased risk when comparing longer term workers with those who worked shorter periods.

Deaths from prostate cancer were close to the number expected (SMR=1.03, 95% CI=0.55-1.76, 13 deaths) with a 10-year lag. However, risk of death from prostate cancer showed a statistically significant increase with increasing length of employment when using 10 and 15-year lags.

Deaths from multiple myeloma were elevated (SMR=2.09, 95% CI=0.76-4.55, 6 deaths) with a 10-year lag, and the multiple myeloma mortality risk showed a statistically significant increase with increasing length of employment when 10 and 15-year lags were used.

### Discussion

The majority of the cohort was still alive at the end of 1995. This fact plus the short average length of employment in the early-term subcohort leads to uncertainty in the risk estimates.

Two causes of death, prostate cancer and multiple myeloma, show positive trends with length of employment. However, exposure data were not collected for the study population. Obtaining radiological and chemical exposure data might allow assessment of whether specific occupational risk factors may be responsible for the increased risk.

Because healthy long-term workers were not included in the analyses of length of employment, risks may be overestimated for the longer employment period categories. Healthy worker effect may be part of the reason positive results were observed in the time-trend analyses.

### Conclusion

A statistically significant trend of increasing risk with increasing length of employment was seen for both prostate cancer and multiple myeloma, though these results may have arisen from study bias. Further investigation, using complete exposure information and employment history, might confirm these results and allow assessment of the impact of specific occupational risk factors, such as radiological and chemical exposures, on mortality.

### *Further NIOSH Information*

For a copy of the final report, call:  
1-800-356-4674

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

<http://www.cdc.gov/niosh/2001-133.html>

### ***NIOSH/HERB Contact Points for Further Information...***

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