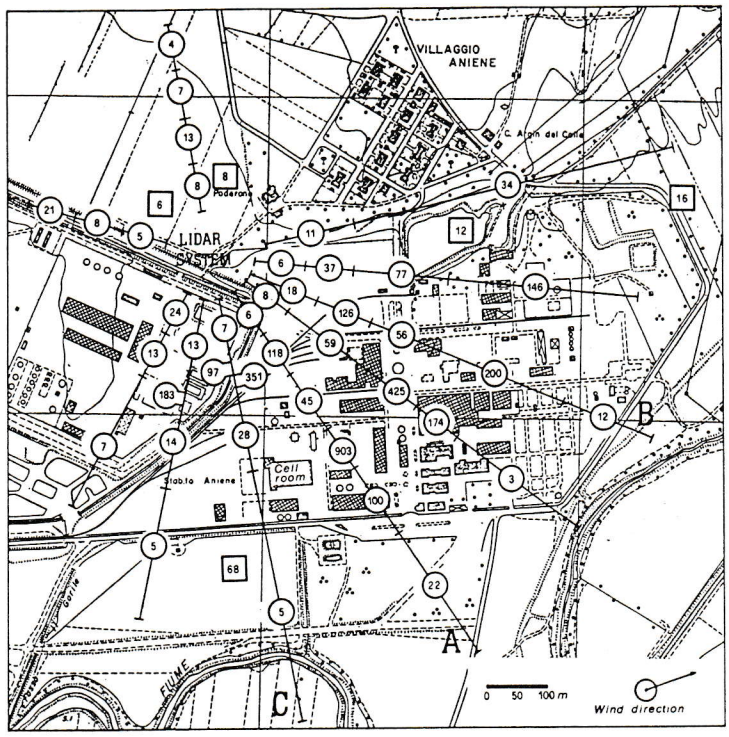

Fig. 2. Horizontal map of the mercury distribution above the chlor-alkali complex measured by the lidar. Along the given measurement directions, mean mercury concentrations were evaluated as presented in the circles for the integration intervals marked along the lines. The length of the integration intervals were selected depending on the concentration level of mercury. The results of point monitors are included in square boxes.

and downwind from this mercury source. A smaller mercury source with a concentration reaching 351 ng m^{-3} seems to be present at about 200 m from the lidar van position. Until now the cause of this emission is unclear, even though the material removed from the settling tanks, formerly dumped in the nearby field, can be suspected.

The mercury levels measured in the atmosphere decrease rapidly a few hundred meters from the plant, reaching values quite comparable to the background ones outside the industrial area of the complex.

Mercury determinations with point monitors were performed outside the complex. They give comparable results to those obtained with lidar, with the exception of the value (68 ng m^{-3}) measured southwards from the electrolytic cells, probably due to the falling mercury vapour.

In Fig. 3 vertical profiles of atmospheric mercury concentrations measured in two directions are plotted; the presence of two plumes reveals the existence of two distinct mercury sources as stated above. A maximum concentration value greater than 1000 ng m^{-3} was determined at a height of 10 m in the plume from the cell rooms. An example of a horizontal scan of the atmospheric mercury levels over the same area is given in Fig. 4, where the lidar curve showing the ratio between the on and off resonance line of mercury for one of the directions is inserted. A horizontal ratio curve is obtained in the absence of mercury while its presence is evinced from the slope of the curve, which is directly related to the atmospheric mercury concentration.

In Table 1 the results of atmospheric mercury measurements performed with the lidar system are reported together with the speed and direction of the wind. In the last column of the same table the flux values from the mercury sources are also indicated. Measurements were carried out downwind from the cell-room area, where the two plumes were located.

The flux values have been calculated by integrating the mercury concentration over the area of the plume cross-section and then multiplying the integrated content by the component of the wind speed perpendicular to the scan.

The two lowest values were observed in a position (C) upwind from the main emission source. Analysing our data we find that the average nighttime value (56 g h^{-1}) is higher than the daytime average (36 g h^{-1}). From 10 p.m. to 6 a.m. the chlor-alkali complex increases the chlorine production because of the lower cost of electricity and we observe this fact reflected in a higher mercury emission.

It is important to point out that the data reported in Table 1 are the first direct measurements aimed at an evaluation of the mercury flux to the atmosphere of a