

Optimal operation of fixed and mobile sensors for fence line monitoring of toxic and flammable gas releases

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Recently, chemical plants put effort to improve the level of process safety management as the number of accidents at the chemical plants increases. To prevent accident leading to a large disaster, the most important thing is to detect chemicals leak quickly and precisely. It's known that scale of damage of accident depends on how fast operators take actions for safety. The best way for it is to manage all areas using a lot of sensors, but it's difficult because of constraints such as number of sensors, budget, etc. Fence monitoring is necessary because it works as a secondary protection layer and it's useful to supervise plants with integrity. CFD simulations of release scenarios are used to optimally allocate fixed and mobile sensors. Probability of each scenario can be estimated with expert comment and previous accidents, and we also use random function to assign probability to each scenario. Mixed-integer linear programming formulation is developed for optimal sensor placement by minimizing detecting time and the number of sensors and maximizing the coverage.