exposure was available either as an average for the cohort as a whole, or for individual subgroups. Seventeen such cohorts were identified (Albin *et al.*, 1990a; de Klerk *et al.*, 1994; Dement *et al.*, 1994; Enterline *et al.*, 1987; Finkelstein, 1984; Hughes *et al.*, 1987; Liddell *et al.*, 1997; McDonald *et al.*, 1983b, 1984; Neuberger and Kundi, 1990; Newhouse and Sullivan, 1989; Peto *et al.*, 1985; Piolatto *et al.*, 1990; Seidman *et al.*, 1986; Seidman and Selikoff, 1990; Sluis-Cremer *et al.*, 1992; Talcott *et al.*, 1989). Three of the selected cohorts have been split into sub-cohorts which have been separately treated in this review: the South African crocidolite and amosite mining cohorts have been treated separately; the New Orleans asbestos cement cohort has been split into the two separate plants covered, since the mix of fibres used in the two plants was different; and the Carolina textile cohort has been split by sex, since the results for men and women were rather different. The cohorts have been referred to by their geographical location except for cohorts 3 (Enterline *et al.*, 1987) and 17 (Newhouse and Sullivan, 1989) which are identified by a company name, and cohort 15 (Albin *et al.*, 1990a) where the name of the principal author on the cohort has been used.

Information extracted

Information was extracted from the identified reports on the following:

- The number of deaths in the cohort from all causes and from lung cancer, and the corresponding SMRs;
- Dose specific lung cancer SMRs (or rates), where available;
- The number of mesothelioma deaths in the cohort (for pleural and peritoneal mesothelioma separately);
- The rates of mesothelioma by categories of time since first exposure;
- The process/type of work being carried out;
- Cohort recruitment period and duration of follow up;
- Average age at first exposure, when available;
- The type(s) of asbestos fibre used in the process;
- The average fibre levels for the entire cohort and the average employment duration for workers in the cohort, or simply the average cumulative exposure for the entire cohort;
- Information about the smoking habits of the workers in the cohort where available;
- The sex of the workers.

Some general issues on the summary of outcome and exposure measures are discussed below. A more detailed discussion on some of these points is given in Appendix A, and the extracted data is shown in full in Tables 12 and 13.

Excess lung cancer measure

Excess overall lung cancer mortality has been expressed as a percentage excess of expected lung cancer mortality per unit of cumulative exposure.

$$R_L = 100(O_L - E_L)/(E_L.X)$$

Where O_L and E_L are the numbers of observed and expected lung cancers, respectively and X is cohort mean exposure. This estimate of the lung cancer risk is described as the 'cohort average' estimate. 95% confidence limits for the cohort average estimate R_L have been calculated assuming a Poisson distribution for O_L.

Mesothelioma measure

Mesothelioma mortality was expressed as a per cent of expected mortality from all causes (adjusted to an age of first exposure of 30) per unit of cumulative exposure.

$$R_M = 100O_M/(E_{Adj}X)$$

Where O_M is the number of mesothelioma deaths, E_{Adj} the total expected deaths from all causes adjusted to an age of first exposure of 30, and X the mean cumulative exposure. (See Appendix A for a discussion of this measure, and the calculation of E_{Adj}). When the expected all causes mortality was not available, the denominator was taken to be the total observed deaths less the total of asbestos-related deaths (mesothelioma, asbestosis and any excess lung cancer deaths). A 95% confidence interval for R_M was calculated assuming a Poisson distribution for O_M.

Treatment of 'best evidence' cause of death data

In some studies causes of death have been assigned in two ways, one based purely on data given on the death certificates (DC), the other using other data (e.g. autopsy reports) to establish a 'best evidence' (BE) cause of death. For lung cancer this review has generally used the DC data, since this preserves comparability with the reference rates, and with the majority of other studies. For mesothelioma however, the BE data has been used, since reference rates are inappropriate, and most studies use some sort of best evidence judgement to identify mesotheliomas.

It might be thought that where reference rates are derived from DC data (as in the SMR analyses in this report) the observed deaths on a DC basis should always be used. The argument is not as clear cut as it seems. The coding of death certificates is subject to a range of errors, and the net error in the count of deaths coded to lung cancer on national death certificates will be determined by the balance of these errors across the whole population. One of these errors is the tendency of pleural mesothelioma deaths to be coded to lung cancer. In the population as a whole,