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UNITED STATES OF AMERICA
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: March 9, 1971

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 13th day of January, 1971.

FORWARDED TO:)
Honorable Carl V. Lyons)
Acting Administrator)
Federal Railroad Administration)
Department of Transportation)
Washington, D. C. 20591)

SAFETY RECOMMENDATION R-71-1

One of the major factors in derailments attributed to equipment failures is the overheating of journals (hotboxes). The National Transportation Safety Board has conducted a special study of the performance of freight car journals and the relationship of this performance to accidents caused by the failure of overheated journals. During the period 1955 to 1969, inclusive, the failure of overheated journals accounted for from 25 to 43 percent of the derailments caused by equipment failures. During this period, the number of cars set out of trains between terminals because of overheated journals (hotboxes) declined significantly, and the number of car-miles per car set out between terminals because of hotboxes increased dramatically. These occurrences reflect improved lubrication and application of roller bearings.

In 1955, the freight car-miles per car set out between terminals because of hotboxes was 314,500 and, during the next 5 years, there was a slight decline. In 1961, the mileage per hotbox set out between terminals began to increase, reaching a high of 1,834,922 in 1967 and 1,720,668 in 1969; an increase of 483.4 percent and 447.1 percent, respectively.

In 1955, the number of freight cars set out of trains between terminals because of hotboxes was 142,051 (4.13 per million car-miles). This figure declined to 20,069 (0.59 per million car-miles) cars set out because of hotboxes in 1969, a decline of 85.8 percent in the number and 85.7 percent in the rate.

During this same period, total freight car-miles has varied in an irregular pattern between 31,198,000,000 in 1955 and 30,344,000,000 in 1969, with a low of 27,226,000,000 in 1961.

In 1955, the number of accidents caused by the failure of overheated journals was 595 and has varied in an irregular pattern between a high of 821 in 1956 and a low of 360 in 1962. The rate of accidents due to the failure of overheated journals per million train-miles follows a similar pattern. Detailed figures are shown in the attached chart.

It is evident from the available figures that the decline in the number of cars set out of trains because of hotboxes and the big increase in miles per car set out of trains between terminals because of hotboxes has not been reflected in a decline in the number of accidents attributed to the failures of overheated journals. The figures indicate that the ratio of undetected overheated journals (those which failed and caused accidents) to detected hot journals (those set out between terminals) increased drastically. For example, the ratio of "undetected" to "detected" in 1955 (595:142,051) increased from 0.0041 to 0.0246 (495:20,069) in 1969. If the ratio of "undetected" to "detected" had remained at 0.0041 until 1969, one would have expected only about 82 accidents due to the failure of overheated journals ("undetected" hotboxes), rather than the reported 495 accidents.

Generally, accidents caused by the failure of overheated journals occur when trains are operating at moderate to high speeds and result in considerable damage. The extensive damage from this type of accident makes it more important that it be determined why the number of accidents remains relatively high. The Safety Board realizes that the Federal Railroad Administration has been aware of the hotbox problem over the years.


Therefore, the Safety Board recommends that:

The Federal Railroad Administration determine why there has been no decrease in the number of train accidents attributable to hotboxes in the period 1955 to 1969, inclusive, when there was a significant decrease in the number of hotboxes. The Board believes that the answer to this question may suggest corrective action.

Representatives of our Bureau of Surface Transportation Safety will be available for consultation in connection with this matter if desired.

This recommendation will be released to the public on the issue date shown above. No public dissemination of the contents of this document should be made prior to that date.

Reed, Chairman, Laurel, McAdams, Thayer and Burgess, Members, concurred in the above recommendation.

By: 
John H. Reed
Chairman

Attachment

HOTBOX PERFORMANCE

YEAR	DERAILMENTS <u>1/</u>		ACCIDENTS DUE TO FAILURE OF OVERHEATED JOURNALS <u>1/</u>			MILLIONS OF CAR-MILES <u>2/</u>			CARS SET OFF BETWEEN TERMINALS BECAUSE OF OVERHEATED JOURNALS <u>2/</u>			MILEAGE PER CAR SET OFF BETWEEN TERMINALS BECAUSE OF OVERHEATED JOURNALS <u>2/</u>		
	TOTAL NUMBER	DUE TO EQUIPMENT FAILURES	TOTAL NUMBER	PER MILLION CAR-MILES	PER HOTBOX DETECTED	MILLIONS OF CAR-MILES	TOTAL NUMBER	PERCENT CHANGE OVER 1955	PER MILLION CAR-MILES	TOTAL MILES	PERCENT CHANGE OVER 1955	TOTAL MILES	PERCENT CHANGE OVER 1955	
1955	4857	2149	595	0.019	0.0041	31,198	142,051		4.13	314,500				
1956	5369	2486	821	0.025	0.0048	31,595	169,395	+19.2	4.78	266,018	-15.4			
1957	2684	1496	550	0.017	0.0029	30,678	187,033	+31.6	5.48	231,813	-26.2			
1958	2579	1498	560	0.019	0.0035	28,077	156,470	+10.1	4.99	257,767	-18.0			
1959	2850	1565	659	0.023	0.0041	28,605	157,471	+10.8	4.94	234,223	-25.5			
1960	2918	1484	639	0.022	0.0046	28,170	138,695	- 2.3	4.43	262,200	-16.6			
1961	2671	1268	471	0.017	0.0060	27,226	77,373	-45.5	2.54	450,450	+43.2			
1962	2830	1258	360	0.012	0.0109	27,772	32,809	-76.9	1.06	959,031	+204.9			
1963	3170	1427	422	0.014	0.0135	28,153	31,088	-78.1	0.98	1,017,340	+223.4			
1964	3399	1419	465	0.016	0.0167	28,912	27,744	-80.4	0.85	1,182,425	+275.9			
1965	3869	1499	470	0.016	0.0193	29,336	24,267	-82.9	0.73	1,391,333	+342.3			
1966	4447	1550	393	0.012	0.0192	30,374	20,364	-85.6	0.59	1,710,247	+443.7			
1967	4960	1611	385	0.012	0.0209	29,661	18,402	-87.0	0.55	1,834,922	+483.4			
1968	5487	1747	436	0.014	0.0219	30,086	19,865	-86.0	0.59	1,721,454	+447.3			
1969	5960	1864	495	0.016	0.0246	30,344	20,069	-85.8	0.59	1,720,668	+447.1			

SOURCE: 1/ Accident Bulletin No. 137

2/ Association of American Railroads