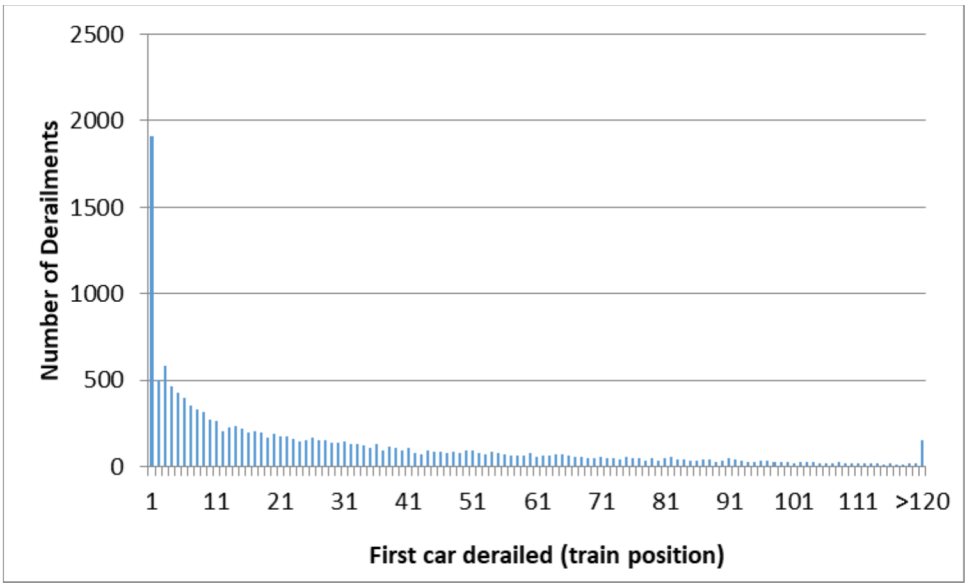

Figure 4. Frequency (count) of the first car position-in-train for mainline derailments with train speeds less than or equal to 25 mph (total count equals 14,180 derailments).

The data reveal that when a train accident results in a derailment, the first car derailed is usually the head car (position 1). In fact, for the data provided in Figure 3, the first car derailed is one of the first ten cars in nearly a third (28%) of all mainline derailments where train speeds are between 25 mph and 50 mph. Similar results are found for the percentage of derailments starting with a car in position 1-10 for the low speed case with 39% for mainline derailments where train speeds are less than 25 mph. Representative probability values of first car derailed versus position are provided in Table 8.

Table 8. Representative probability of position-in-train of first car derailed (1997-2016) given that an accident with derailment has occurred.

Statistic	Car Position in Train			
	1	11	21	31
Mainline Derailment Accident, Speed ≤ 25 mph	13.5%	1.87%	1.23%	1.02%
Mainline Derailment Accident, Speed > 25 to ≤ 50 mph	13.4%	1.20%	0.91%	0.80%

Assuming the train configuration is described by LNG DOT-113 tank cars starting at position eleven (11) and continuing until the end of the train, the probability of having a given number of LNG DOT-113 rail cars involved in the derailment was calculated for both the high speed and low speed cases. Using the average number of involved cars, and the position-in-train derailment probabilities from Figure 3 and Figure 4, the probability of having 1-11 cars (for