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Short Communication

Accident speed of freight trains

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Abstract

Hazard assessment of the transport of hazardous materials sometimes creates a requirement for data on the speed of freight trains at the moment of collision or derailment. Data are presented on the distribution of these speeds.

Introduction

In the hazard assessment of the transport of hazardous materials there are two types of freight train accident for which estimates of accident speed are required: collisions and derailments. High quality data on accident speeds are not easily obtained, but information has been obtained from Railway Inspectorate (RI) reports on the closing speed of freight train collisions and from a British railway accident environment study on the speed of freight train derailments. This note presents some data on freight train (FT) accident speeds from these sources.

A study of impact speeds of heavy goods vehicles was described in a companion note [1].

Accident speeds

Table 1 and Fig. 1 present data on the closing speed of FT collisions with rolling stock. The data are the authors' best estimates based on details of rail accidents in a number of RI accident reports.

The data include head-on, front-rear and rear-front collisions with passenger trains (55%), FTs (25%) and miscellaneous rolling stock (20%). The sample is not large enough to justify subdivision into these separate categories.

These data are considered to be a biased sample, because RI accident reports tend to deal with those accidents in which there are extensive casualties and/

or property damage. It may be expected that this sample will have rather higher closing speeds than the overall population of accidents from which it is drawn.

Table 2 and Fig. 2 give the speeds at which FT derailments occur. The data are taken from a study of 300 derailments by Taig [2]. Taig distinguishes between track which is plain and that which is not plain, in other words with points, etc., and gives data separately for these two cases. The data are in the form of the proportion of derailments in different speed ranges; the actual number of derailments in each range is not given. Casualties and damage in derailments are attributable mainly to those which occur at high speed. Taig comments that whilst derailments on plain track tend to occur either at low speed or around normal running speeds, those not on plain track occur almost entirely at low speed. His results for non-plain track, however, do show that the proportion of derailments at relatively high speeds is not negligible.

TABLE 1

Freight train closing speeds in collisions with rolling stock (sample size = 20)

Closing speed (mph)	No. of collisions	Proportion of collisions (%)
1-10	1	5
11-20	8	40
21-30	4	20
31-40	3	15
41-50	3	15
51-60	1	5

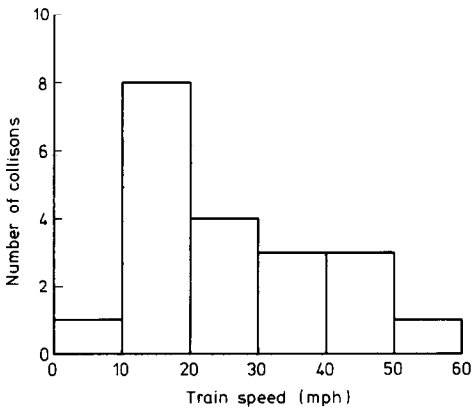

Fig. 1 Collision speed of freight trains.

TABLE 2

Derailment speeds of freight trains (sample size (on and not on plain track) = 300)

Derailment speed (mph)	Proportion of derailments	
	On plain track (%)	Not on plain track (%)
1-10	15	54
11-20	20	20
21-30	6	6
31-40	18	4
41-50	26	4
51-60	9	4
61-70	3	4
71-80	2	4
81-90	1	0

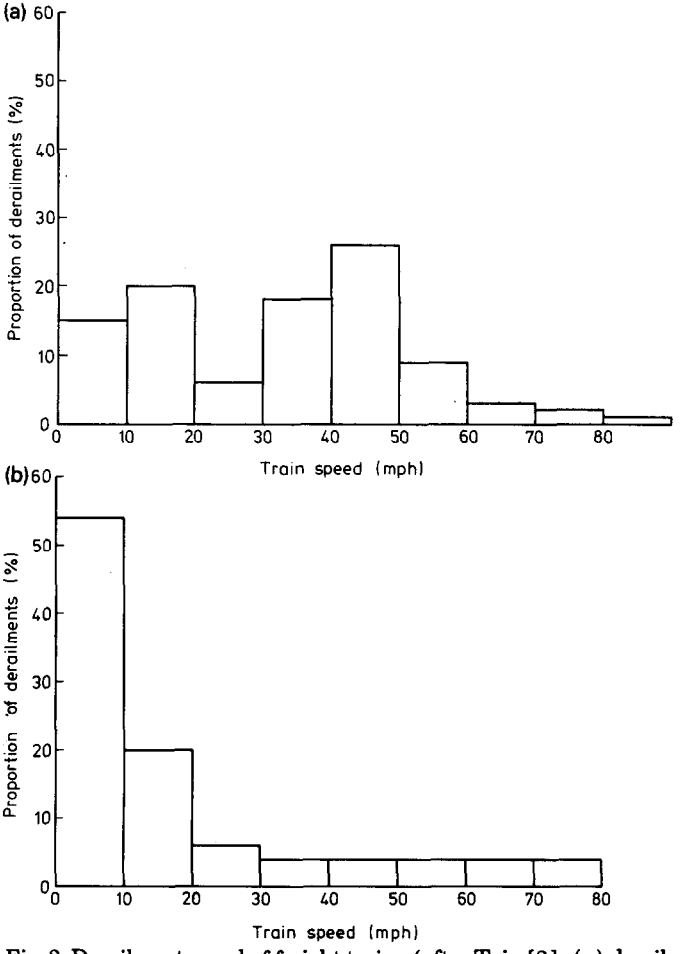

Fig. 2. Derailment speed of freight trains (after Taig [2]: (a) derailments on plain track; and (b) derailments not on plain track.

Conclusions

The study provides useful, but limited, data on FT accident speeds. A fuller study would be assisted by more detailed recording of accidents involving FTs, especially in respect of closing speeds of collisions and, in particular, the higher closing speeds in built-up areas.

References

1 P.A. Davies and F.P. Lees, Impact speed of heavy goods vehicles, J. Hazardous Mater., 26 (1991) 213.
2 A.R. Taig, Radioactive packages and the British railway accident environment, Sixth Int. Symp. on Packaging and Transportation of Radioactive Materials, Vol. 1, 1980, p. 190.