Designing Emergency Response Network for Rail Hazmat Shipments

Authors : Ali Vaezi, Jyotirmoy Dalal, Manish Verma

Abstract : The railroad is one of the primary transportation modes for hazardous materials (hazmat) shipments in North America. Installing an emergency response network capable of providing a commensurate response is one of the primary levers to contain (or mitigate) the adverse consequences from rail hazmat incidents. To this end, we propose a two-stage stochastic program to determine the location of and equipment packages to be stockpiled at each response facility. The raw input data collected from publicly available reports were processed, fed into the proposed optimization program, and then tested on a realistic railroad network in Ontario (Canada). From the resulting analyses, we conclude that the decisions based only on empirical datasets would undermine the effectiveness of the resulting network; coverage can be improved by redistributing equipment in the network, purchasing equipment with higher containment capacity, and making use of a disutility multiplier factor.

Keywords : hazmat, rail network, stochastic programming, emergency response
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