Frequency Analysis of Hazardous Material Transportation Incidents as a Function of Distance from Origin to Incident Location

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Abstract

This paper presents a temporal trend study (1995-2004) of 1,850 HazMat incidents occurring through the transportation of flammable-combustible liquids. The study was centered about HazMat shipments originating within five states (California, Illinois, Iowa, New Jersey, Texas) chosen for their geographic variations in size and location. The main objective of this study is to conduct a frequency analysis of HazMat incident as a function of distance between origin and incident location. Procedures for this study entailed compiling a sample of HazMat road incidents originating within the selected states and generating the great-circle distance from their originating location to sites of incident. Analysis for great circle distances presented a skewed distribution with a high percentage of incidents occurring at distances less than 161 km. An analysis was again undertaken with the logarithmic (log) transformation of great-circle distances to identify patterns in this high percentage of incidents. Key findings of the logarithmic analysis illustrated a bimodal distribution of incident frequency as a function of the great-circle log distance. The first mode presented an average distance of incident which was short-haul in classification. The second mode presented an average distance of incident which was long-haul in classification. Time series forecasting of incident data has demonstrated continuing trend in Hazmat incidents. Findings of this study speculate fatigue to be a contributing factor for incident occurrences. This requires that more research be carried out on various aspects of flammable-combustible liquids such as hours-of-service regulations, fatigue and incident reporting.