



Transportation Science

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

Introduction to Special Issue on Hazardous Materials Transportation

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To cite this article:

Mark A. Turnquist, Konstantinos G. Zografos, (1991) Introduction to Special Issue on Hazardous Materials Transportation. Transportation Science 25(2):99-99. <https://doi.org/10.1287/trsc.25.2.99>

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Introduction to the Special Issue

Hazardous materials transportation is an activity of vital economic importance for any industrial society. At the same time, however, shipments of these materials create risks—the potential for harm to human health and/or the environment. The importance of hazardous materials transportation issues has attracted the attention of the research community as well as that of policy makers and the public at large. During the last decade, significant methodological advances have been made in the areas of risk analysis, routing/scheduling of shipments, and siting of facilities for treatment or storage of hazardous wastes. The purpose of this special issue of *Transportation Science* is to focus on important current work in this area.

The issue includes six papers covering different facets of research in hazardous materials transportation. The opening paper presents a comprehensive survey of research related to problems of risk analysis, routing/scheduling and facility location in transportation of hazardous materials. It also offers suggestions for several areas of future research.

The second paper, by Ted Glickman, is representative of current efforts in applying probabilistic risk assessment methods to transportation problems. He presents a method for assessing the relative risks of transporting flammable liquids by two different types of trucks. The comparison of technologies is conducted across different routes and under assumptions of “average” and “worst case” scenarios.

The paper by Laurel Lindner-Dutton, Rajan Batta and Mark Karwan represents work in the routing/scheduling arena. They are concerned with the problem of equity (or risk sharing) among various geographic areas (zones) along transportation routes. If a series of shipments is to be made using a set of possible routes from a single origin to a single destination, they present a method for determining a sequence of route utilization that maintains a most equitable distribution of risk across the zones for any number of completed shipments.

The fourth and fifth papers deal with interactions between routing decisions and siting decisions for

hazardous waste facilities. Chuck ReVelle, Jerry Cohon and Don Shobryns use a bi-objective formulation for their model, focusing on transportation cost and population exposure, and illustrate how to incorporate the results of bi-objective routing analysis into a p -median formulation for facility siting. The model is applied to a problem of locating temporary storage facilities for nuclear waste in the eastern United States.

George List and Pitu Mirchandani develop a different formulation of a combined routing/siting model, which focuses on measuring risks to zonal areas from both transportation activities (along routes) and facility operations (at nodes). Their approach to measuring risks is similar to that used by Lindner-Dutton et al., but the focus of their model is on more strategic decisions, in the same vein as ReVelle et al.

Finally, the paper by Akihiro Watabe deals with the larger economic arena within which hazardous materials shipment decisions are made. He is concerned with the relationship between shippers and carriers under different assumptions (joint versus strict liability) about financial responsibility for the consequences of an accident. His results have significant implications for the nature of contracts which might be negotiated between shippers and carriers in the hazardous materials transportation market, and availability of information which would lead to socially desirable outcomes.

We want to thank Amedeo Odoni, the previous Editor of *Transportation Science*, who first supported the creation of this special issue, and Mark Daskin, the current Editor, whose advice and assistance in actually getting it finished were invaluable. We also want to thank the authors who contributed their work, and made this issue possible. It is our hope that, by collecting these papers together, we can create better understanding of the current state-of-the-art, and foster even more substantial research efforts in this important area.

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