

Risk Estimation based on Dispersion of Benzene Pollutant from an Assumed Chemical Accident in Urban Area using AERMOD

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Accidental releases and explosion of hazardous chemicals stand out as a potential risk to human health living in big cities and metropolitans worldwide. However, appropriate method to prevent such events is still unsatisfactory and limited. In this study, AERMOD was applied to investigate the dispersion of Benzene pollutant released from an assumed chemical release in Ulsan District, South Korea. To quantitatively assess and identify of high probable-risk areas in the summer, simulations were tested for 5 consecutive months of August (2008 – 2013). The study objective is to compare between daytime and nighttime started cases. The results reveal that nighttime started dispersion influenced larger areas in aspect of concentration over 30 $\mu\text{g}/\text{m}^3$. Thus, average nighttime concentration was higher than that in the daytime. Dispersion characteristics highly depend on local meteorological conditions including land breeze in daytime and sea breeze in nighttime. From the average concentration, a highly probable-risk map was constructed by combining the level of risk based on the degree of exposure limit to human health. The results suggest that there is a high uncertainty in the detection of vulnerable areas in nighttime started case due to weak wind speed with no prevailing direction, whereas daytime dispersion due to highly persistent meteorological conditions over the simulation period. The results of this study highlights that the development of the emergency response systems need to consider long-term local meteorological conditions to identify the vulnerable areas in risk.

Key words: AERMOD, Benzene, pollutant, probable-risk map.