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Reducing Hazardous Materials Releases from Railroad Freights through Dynamic Trip Plan Policy

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Abstract : Railroad transportation of hazardous materials freights is important to the North America economics that supports the national's supply chain. This paper introduces various extensions of the dynamic hazardous materials trip plan problems. The problem captures most of the operational features of a real-world railroad transportations systems that dynamically initiates a set of blocks and assigns each shipment to a single block path or multiple block paths. The dynamic hazardous materials trip plan policies have distinguishing features that are integrating the blocking plan, and the block activation decisions. We also present a non-linear mixed integer programming formulation for each variant and present managerial insights based on a hypothetical railroad network. The computation results reveal that the dynamic car scheduling policies are not only able to take advantage of the capacity of the network but also capable of diminishing the population, and environment risks by rerouting the active blocks along the least risky train services without sacrificing the cost advantage of the railroad. The empirical results of this research illustrate that the issue of integrating the blocking plan, and the train makeup of the hazardous materials freights must receive closer attentions.

Keywords : dynamic car scheduling, planning and scheduling hazardous materials freights, airborne hazardous materials, gaussian plume model, integrated blocking and routing plans, box model
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