The Importance of Weather Variations in a Quantitative Risk Analysis

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Abstract

As more and more quantitative risk analyses (QRAs) are performed for petrochemical facilities around the world, the variety of techniques used in these analyses continually expands. Although the emphasis is always placed on risk’s two constituents, consequence and probability, many of the contributing elements get marginalized, or even lost in the analysis. One such element is the weather data. Changes in wind speed and atmospheric stability affect the size and extent of impact zones, while the different wind directions modify how the impacts are mapped in the area surrounding each release point when creating risk contours. Weather data is often defined by the three variables (wind speed, stability, and wind direction), and is site-specific in nature, with definable probabilities for each triplet combination. Many QRA studies shortcut the quantitative nature of a QRA by condensing the weather data into a small number of combinations, with unpredictable results. By utilizing a robust risk mapping software package, it can be demonstrated that risk contours may be critically dependent on the number of wind speed/stability/direction combinations employed in the analysis. This paper will also show how a risk assessment can come to different conclusions based on the level of weather data detail applied in the analysis.