4.04   COMPARISON BETWEEN DIFFERENT METHODS USED TO DETERMINE PASQUIL STABILITY CLASSES, APPLICATION TO THE CASE OF THE FUEL NUCLEAR REPROCESSING PLANT OF LA HAGUE.

Alexis Coppalle *, Denis Maro**, Didier Hebert**
* UMR 6614 CORIA, St Etienne du Rouvray (France)
** Institut de Radioprotection et de Sûreté Nucléaire (IRSN), Cherbourg (France)

The assessment of the impact of radioactive elements emitted by the reprocessing plant is easily performed using a Gaussian model knowing the vertical and horizontal standard deviations of the plume (σv and σh). This usually achieved using the so-called Pasquil stability classes (A-F). However, one needs a method to determine the atmospheric stability as a function of routinely observed meteorological parameters.

The aim of this study is to compare two methods. The first one uses the Monin-Obukhov length L which can be calculated from meteorological observations (as explained by Golder, 1972 and Tagliazucca, 1983), the second one uses the observations of the standard deviation σw of the vertical velocity fluctuation (as recommended by the US-EPA, 2000). One must be confident with the atmospheric stability conditions. For some industrial sites, local effects are important, as complex topography, site buildings or the sea breeze and they may have a great influence on the turbulence and on the atmospheric stability conditions.

Close to the fuel nuclear reprocessing plant was located a meteorological station running routinely with a Metek sodar system, sounding up to 500 m with a 25 m vertical resolution. During two months in 2003 winter , two sonic anemometers, at 10m and 30m above ground, were installed and also a second wind profiler, an Aerovironment mini-sodar (4500 hz) system, making observations up to 200m with a 5 m vertical resolution. It was specially installed for comparing and checking the first profiler up to 100m above ground.
The comparison between the data provided by the two anemometers will be shown, in particular the roughness lengths and the Monin-Obukov lengths L.

The mean vertical profiles of the horizontal wind speed given by the mini-sodar will be discussed. The fine vertical resolution of the mini-sodar makes it easy to determined a mean roughness length over the site, which has been found close to the anemometer values. The standard deviation σw do not show strong variations with height up to 100m. Comparisons between the two profiler data, for the first levels of the Metek sodar ($z> 75$ m) will also be shown. We have found good agreement for the mean horizontal wind speed however the agreement is weaker for σw.

The Monin-Obukhov length L and the standard deviation σw observations have been used to determine the Pasquil stability classes using the two previous methods. During the period of intense observations, the weather was windy with some calm period, so the atmosphere was most of the time in a neutral condition with some convective cases. There is a good agreement for the neutral cases and a lesser agreement for the unstable cases.