Because LRT models are generally used to generate long-term average concentrations and depositions, integration of the results with time is needed. Some models (AES, ENAMAP, CAPITA, MEP, UMACID) advect the pollutants from each source every 6 hours or so, using synoptic data, and integrate over long time periods while others (ASTRAP, MOE, RCDM-3) use mean monthly or annual wind fields or wind roses.

3.2.2 Dilution of the Pollutant by Atmospheric Turbulence

As it is moving along with the wind, the pollutant is also being dispersed and diluted by atmospheric turbulence which may be described as horizontal and vertical fluctuations of the wind about its mean speed and direction.

The treatment of the horizontal dispersion of the pollutant varies greatly in complexity among the models. The simplest approach is to assume horizontal uniformity within the plume or puff of pollutants, with the width of this plume or puff remaining constant with time (AES). This assumes that the horizontal dispersion occurs instantly at the time of emission throughout the emission grid cell. A slightly more complex treatment is to allow the width of the plume to vary with time, but still maintain horizontal uniformity. An example of this approach is the ENAMAP model. More detail may be introduced by allowing the concentrations to vary horizontally by using, for example, a Gaussian distribution whose standard deviations may or may not vary with time (MOE, MEP). The ASTRAP and UMACID models simulate horizontal dispersion by calculating the distribution of plume centerlines about the mean path or trajectory of the pollutants. The most complex treatments of horizontal dispersion are by the Eulerian models which use the horizontal wind components and/or an eddy diffusivity at each grid point. The RCDM-3 model uses analytical solutions to the Eulerian diffusion equation for large scale motions. The CAPITA model treats