

³ Unpublished report. A preliminary report of cancer incidence in a group of workers exposed to ethylene oxide. Clinical Epidemiology Unit, University of Pennsylvania, School of Medicine, April 25, 1986.

⁴ Shore R, Gardner M, Pannett B *et al.* Ethylene oxide: An assess-

ment of the epidemiological evidence on carcinogenicity. *Br J Ind Med* 1993; 50: 917–97.

⁵ Steenland K, Stayner L, Griefe A *et al.* Mortality among workers exposed to ethylene oxide. *N Engl J Med* 1991; 324: 1402–07.

Authors' Response

From SANDRA A NORMAN, JESSE A BERLIN, KEITH A SOPER, BRUCE F MIDDENDORF AND PAUL D STOLLEY

Sir—As Lucas and Teta state, the results of our study of cancer incidence in a group of workers potentially exposed to ethylene oxide have been reported and interpreted with due caution. We, too, were concerned about the issue of increased awareness and early detection. Thus, as stated in the article, in addition to comparisons of observed numbers of cases to those expected using the National Cancer Institute's SEER data, we also compared the number of breast cancers observed to those expected based on cancer incidence rates in Western New York, where the plant was located. Love Canal is also located in the eight-county area encompassed by the Western New York Tumor Registry. If heightened concern about cancer risk in the area from publicity about Love Canal resulted in more screening and early detection of breast cancer, breast cancer incidence rates in Western New York should have been higher than the SEER rates. This was not the case, as is stated in the article. We also noted in the article that none of the 12 breast cancer cases was discovered by screening carried out by the Health Appraisal Project.

Lucas and Teta suggest that using duration of employment and time from first exposure as stratifying

variables would have provided more useful information concerning the likelihood of a work-related association. We agree that ideally this type of analysis is preferable for very large studies. However, stratification on multiple levels related to duration of employment and/or latency could have resulted in serious loss of sensitivity due to the small size of our cohort. Nor is multivariate modelling an attractive alternative to stratification in these data due to the small number of cases. Further, because there was not consistent monitoring of exposure, and because there were some intermittent leaks of ethylene oxide at the plant, it is not clear that the factors suggested by Lucas and Teta would much improve the rough measures of potential exposure in our paper. The regular employees worked at the plant for a considerably longer time, on average, than the temporary employees. Also, results for analyses assuming latency periods of 2–5 years were similar to those that did not include a latency period.

For cancers like breast cancer, for which survival is relatively high, incidence studies, although difficult, are especially relevant. Mortality studies alone will not suffice unless there is sufficient follow-up to include development of cancer after exposure and then death. Nevertheless, we agree that, given the inconsistency of findings in the literature, the relationship between ethylene oxide exposure and breast cancer risk is still not known.

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