

# A New Approach for Facility Siting using Mapping Risks on a Plant Grid Area and Optimization

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## Abstract

The present work is focused on developing a methodology to find the optimal placement of a hazardous process unit and other facilities using optimization theory while considering a risk map in the plant area. Incidents can have possible consequences resulting from flammable gas releases, which can be evaluated by using consequence modeling programs. The probability of each incident can be derived from initial leak hole size estimation through event tree analysis. Initially, the plant area was divided into square grids and risk scores were estimated for each grid. The overall cost is a function of the probable cost of property damage due to fires or explosions and the interconnection cost including piping, cable, and management. The proposed approach uses a mixed integer linear optimization programming (MILP) that identifies attractive locations by minimizing the overall cost. A case study is presented for a hexane-heptane separation facility that considers the meteorological data for the given area in order to show the applicability of the proposed methodology. Results from this study will be useful in assisting the selection of locations for facilities and for risk management.

**Keywords:** facility siting; risk map; optimization; MILP