Fig. 4. Horizontal scan of atmospheric mercury above the electrolytic cell room. The ratio of on and off resonance lidar curve for one of the directions is inserted.

normal complex activity, an average diurnal mercury flux of 43 g h^{-1}, corresponding to a mercury amount of 400 kg y^{-1} emitted into the atmosphere, has been calculated.

A careful examination of the vertical profiles of the atmospheric mercury concentration determined with the lidar reveals that a large part of the mercury vapor emitted from the cell rooms falls down close to the ground. Depending on the surrounding buildings it is not always possible to scan from the ground level. From the measured plume cross-sections we have estimated that 20% of emitted mercury goes undetected. Consequently, the mercury amount discharged into the atmosphere from the chlor-alkali complex is of the order of 500 kg y^{-1}.

Taking into account the chlorine production of this complex the mercury emission into the atmosphere is 4 g per 1000 kg of chlorine. This finding shows that the chlor-alkali plant of Rosignano Solvay uses quite good production techniques, even though they can be further improved by applying the most modern technology.

CONCLUSION

From the atmospheric mercury determination performed with the lidar above the chlor-alkali plant of Rosignano Solvay two distinct sources were located. The main mercury source is the emission from the electrolytic cells with a flux of 31–65 g h^{-1}; the other source, of minor importance, presents a flux value of 2–4 g h^{-1} and is located over old deposits of solid wastes removed from the settling tanks.

The distribution of the mercury concentrations in the atmosphere obtained with the lidar evidences the presence of these hot spots and a sharp decrease of the mercury levels reaching background values about 1–2 km from the complex.

From the vertical scan of the mercury concentrations in the plume it appears evident that the