#### INTERSTATE COMMERCE COMMISSION

### FORTY-FOURTH ANNUAL REPORT

OF THE

## DIRECTOR OF LOCOMOTIVE INSPECTION

TO THE

INTERSTATE COMMERCE COMMISSION

FISCAL YEAR ENDED
JUNE 30, 1955



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1955

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 20 cents

# ANNUAL REPORT OF THE DIRECTOR OF LOCOMOTIVE INSPECTION

September 30,1955.

To the Interstate Commerce Commission:

In compliance with section 7 of the act of February 17, 1911, as amended, the Forty-Fourth Annual Report of the Director of Locomotive Inspection, covering the work of the fiscal year ended June 30, 1955, is respectfully submitted.

Summaries are given, by railroads, of all accidents which resulted in serious injury or death to one or more persons, due to the failure of parts and appurtenances of locomotives, as reported and investigated under section 8 of the Locomotive Inspection Act. Accidents which occurred as a result of failure of parts and appurtenances of locomotives, which resulted in damage to property or equipment but not serious injury or death, are not included in this report. For additional information concerning railroad accidents, see Accident Bulletin, prepared by the Bureau of Transport Economics and Statistics.

Tables contained in the report show the results of inspection of locomotives, the number of accidents and resultant casualties caused by failure of some part or appurtenance of individual locomotives, and the parts and appurtenances which caused accidents and casualties. The tabulated inspection data cover the number of locomotives for which reports were filed, the number inspected, the number and percentage found defective, the number for which written notices for repairs were issued in accordance with section 6 of the act, and the total number of defects found and reported. Tables are included to show, by railroads, all locomotive defects found by our inspectors. Data for preceding years are given where possible for comparative purposes.

Results of locomotive inspections made by our district inspectors in performance of duties prescribed under section 6 of the act are shown in table I. The decrease in the number of locomotives for which reports were filed, which has occurred from year to year since 1950, has resulted, in the major part, from replacement of steam locomotives by locomotives other than steam, most of which were of the Diesel-electric type. The higher availability of the Diesel units placed in service has been responsible for displacement of a greater number of steam locomotives.

Funds appropriated for travel in the past 3 years have not been sufficient to permit our inspectors to travel throughout their respective

districts with the same frequency as in former years for the purpose of properly performing duties assigned under the law. The number of units inspected per inspector has remained approximately constant for this period but, because of their inability to cover outlying terminals in the respective districts with frequent regularity, uniform inspection of locomotives throughout the various inspection districts has not been possible.

The number of locomotives found defective and the number of defects found were approximately comparable with the preceding year but, due to decrease in number of locomotives inspected, the percentage of inspected found defective increased from 9.7 to 10.1 percent. As the age of Diesel power recently placed in service increases, more maintenance attention will be required if defects are to be avoided.

Table I.—Reports and inspections—Steam locomotives and locomotive units other than steam

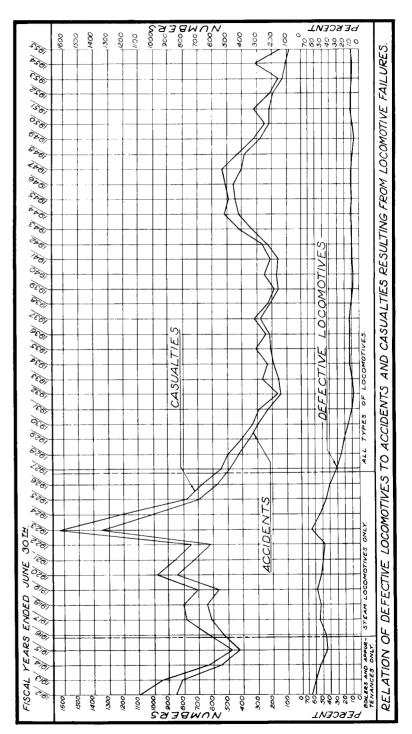
			Year end	led June	30	
	1955	1954	1953	1952	1951	1950
Number of locomotives for which reports were filed Number inspected Number found defective Percentage of inspected found defective Number ordered out of service Number of defects found	36, 992 98, 025 9, 913 10. 1 223 29, 968	39, 270 103, 337 9, 994 9, 7 257 29, 403	41, 172 104, 069 10, 154 9, 8 281 30, 143	43, 206 110, 483 12, 321 11. 2 505 41, 351	45, 915 115, 061 12, 370 10. 8 614 46, 592	45, 462 109, 312 9, 488 8. 7 441 34, 829

#### INVESTIGATION OF ACCIDENTS AND GENERAL CONDITION OF LOCOMOTIVES

All accidents reported under requirements of the law and rules were carefully investigated and appropriate action taken to prevent recurrence so far as possible. Copies of published reports of accident investigations were distributed to interested parties, and all inspectors were advised of details and causes of unusual accidents to better assist them in their educational contacts with railroad personnel. The dissemination of pertinent information concerning fundamental causes of locomotive accidents and resultant casualties has been an important adjunct to our basic enforcement activities. Such public information combined with the active enforcement of the requirements has been effective in promotion of locomotive safety and has resulted in a decreasing accident trend. To promote further accident reduction, activity of all members of the Locomotive Inspection Section will be continued in our effort to bring about additional improvement in locomotive safety.

#### ACCIDENTS

Eighty-three accidents occurred in connection with all types of locomotives and resulted in 3 deaths and 142 injuries. Compared



with the preceding year there was a decrease of 22 accidents and 160 injuries. Three fatalities occurred in each year.

The chart on page 3 shows the relation between the percentage of defective locomotives, the number of accidents and casualties resulting from defective parts and appurtenances, and illustrates the effect of operating locomotives in defective condition.

The advancement of locomotive safety is emphasized by the significant fact that, for the first time in the 44 years since passage of the act, a full fiscal year has elapsed without the occurrence of a steam locomotive boiler explosion.

Tables II, III, and IV which follow show details of accidents which occurred in the past year and are prepared to show their distribution among personnel and responsible parts and appurtenances. If advantage is taken of information contained in these tables, if proper inspections and repairs are made, and if equipment is maintained in compliance with the standards of condition established by the requirements of the law and rules, many accidents may be prevented.

Tables V and VI show details of defective parts and appurtenances of steam locomotives and locomotives other than steam reported, inspected, found defective, and ordered out of service. If the distribution of reported defective parts shown by the tables is considered, those parts which may be expected to require most maintenance will be indicated and inspection and repair programs may be set up on the emphasized basis.

Detailed results of our inspections of steam locomotives and locomotive units other than steam are shown in tables VII and VIII, respectively.

Table II.—Accidents and casualties caused by failure of some part or appurtenance of steam locomotives and locomotive units other than steam

	Year ended June 30—										
	1955	1954	1953	1952	1951	1950					
Number of accidents.  Percent increase or decrease from previous year  Number of persons killed  Percent increase or decrease from previous year  Number of persons injured	83 21, 0 3	105 21. 6 3 75. 0	134 31.6 12 1 200.0	196 11. 3 4 75. 0	221 1 0. 5 16 1 60. 0	220 20.6 10					
Percent increase or decrease from previous year	142 53. 0	302 1 101. 3	150 26. 1	$\frac{203}{32.1}$	299 1 27. 8	24.5					

<sup>&</sup>lt;sup>1</sup> Increase.

Table III.—Number of casualties classified according to occupation—steam locomotives and locomotive units other than steam

				Yea	r ended	l June	30—				
	19	55	19	54	19	53	19	52	198	51	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	
Members of train crews: Engineers Firemen Brakemen Conductors Switchmen Maintenance employees Other employees Nonemployees	1	26 34 10 4 4 4 18 42	2	37 39 11 4 3 12 2 194	4 4 3	37 57 20 8 4 8 2	1 2 1	51 76 31 7 10 24 2	2 4 1 1 4	62 92 24 6 13 17 16	
Total	3	142	3	302	12	150	4	203	16	299	

Table IV.—Accidents and casualties resulting from failure of steam locomotives' tenders, locomotives other than steam, and their appurtenances

	Year e	nded June	30, 1955
Part or appurtenance which caused accident	Acci- dents	Killed	Injured
Air compressors	2		2
Axles, axle journals and journal boxes	2		60
Blow-off cocks	1		2
Flues and tubes including superheater, arch and water	2		2
Fuel explosions in firebox	1		1
Grate shakers and mechanism	1		1
Injectors, pumps, and connections	3		4
Squirt hose	2		4 2
Squirt hoseSteam valves, piping and blowers	1		1
Brakes and brake rigging	1		1
Cab:			
Doors or windows	4		4
Seats	8		8
Control equipment—mechanical, electrical, pneumatic or electro-pneu-			
matic	2		2
Electrical equipment:		1	
Insulation, short circuits or electrical flashes	7	1	6
Pantographs, trolleys, or third rail shoes	1	1	
Switches and gear	4	1	4
Fans and shutters	1		1
Floors, steps, and passageways.	20		20
Footboards	1		1
Handholds	2		2
Internal-combustion engines and turbines:		į	
Crankcase or air-box explosions	2		8
Exhaust and cooling systems	1		1
Fuel injectors and connections	2		2
Governors and mechanism	1		1
Machinery—steam locomotive:		1	
Lubricators, glasses and connections	2		2
Valve and reversing gear	1		1
Miscellaneous	8		8
Total	83	3	142

Table V.—Number of steam locomotives reported, inspected, found defective, and ordered out of service

of the rules  Air compressors Arch tubes Asbpans and mechanism Axles Blow-off cocks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains Cab aprons and decks Cab dards Coupling and uncoupling devices Crossheads, guides, pistons, and piston rods Crown bolts Cylinders, saddles, and steam chests Cylinder cocks and rigging.	1955 229 5 177 3 105 84 43 636 241 100	304 4 24 3 121 158 79	1953 351 5 36 185	1952 671 12 59 1	1951 897 17 64	1950 
Arch tubes Asbpans and mechanism Axles Blow-off cocks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains Cab aprons and decks Cab cards Coupling and uncoupling devices Crossheads, guides, pistons, and piston rods Cylinders, saddles, and steam chests Cylinder cocks and rigging	5 17 3 105 84 43 636 241	4 24 3 121 158 79	36 185	12 59 1	17	719
Asbpans and mechanism Axles Blow-off cocks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains Cab aprons and decks Cab cards Coupling and uncoupling devices Crossheads, guides, pistons, and piston rods Cylinders, saddles, and steam chests Cylinders, saddles, and steam chests Cylinder cocks and rigging.	17 3 105 84 43 636 241	24 3 121 158 79	36 185	59 1		
Blow-off cocks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains Cab aprons and decks Cab cards Coupling and uncoupling devices Crossheads, guides, pistons, and piston rods Crown bolts Cylinders, saddles, and steam chests Cylinder cocks and rigging	3 105 84 43 636 241	3 121 158 79	185	1		9
Blow-off cocks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains Cab aprons and decks Cab cards Coupling and uncoupling devices Crossheads, guides, pistons, and piston rods Crown bolts Cylinders, saddles, and steam chests Cylinder cocks and rigging	105 84 43 636 241	121 158 79			4	59 1
Boller shell Brake equipment. Cabs, cab windows, and curtains Cab aprons and decks. Cab cards. Coupling and uncoupling devices. Crossheads, guides, pistons, and piston rods. Crown bolts. Cylinders, saddles, and steam chests. Cylinder cocks and rigging.	84 43 636 241	79		299	262	220
Boller shell Brake equipment. Cabs, cab windows, and curtains Cab aprons and decks. Cab cards. Coupling and uncoupling devices. Crossheads, guides, pistons, and piston rods. Crown bolts. Cylinders, saddles, and steam chests. Cylinder cocks and rigging.	636 241		182	356	477	386
Cab aprons and decks. Cab cards. Coupling and uncoupling devices. Crossheads, guides, pistons, and piston rods. Crown bolts. Cylinders, saddles, and steam chests. Cylinder cocks and rigging.	241		94	174	226	211
Cab aprons and decks. Cab cards. Coupling and uncoupling devices. Crossheads, guides, pistons, and piston rods. Crown bolts. Cylinders, saddles, and steam chests. Cylinder cocks and rigging.		835 298	1, 038 354	1, 955 694	2, 453 1, 173	1,845 $862$
Cab cards.  Coupling and uncoupling devices.  Crossheads, guides, pistons, and piston rods.  Crown bolts.  Cylinders, saddles, and steam chests.  Cylinder cocks and rigging.		133	179	295	395	364
Coupling and uncoupling devices Crossheads, guides, pistons, and piston rods. Crown bolts Cylinders, saddles, and steam chests. Cylinder cocks and rigging.	19	27	40	53	83	97
Crown bolts Cylinders, saddles, and steam chests Cylinder cocks and rigging	11	22	30	42	54	41
Cylinders, saddles, and steam chests Cylinder cocks and rigging	256 7	398 20	478 27	$\frac{1,035}{38}$	$\begin{array}{c c} 1,363 \\ 52 \end{array}$	1, 100 53
Cylinder cocks and rigging	387	364	455	908	1, 437	1, 160
	130	132	136	328	474	376
Domes and dome caps	20	20	45	85	131	90
Draft gear	133	150	168	313	441	368
Draw gear	69	79	108	189	297	280
Driving boxes, shoes, wedges, pedestals, and braces	226	258	345	681	1, 145	1.037
Firebox sheets	20	37	55	141	203	181
Flues	27	32	49	121	184	152
Frames, tail pieces, and braces, locomotive	100	151	225	368	486	451
Frames, tender	11 42	14 47	10 61	26 136	47 173	34 116
Gages and gage fittings, air	61	89	112	228	325	272
Gage cocks.	116	120	211	337	495	38€
Grate shakers and fire doors	107	90	121	282	339	326
Handholds	110	146	196	353	420	439 45
Injectors, inoperative Injectors and connections Inspections and tests not made as required	35 406	33 674	18 843	$\frac{34}{1,615}$	2, 190	1, 767
Inspections and tests not made as required.	26	24	53	68	121	122
Lateral motion	65	98	137	274	465	<b>3</b> 89
Lights, cab and classification.	35	39	26	44	118	60
Lights, headlight	34 47	56 63	42 81	100 160	108 222	131 157
Lubricators and shields	33	65	78	149	153	145
acking nuts	233	240	294	552	638	558
Packing, piston rod and valve stem	122	154	220	494	765	510
Pilots and pilot beams	39	52	48	102	124	126 104
Plugs and studsReversing gear	16 151	22 170	50 216	91 4 <b>2</b> 9	117 631	104 404
Rods, main and side, crankpins, and collars	221	315	459	990	1, 511	1, 213
Safety valves	22	15	19	39	45	34
Sanders	155	277	324	552	806	641
Springs and spring rigging	551	834	1, 322 41	2, 424 69	3, 340 90	2, 848 74
Squirt hose Stay bolts	27 55	39 108	144	254	280	229
Stay bolts, broken	27	55	125	159	282	193
Stay bolts, broken Steam pipes	58	87	161	232	342	302
Steam valves	33	69	68	146	181	131
Steps	157	255	321	561	805	680 1, 205
Tanks and tank valves	269 6	340 13	466 6	$\frac{980}{15}$	1, 304 33	1, 200
Throttle and throttle rigging	179	228	327	608	927	664
Throttle and throttle rigging	153	171	263	427	700	580
Trucks, tender	129	152	219	474	710	540
Valve motionWashout plugs	114	174	195	437	673 325	48€ 289
Stokers	73 58	79 55	138 133	266 253	306	261
Water glasses, fittings, and shields	218	282	357	651	858	907
Wheels	94	107	151	340	536	394
Miscellaneous—Signal appliances, badge plates, brakes (hand)	194	263	339	569	774	652
Number of defects	7, 350	9, 763	12, 980	24, 738	34, 657	28, 504
Locomotives reported	8,892	12, 135	15, 798	20, 490	26, 595	29, 743
Locomotives inspected	12 128	19, 999	28, 899	45, 220	62, 113	66, 809
Locomotives defective Percentage of inspected found defective	1, 784	2, 599 13. 0	3, 583 12. 4	6, 234 13. 8	7, 995 12. 9	6, 740
Locomotives ordered out of service	14. 7 96	117	163	370	508	10. <b>1</b> 399

Table VI.—Number of locomotive units other than steam reported, inspected, found defective, and ordered from service

			Ye	ear ended	June 30		
Parts defective, inoperative of the	e or missing, or in violation	1955	1954	1953	1952	1951	1950
1 Air companyon		419	326	210	206	146	99
1 Air compressors 2 Axles, truck and driving	ng	7	4	7	3	2	2
4 Batteries	18	83	82	40	39	85	20
5 Boilers		203	175	103	69	43	46
6 Brake equipment		2, 790	2, 126	1,698	1,450	1, 166	673
8 Cabs and cab windows	S	1,073	858	679	813	672	377
9 Cab cards		150	135	128	139	100	75 790
10 Cab floors, aprons and	deck plates	1,677	1, 703	1, 589	1, 694	1, 281	726
11 Clutches		2	5	9	5	4	1
12 Controllers, relays, o	circuit breakers, magnet	000	454	424	222	166	61
valves, and switch g	roups	802	139	95	76	35	32
13 Coupling and uncoupl	ing devices	204	139	6	5	9	18
14 Current collecting app	aratus	15 336	291	218	202	141	91
16 Draft gear		140	55	42	28	46	27
17 Draw gear	and wedges	249	154	128	98	38	51
18 Driving boxes, shoes, a	s	14	32	22	33	27	9
20 Frames or frame brace 22 Fuel system	S	1, 833	1, 951	1,853	1,751	1,082	483
23 Gages or fittings, air		226	136	138	110	70	29
24 Gages or fittings, steam	u	48	56	44	11	14	14
25 Gears and pinions		27	12	13	26	9	15
26 Handholds		219	230	121	127	97	70
28 Inspections and tests r	not made as required	183	185	175	159	143	116
	levices	188	105	77	102	64	48
30 Internal-combustion	engine defects, parts and				4 500	0.070	1 450
appurtenances		5,035	4,848	4, 564	4,768	3, 270	1, 456
32 Jack shafts		2		1.50	101	190	86 86
33 Jumpers and cable cor	mectors	214	178	156	191 8	190	2
35 Lateral motion, wheel	S	39	232	109	49	23	5
36 Lights, cab and classif	leation	198 33	28	42	22	16	ġ
37 Lights, headlight			40	27	41	14	7
39 Meters, volt and amp	ere	880	813	655	674	314	106
40 Motors and generators	}	71	71	46	53	36	29
42 Pilots and pilot beams 43 Plugs and studs				3	3	3	
45 Flugs and studs 44 Quills		22	11	6	15	26	1(
46 Rods, main, side, and	drive shafts	7			15	2	
48 Sanders		1,492	1, 200	1, 224	1, 202	902	356
49 Springs and spring rigg	ring, driving and truck	306	241	178	153	108	103
51 Stay bolts, broken or	defective '				1		
53 Steam pipes		177	154	119	89	24	35 28
54 Steps, footboards, et c	etera	737	622	505	480	377	201
55 Switches, hand-operat	ed, and fuses	38	34	17	18	15 9	
56 Transformers, resistor	s, and rheostats	3	6 503	3 439	390	234	18
57 Trucks		1, 054 31	34	31	47	33	2
59 Water tanks	1 1 1 1 1 1 1	16	11	14	38	11	2
60 Water glasses, fittings	s, and shields		121	122	117	83	2
61 Warning signal applia	nces	282	257	212	230	215	9
62 Wheels		898	1,005	864	638	574	37
		22, 618	19, 640	17, 163	16, 613	11, 935	6, 32
	ets		<del></del>			19, 320	15, 71
	orted	28, 100	27, 135 83, 338	25, 374 75, 170	22, 716 65, 263	52, 948	42, 50
Locomotive units insp	pected	85, 897		6, 571	6, 087	4, 375	$\frac{42,50}{2,74}$
Locomotive units defe	ective	8, 129 9, 5	7, 395 8. 9	8.7	9.3	8.3	6,
Percentage of inspecto	d found defective	127	140	118	135	106	4
Locomotive units ord	ered out of service	127	130	110	100	200	

#### LOCOMOTIVE ACCIDENTS

Derailment of 2 locomotive units and 9 cars of a passenger train caused by the broken journal of an axle in the first truck of the third unit of a 4-unit Diesel-electric locomotive resulted in injury of 40 passengers, 18 dining car employees, and 1 train service employee. Investigation of the accident disclosed that the failed axle had been first placed in service by the operating railroad in 1949 and had

made 1,312,142 miles at time of failure. The failed journal had been built up by use of a metal spraying process which extended into the fillet. A progressive fracture had developed near the wheel end of the inner bearing race, and failure occurred through this fracture. The published report discussed the relationship of the failure to the endurance limit of the axle material and commented that application of metalizing precluded discovery of defects in the journal metal.

Twenty accidents occurred because of defective condition of floors, steps, and passageways. Accumulation of oil upon walking surfaces was responsible for the majority of these accidents. Because each oil leak, whereby oil is deposited on steel walkways, is a potential source of a disabling accident, our inspectors have been instructed to give particular attention to this type of defect which is prevalent on some railroads.

Eight accidents resulted from defective cab seats, which frequently have been found in dangerously defective condition by our inspectors.

Accidents involving floors, steps, passageways, cab seats, doors, and windows, which represented 38 percent of all locomotive accidents during the year, generally resulted from what might be termed "poor housekeeping". Emphasis has been placed upon action necessary to avoid continuation of accidents of this type, and such defective conditions as are found by our inspectors are actively handled with responsible carriers.

One serious accident, in which an employee suffered the loss of an eye, occurred when defective cab-signal equipment caused a sudden and severe brake application. An engine service employee was thrown forward and his eye struck a thin metal hood over a cab signal indicator lamp. As a result of this accident, the carrier instituted a program for removal of cab signal indicator hoods from all classes of locomotives other than steam

#### SPECIFICATIONS AND ALTERATION REPORTS

Under rule 54 of the Rules and Instructions for Inspection and Testing of Steam Locomotives, 28 specification cards and 899 alteration reports were filed, checked, and analyzed. These reports are necessary in order to determine whether or not the boilers represented were so constructed or repaired as to render safe and proper service and whether the stresses were within the allowed limits. Corrective measures were taken with respect to numerous discrepancies found.

Under rules 328 and 329 of the Rules and Instructions for Inspection and Testing of Locomotives Other Than Steam, 2,346 specifications and 664 alteration reports were filed for locomotive units and 245 specifications and 360 alteration reports were filed for boilers mounted on locomotive units other than steam. These were checked

and analyzed and corrective measures were taken with respect to discrepancies found.

9

#### EXTENSION OF TIME FOR REMOVAL OF FLUES

Three hundred and eighty-four applications were filed for extension of time for removal of flues, as provided in rule 10. Our investigations disclosed that in 25 of these cases the condition of the locomotives or other circumstances were such that extensions could not properly be granted. Two were in such condition that the full extensions requested could not be authorized, but extensions for shorter periods of time were allowed. Twelve extensions were granted after defects disclosed by our investigations were required to be repaired. Fourteen applications were canceled for various reasons. Three hundred and thirty-one applications were granted for the full period requested.

#### APPEALS

No formal appeal from the decision of an inspector was filed by any carrier during the year.

#### BETTERMENT OF SERVICE

In order that all inspectors be kept currently informed on the latest improvements in construction and design of Diesel-electric locomotives, arrangements were effected whereby all inspectors were given specialized instructions at a builder's plant for periods of 1-week duration. At that time, all inspectors were assembled for a 1-day conference for the purpose of discussing policies with officers of the Bureau and in the interest of uniformity of understanding with respect to enforcement of the requirements of the Act.

#### RECOMMENDATION

Review of tabulated data contained in this report and the accident and casualty chart on page 3 shows a noticeable improvement in accident trend since the war years, which may be attributed in large extent to the conversion to Diesel-electric locomotives. However, a corresponding improvement is not shown in data for percentage of inspected locomotives that were found defective. Since the effectiveness of our work is related to the mobility of our inspectors, satisfactory compliance with the requirement that each inspector see that proper inspections are made by railroads within his district is not practicable when inadequate travel funds restrict the time available for inspection at outlying terminals.

It is therefore recommended that the necessity for adequate travel funds be stressed to the end that sufficient funds be appropriated to properly discharge specified inspection duties.

#### ACKNOWLEDGMENT

All organization personnel are commended for their cooperative efforts and satisfactory performance of their duties despite the increase in work load during the period covered by this report.

JOHN A. HALL, Director of Locomotive Inspection.

# ACCIDENTS AND CASUALTIES RESULTING FROM THE FAILURE OF STEAM LOCOMOTIVES, TENDERS, LOCOMOTIVES OTHER THAN STEAM AND THEIR APPURTENANCES DURING THE FISCAL YEAR ENDED JUNE 30, 1955, BY ROADS

[A double star (\*\*) indicates accidents not properly reported, as required by rules 55, 162, and 335. Complete investigations therefore, could not be made, inasmuch as the Bureau was not apprised of the accidents in sufficient time after they occurred to permit them to be properly investigated.]

#### ATCHISON, TOPEKA & SANTA FE RAILWAY:

\*\*August 25, 1954, unit 2210, El Paso, Tex. Ammeter in control panel exploded; excessive slipping caused by oil leaking from journal boxes to wheel treads; No. 1 traction motor was grounded; one injured.

\*\*September 2, 1954, unit 17-B, Albuquerque, N. Mex. Oil and water had

accumulated on engineroom floor; one injured.

\*\*September 13, 1954, unit 206, near Perea, N. Mex. Oil on engineroom floor;

one injured.

September 22, 1954, unit 31-A, near Orwood, Calif. Axle on a Diesel-electric unit broke through fracture in journal at point near wheel end of inner roller bearing race, resulting in derailment of passenger train; old fracture in journal extended through approximately 80 percent of cross-sectional area; journal had been built up by the metal spraying process which extended into fillet; 59 injured.

October 19, 1954, unit 2350, San Bernardino, Calif. Front platform was ob-

structed by a brakeman's club; one injured.

February 26, 1955, unit 112, Aikman, Kans. Fireman slipped on oil on engineroom floor while going to manually adjust the shutters; shutters were reported not working properly on January 18 (two times) and 26, February 4 and 11, and March 2; one injured.

Six accidents; 64 injured.

#### BALTIMORE AND OHIO RAILROAD:

November 5, 1954, locomotive 4548, Blaine Mine, Ohio. Insufficient clearance between cab gangway handhold and gangway ladder when on curve; one injured.

March 31, 1955, locomotive 4425, near Hardies, Pa. Suspension spring supporting drop type cab seat failed through old fracture and seat collapsed; one injured

June 25, 1955, unit 458, Hazelwood, Pa. Wood screws which fastened cab seat pedestal to floor pulled out, permitting seat to fall; one injured.

Three accidents; three injured.

#### CHESAPEAKE & OHIO RAILWAY:

\*\*April 14, 1955, unit 7523, between Jett, Ky., and Cliffside, Ky. Disconnected dynamic brake cable caused heavy electrical arc at brake contactors; one injured.

One accident; one injured.

#### CHICAGO & NORTH WESTERN RAILWAY:

January 31, 1955, locomotive 633, Melrose Park, Ill. Injectors failed to supply water to the boiler, necessitating stopping the train and dumping the fire to avoid a serious accident; a normal brake application was initiated and subsequently an undesired emergency brake application occurred which resulted in injury to passengers; locomotive was dispatched without proper cab lights and without proper tests, including test of injectors, water glasses, gage cocks, and brakes; two injured.

One accident; two injured.

#### CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD:

January 14, 1955, unit 2312, Samoa, Iowa. Nipple in engine lubricating oil line broke off at globe valve; single-strength iron nipple was flawed for approximately 80 percent of circumference at point of failure; one injured.

One accident; one injured.

#### CHICAGO RIVER & INDIANA RAILROAD:

\*\*July 9, 1954, unit 9800, Chicago, Ill. Right cab seat pedestal bearing mounting plate broke loose from weld which attached it to pedestal; "Repair Engrs seat" was reported on July 7; one injured.

One accident; one injured.

#### CHICAGO, ROCK ISLAND & PACIFIC RAILROAD:

July 12, 1954, unit 377, Mason City, Iowa. Battery compartment door did not latch properly; door was warped and latch handle was bent so that true position of latch was not evident; latch was located behind panel and was not seen easily; one injured.

\*\*October 4, 1954, unit 426, Sayre, Okla. Trap door in cab floor became dis-

placed; one injured.

April 19, 1955, unit 603, Blue Island, Ill. Metal plate covering fuel oil supply pipe on engineroom floor at passageway shifted from position, causing employee to fall; plate was loose, smooth, and had film of oil on it; one injured.

June 28, 1955, unit 1216, West Ober, N. Mex. Cab door would not remain

closed due to defective latch; one injured.
Four accidents: four injured.

#### DULUTH, SOUTH SHORE & ATLANTIC RAILROAD:

March 16, 1955, unit 204, west of Baraga, Mich. Broken pin worked out of load regulator linkage, nullifying operation of load regulator; one killed.

One accident: one killed.

----, -----, ---

#### ERIE RAILROAD:

November 8, 1954, unit 1404, near Secaucus, N. J. Oil vapor explosion in combustion space of steam generator type of train heating boiler, resulting from excessive spark plug electrode gap and defective outfire relay; one injured.

One accident; one injured.

#### GREAT NORTHERN RAILWAY:

\*\*February 17, 1955, unit 5017, Skykomish, Wash. Pantograph-lowering solenoid inoperative on unit 5016, which was electrically and mechanically coupled with unit 5017; one killed

One accident; one killed.

#### GULF COAST LINES:

October 9, 1954, unit (St. L. B. & M.) 4329, Hubert, Tex. Oil on left running board; "Engine throwing oil on left running board" was reported on October 7 and "Clean oil off both running boards" was reported on October 9 (after accident); one injured.

One accident; one injured.

#### HOUSTON BELT & TERMINAL RAILWAY:

September 23, 1954, unit 25, Houston, Tex. Sand box filling hole cover fell from closed position; latches for holding cover in closed position were bent and defective; one injured.

One accident; one injured.

#### LEHIGH VALLEY RAILROAD:

November 26, 1954, unit 587, Caledonia, N. Y. Steam generator water pump plunger packing was leaking due to being excessively worn, permitting water to flow over engineroom floor; "Clean oil off engine room floor" was reported on October 31 and November 4, 8, 14, 20, and 23 and "Bad water leak around steam heat boiler, examine and repair as water is plenty on floor of unit" was reported on November 25; one injured.

One accident; one injured.

#### NEW YORK CENTRAL RAILROAD:

August 2, 1954, unit 657, Chicago, Ill. Tubular metal frame of cab seat back rest broke where previously repaired by fusion welding; cab seat was reported broken on July 31; one injured.

13

FORTY-FOURTH ANNUAL REPORT

August 8, 1954, unit 1613, Archbold, Ohio. Employee fell when cab seat box cushion tilted from position; two of the four securing bolts had pulled from seat

box pedestal and remaining bolts were very loose; one injured.

September 10, 1954, unit 1068, near Dunkirk, N. Y. Flash occurred in high voltage cabinet when attempt was made to use dynamic brake; braking switch contacts were burned, stationary side contacts were loose on contact bars, and

spacing sleeves at ends of two contacts were burned; one injured. October 20, 1954, unit 5740, near Carman, N. Y. Automatic train control

motor-generator set stopped due to an open circuit in motor starting switch. resulting in an undesired service brake application; a load side contact in motor starting switch was burned off causing an open circuit; two injured.

\*\*January 20, 1955, unit 7300, New York, N. Y. Wood screws which fastened

cab seat pedestal to floor pulled out, permitting seat to fall; one injured.

April 17, 1955, unit 1075, Cleveland, Ohio. Back rest of engineer's cab seat unexpectedly tilted backward; end of back rest adjustment spring-loaded locking pin and spring were missing; locking pin was worn through at cotter key hole; "Repair engineer's seat back rest" was reported on April 14; one injured.

April 30, unit 5005, near Jordan, N. Y. Number 8 cylinder liner cracked and leaking engine cooling water into crankcase contaminating lubricating oil, shutting down engine. Undesired automatic train control brake application due to low voltage in train control circuit when attempting to start the stalled engine: one injured.

May 7, 1955, unit 819, Collinwood, Ohio. Leaking cab heater core inlet;

reported April 1, 6, 23, 25, and May 2; one injured.

May 25, 1955, unit 1611, Dorset Junction, Ohio. Flash-over occurred in high voltage cabinet; defective magnet valve prevented proper transition; one injured. June 29, 1955, locomotive 1327, Code, Ind. Swivel collar on lubricator oil pipe broke; one injured.

Ten accidents; eleven injured.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD:

July 19, 1954, unit 0709, Needham Junction, Mass. Oil on engineroom floor; crack in No. 1 engine turbo-charger drip pan; hardened and leaking turbo-charger foot bracket gaskets; engineroom floor reported to be cleaned on July 1, 2, 6, 8, 9, 12, 13, and 16; one injured.

\*\*Åugust 31, 1954, unit 305, New Haven, Conn. Cab window retaining strip pulled off, permitting window sash to fall outside the storage recession in side wall and strike employee's foot; retaining strip was not properly applied; one

October 6, 1954, unit 0422, Plainfield, Conn. Oil on engineroom floor; engineroom floor to be cleaned and/or oil leaks in engineroom were reported 8 times

since September 19; one injured.

October 30, 1954, unit 0424, Sound View, Conn. Cab window was stuck in lowered position and cab seat broke from supporting post while employee was attempting to close window; spiral spring in window clutch box was broken and wedged between clutch and clutch box housing; cab seat bottom plate was not

properly secured to seat post; one injured.

\*\*November 29, 1954, unit 44, between Avery, Mass., and Boston, Mass. Fumes in operating cab of rail Diesel unit; accumulation of rainwater in air cleaner raised the oil level and blocked passage of air with result that air compressor drew contaminated air from its crankcase and an engine crankcase and discharged it into the airbrake system from which it entered the cab; one injured.

December 28, 1954, unit 467, Boston, Mass. Oil on engineroom floor; oil

leaks reported 12 times since December 6; one injured.

December 28, 1954, unit 0927, Boston, Mass. Fuel tank filling pipe cap fell off, striking employee; cap was loose fit and was not properly secured; safety chain ring was missing and cap was not attached to safety chain; one injured.

February 7, 1955, unit 0609, Hartford, Conn. Oil on footboard; fuel oil return

pipe was found broken through old fracture at connection to fuel tank on February 9; running boards, engineroom and/or footboards were reported to be cleaned on February 4, 7, 8, and 9; one injured.

March 28, 1955, unit 314, New Haven, Conn. Stanchion on walkway at No. 1 end of unit broke at base connection through old fracture which extended through

approximately 72 percent of cross-sectional area; one injured.

Nine accidents; nine injured.

#### NORFOLK AND WESTERN RAILWAY:

May 5, 1955, locomotive 2170, Buchanan, Va. High pressure union link failed at old fraction in bottom section of eye at crosshead connection resulting in breakage of main rod; one end of main rod entered firebox and punctured side sheet: one injured.

\*\*May 27, 1955, locomotive 241, Columbus, Ohio. Sprinkler hose blew off

nipple; one injured.

Two accidents: two injured.

#### NORTHERN PACIFIC RAILWAY:

September 28, 1954, locomotive 1714, Cabin Creek, Wash. Hot water and steam discharged from open end of steam heat pipe at rear of tender; steam heat valves were leaking and automatic drain not provided in heat line; seat of regulating valve of steam heat valve was cut: one injured.

\*\*December 29, 1954, locomotive 5136, Laurel, Mont. Connecting rod pin

came out of ash pan dump lever; one injured.

February 13, 1955, locomotive 5148, Lind, Wash. Union in fuel line above front burner was leaking badly: union connection threads were loose fit: one

Three accidents; three injured.

#### PENNSYLVANIA RAILROAD:

December 16, 1954, locomotive 4435, Enola, Pa. Superheater flue broke off near front flue sheet where flue wall was wasted away to approximately 1/32 inch in thickness; one injured.

December 24, 1954, unit 9012, Wissinoming, Pa. Ammeter exploded due to short circuit, scattering broken glass in the cab; one of the cap screws holding magnet to bracket inside the ammeter worked out and in falling made contact with internal circuit and short circuited to ground through ammeter case; no protection provided from shattered glass in case of ammeter breakage; one injured.

February 3, 1955, unit 4803, Perryville, Md. Undesired operation of automatic train speed control apparatus; defective grease seal in speed control governor

prevented low speed contacts in governor from making up; one injured.

February 13, 1955, unit 9788-A, Columbus, Ohio. Crankcase explosion resulting from overheated main bearings and a connecting rod bearing; oil passages from lube oil manifold to five main crankshaft bearings were stopped up; shreds of a cleaning rag were found in lube oil manifold above the crankshaft and in oil holes to several main bearings; two injured.

March 19, 1955, unit 9202, Altoona, Pa. Cab heater was inoperative on account of defective heater fan motor; one commutator brush was worn and mating terminal tensioning spring was weak, causing improper commutation; cover was missing

from commutator end of motor; one injured.

April 3, 1955, unit 4730, Midway, N. J. Hooks holding reverser cabinet cover worn and loese; cover contacted electrical parts causing ground and short circuit; one injured.

April 12, 1955, locomotive 3703, Enola, Pa. Superheater flue broke through prosser groove at flue sheet; flue wall was wasted away on water side and reduced

April 14, 1955, unit 9522-B, Chicago, Ill. Excessive engine speed resulting from defective overspeed control caused failure of pistons and connecting rod

assemblies; inspection ramp not properly secured; one injured.

April 23, 1955, unit 5815, Altoona, Pa. Seat disengaged from fastenings to seat column due to repairs made not in accordance with carrier's standard; one injured.

May 5, 1955, unit 2011-A, Altoona, Pa. Defective internal connections caused failure of cab signal equipment which resulted in speed control service application of automatic air brake which was immediately followed by an emergency brake application; one injured.

June 28, 1955, unit 4867, Bryn Mawr, Pa. Chafing of motor leads against lifting lug caused short circuit and resultant fire; one killed.

Eleven accidents; one killed; eleven injured.

#### READING COMPANY:

July 22, 1954, unit 561, near Bingen, Pa. Diesel-electric unit did not load properly due to movement of F-2 fan contactor into closed position while reverser was stuck in opposite position to direction of movement; some tangs on reverser piston packing expander were damaged and leather packing was distorted, permitting air pressure to blow through at times; reverser was reported sticking on July 9 and 19; one injured.

One accident; one injured.

DIRECTOR OF LOCOMOTIVE INSPECTION

#### SEAFOARD AIR LINE RAILROAD:

July 4, 1954, unit 4005, Monroe, N. C. Oil on engineroom floor; defective gasket between engine base and handhole cover plate; "Check oil leaks and wipe off engineroom floor" was reported on June 25, and "Oil leaking around base of engine" was reported on July 3; one injured.

January 21, 1955, unit 4020, Wake Forest, N. C. Oil on engineroom floor, resulting from a crankcase explosion which occurred about 3 hours previously;

one injured.

Two accidents: two injured.

#### SOUTHERN RAILWAY:

September 29, 1954, unit 2238, Atlanta, Ga. Engine had been overheating; shutter operating mechanism bound in last quarter of quadrant; roughening on running board had worn smooth; one injured.

October 19, 1954, unit 2226, Spencer, N. C. Fuel injection pump was leaking,

resulting in oil on frent platform, steps, and running board; one injured.

October 31, 1954, unit 2009, Charlotte, N. C. Hook for holding cab door in

open position was not properly secured when not in use; one injured. \*\*December 31, 1954, unit 2951, Atlanta, Ga. Hand brake failed to release properly; pin had worked out of latch spring; cotter pin had lodged in teeth of gear

in hand brake; one injured. March 1, 1955, unit 6801, Gainesville, Ga. Engineroom floor was very dirty and greasy and engineroom steps were oily and greasy; engineroom floor was reported dirty on February 26 and 28; one injured.

Five accidents; five injured.

#### SOUTHERN PACIFIC—LINES EAST:

July 27, 1954, unit (T. & N. O.) 377, near Shumla, Tex. Air compressor discharge pipe pulled out of elbow union at top of oil separator; no trace of solder found in the union; one injured.

May 9, 1955, locomotive (T. & N. O.) 745, Houston, Tex. Resultant discharge from break at old defect in blow-off discharge line extinguished fire. Vaporized oil was ignited by hot brickwork and caused firebox explosion; two injured.

Two accidents; three injured.

#### SOUTHERN PACIFIC—LINES WEST:

July 27, 1954, locomotive 4473, Fresno, Calif. Employee tripped on squirt

hose which was lying on cab deck; one injured.

\*\*August 25, 1954, locomotive 2524, Alvarado, Calif. Oil on top of tender fuel oil tank; manhole cover was not properly secured on oil tank; one injured. September 24, 1954, locomotive 3807, Alturas, Calif. Employee was burned

by overflow discharged from defective injector; one injured. \*\*September 29, 1954, unit 6260, Klamath Falls, Oreg. Oil on engineroom floor and steps between engineroom and cab; engineroom floor to be cleaned

reported 7 times since September 12; one injured.

November 26, 1954, locomotive 4340, San Jose, Calif. Oil on top of tender

fuel oil tank; one injured.

December 31, 1954, unit 5361, near Galt, Calif. Defective ground relay; one injured.

January 30, 1955, unit 1518, Pasadena, Calif. Outside edge of step was not properly roughened; one injured.

February 7, 1955, unit 1418, Los Angeles, Calif. Right front footboard was

¼ inch below minimum prescribed height; one injured.

February 17, 1955, unit 6314, Roseville, Calif. Steps between cab and nose of unit were missing; steps not replaced after removal during inspection of the unit; one injured.

May 23, 1955, unit 6349, El Paso, Texas. Removable steps in engineroom at

cab entrance not properly secured; one injured.

June 4, 1955, unit 6248, San Luis Obispo, Calif. Steps leading from cab of

locomotive not properly roughened; one injured.

June 11, 1955, locomotive 4501, West Oakland, Calif. Employee fell from running board; leak at compressor steam pipe connection; 2 bolts missing from cylinder head-steam end; oil cups on air end of compressor had not been filled; one injured.

Twelve accidents: twelve injured.

#### SPOKANE, PORTLAND & SEATTLE RAILWAY:

August 5, 1954, unit 866, near Fisher, Wash. Diesel engine turbo-charger air filter element fell from position and struck employee's head; filter element locking device was inadequate; one injured.

One accident; one injured.

#### UNION PACIFIC RAILROAD:

August 8, 1954, locomotive 3838, Lupton, Colo. Hot driving box (left No. 5); rods and/or boxes reported pounding on July 21, 26, and 29 (two times), driving boxes reported warm on July 29 (two times), and left No. 5 driving box reported burned out on July 31; one injured.

March 2, 1955, unit 1639, near Egbert, Wyo. Crankcase explosion resulted from a failed piston; piston ring lands were disintegrated and missing from one side of piston; compression rings were stuck and broken, resulting in blowby

which ignited vapor in crankcase; one injured.

Two accidents; two injured.

Table VII.—Number of steam locomotives inspected,

FORTY-FOURTH ANNUAL REPORT

	TABLE V	11.	-1 <b>v</b> u	тоег	oj s	siean	i ioc	omot	ves	insp	ected,
			જ			Ī		jo	Ī		st
	Parts defective, inoperative or missing, or in violation of the rules	Aliquippa & Southern	Atchison, Topeka Santa Fe	Baltimore & Ohio	Boston & Maine	Canadian National	Canadian Pacific	Central Railroad New Jersey	Central Vermont	Chesapeake & Ohio	Chicago & Illinots Midland
		_₹	₹	m	B	O	O	0	Ö	0	Ö
1	Air compressors			9	l	1			3	1	
3	Arch tubes			1							
4	Ashpans and mechanism					<b>-</b> -					
5	Blow-off cocks					2					
6	Boiler checks			3	2	1					
6 7 8 9	Boiler shell			4			=				
9	Brake equipment		3	29		3	ð		2	1 2	
1ŏ	Cab aprons and decks			6							
11	Cab cards					2					
12	Coupling and uncoupling devices										
$\frac{13}{14}$	Crossheads, guides, pistons, and piston rods. Crown holts			12			8				
15	Crown bolts.  Cylinders, saddles, and steam chests.  Cylinder cocks and rigging.			25	2				<b>-</b>		
16	Cylinder cocks and rigging			4							
17	Domes and dome caps			1		1				,	
18 19	Draft gear Draw gear			1 5		1	1		2		
20	Driving boxes, shoes, wedges, pedestals, and			13		1					
ł	braces.			10							
21	Firebox sheets				1						
22	Flues			1			<del>-</del> -				
23	Frames, tail pieces, and braces, locomotive Frames, tender			5							
25	Gages and gage fittings, air						<u>î</u>				
24 25 26 27	Gages and gage fittings, steam			1	1		8		2		
27	Gage cocks			3		2	1				
28 29	Grate shakers and fire doors Handholds	i	1	1 4		2					
30	Injectors, inoperative Injectors and connections Inspections and tests not made as required.			2		ಿ					
31	Injectors and connections		2	23		3	10		2	2	
32	Inspections and tests not made as required			1		1					
33 34	Lateral motion Lights, cab and classification			2			4				
35	Lights, headlight			5		<sub>A</sub>	1				
36	Lights, headlight Lubricators and shields			Ιĩ					2 1	ī	
37	Mudrings	1	l	1	3		1				
38 39	Packing nuts Packing, piston rod and valve stem Pilots and pilot beams Plugs and studs Plugs and studs				7	1	4				
10	Pilots and pilot beams			2		1			2	1	1
41	Plugs and studs.								1		
12	Reversing gear- Rods, main and side, erankpins, and collars- Safety valves			6	2	i			î		
13	Rods, main and side, erankpins, and collars.			3	3		2				
14 15						,			1		
6	Springs and spring rigging			30		7	1		4		
17	Springs and spring rigging . Squirt hose Stay bolts Stay bolts, broken Steam pipes Steam pipes								1		
18	Stay bolts			4	1		2				
19 50	Stay Dolts, Droken										
1	Steam valves					1	_ 1		;	1	
2	Steps			11		1	5		ĵ		
3	Tanks and tank valves			11	1	1					
54	Telltale holes. Throttle and throttle rigging					;					
6	Throttle and throttle rigging  Trucks, engine and trailing			8		9			2	1	
7	Trucks, tender			7					<u>-</u>		
8	Valve motion			3		2	1				
59 50	Washout plugs			5			2				
31	Stokers			1 12		$\frac{2}{1}$		~	<sub>1</sub>		
52	Wheels.			5					1	<u>ī</u>	
33	Wheels Miscellaneous—Signal appliances, badge			3		2			5		
	plates, brakes (nand).									1	
	Number of defects		5	282	31	61	71		35	16	3
	Locomotives reported	13	299	596	70	189	89	35	36	318	25
	Locomotives inspected		30	1, 265	137	71	73		124	170	30
	Locomotives defective Percentage of inspected found defective		6 7	102	17	17	20 7		114	4	1
- [	Locomotives ordered out of service.		6.7	8.1	12.4	23. 9	39. 7		11.3	2, 4	3. 3
				,.				'			

<sup>1</sup> Atchison, Topeka & Santa Fe.

ervi <b>c</b> e, et	cetera—by carriers
$\epsilon$	ervi <b>c</b> e, et

North	ton &	Milwaukee, & Pacific	Paul, Omaha		ern	& Rio Grande Western	30 0	be &	enver	stern		ado &		ior &		hville
estern	3urling uincy	Milw 1 & F	મંજ		South	Rio (estern	Toled	Missa n Rang	h & D	unk We	thern	Colorado Santa Fe	ntral	Superior Ishpeming	pu	& Nas
Chicago & Western	Chicago, Burlington Quincy	Chicago, St. Paul	Chicago, S Minneapolis	Clinchfield	Colorado & Southern	Denver &	Detroit, Toledo Ironton	Duluth, Missabe Iron Range	Fort Worth & Denver	Grand Trunk Western	Great Northern	Gulf, S	Illinois Central	Lake S	Long Island	Louisville & Nashville
ਰ	- G	වී	25	<u></u> 5_			<u> </u>	<u>A</u>	<u> </u>			<u>.</u>				<u> </u>
34	4	9	18		1	2		1		3	1		4			
2		1	1													
4		8	1					- <b>-</b>	<b></b>	4	6		3			
$\frac{6}{1}$		4 2 10 6 2	1					1	10	20			2 29	<u>-</u>		2
51 12 12 1	6 4	10 6	33 4	'	3 1	5 1		8	1				6			
12		2	4													
		10	8			<u>-</u>				8	i		6			
30	55							1	1		4		5	2		
$\frac{14}{12}$	15 6	8	9 2	- <b>-</b>					i	10 5	2		4 2	$\bar{4}$		
			10						<u>î</u>		1		4			
11 17 37		8 1 2	2 13		<sub>1</sub>	3				1 4	2		2 5			
1										ļ			1			
$\frac{2}{1}$			1						2		1					1 1
9		1	9			1										î
6		2								2			2			
20	1	6	9					2	2	5 5			8			1
4 7	$\begin{vmatrix} & 1\\ & 2\\ & 1 \end{vmatrix}$	4 2	5			i				7	3		3			
26	1 4	15	9		4	<del>-</del>	 		3	6	2		12	1		2
1 6	<del>-</del>								<b>-</b>	2						
4		i	2 5		1	j				1				1		
$\frac{2}{7}$	1		. 2			3	3	1		ī			2			
4 30		2	15		<u>î</u>	4	i						4			
10 2	4	4	1 5		·		-		. 4	1	1		8			
1	1 1						5		1 2	, . <b></b>			1			<u>î</u>
22 17 2	2	8	5 6				3		.				11			
2 15	) 	;  <u>;</u>	3				i		i	1 16	]		2			2
15 45 4	4	11	14			1	4 1									
4		] :	i		.  1		-		-				1			
1			2				3		-	-	1 1	L¦	. 1	اـــــ	-	
6			1 5 6 1 6						-		1			5		
14 40 1	)			3			4		_	1 1	+		.			
35		1	9	5	-		1		4	2 1	2 2	2		5	L	1
35 15 23 6	<u> </u>	1	i	<u> </u>	-				-	2 1	2	٠		11 :	l l	
		1 1	υ; 1	l			ī					2			-	
8 3 22	3	3	4 9	3	-	. - <b></b> -	ī	-	1   3	3		ī		2		
2	2	-1		2	-		i	_	-	1	1	2		3 9,	i	-
13	`l'		8 13					_	_	_		_	.	_	<u> </u>	
686					18		1		_			2	19		2 10	12
287 568		9 4 18			_ 130	) 14	4	$\begin{vmatrix} 6 & 15 \\ 2 & 7 \end{vmatrix}$	5 7	5 20	3 11	8	1, 22	3 2	7 '	7 49
144		8 3	7 4					_1	7 1 3 14.	1 4	1 1	1	3.	3	2	12.

19

_					00000		pecu	$\alpha, j$	ouna	aeje	cuve
	Parts defective, inoperative or missing, or in violation of the rules	Maine Central	Minneapolis, St. Paul & S. S. Marie	Missouri Pacific	Monongahela	New York Central	New York, Chicago & St. Louis	Norfolk & Portsmouth Belt Line	Norfolk & Western	Northern Pacific	Pennsylvania
1	Air compressors			5	1	(	, ,				
2	Arch tubes		-  `	1		i i	<u></u>		18		12
3	Ashpans and mechanism		-		]	1 1			- 1	2	
4	Axles		-		1				1	-	
5	Blow-off cocks					13			3	14	
6 7	Boiler checks	.l		2		21			ĭ		
7	Boiler shell					4		1	2		
8	Ashpans and mechanism Axles. Blow-off cocks Boiler checks Boiler shell Brake equipment Cabs, cab windows, and curtains Cub aprons and decks Cab cards Coupling and uncoupling devices.			3	2	65			30		
9	Cabs, cab windows, and curtains			.		18			16		5
10	Cab aprons and decks			. 1	l	16			Ž	3	
11	Cab cards					1				ž	
12	Coupling and uncoupling devices.				.		ļ			ī	1
13	Crossneads, guides, pistons, and piston rods		- 6	5		29			23	14	2
14 15	Cab eards. Coupling and uncoupling devices. Crossheads, guides, pistons, and piston rods. Crown bolts. Cylinders, saddles, and steam chests. Cylinder cocks and rigging. Domes and dome caps. Draft gear Draw gear		-				1			2	
16	Cylinders, saddles, and steam chests					65			. 39	18	2
17	Domog and dome as-		.∣ €	5		31			. 3	6	2
18	Droft goor					3			. 1	2	
19	Draw goar		1 !			2			. 2		
20	Draw gear		. 1			-			2		
	and braces.		. 10	'] 1		21			27	11	1
21	Firebox sheets	1	[	1 1	1						
22	Flues			1 1		1 1	1		. 1		
23	Frames, tail pieces, and braces, locomotive								10	1	
24	Frames, tail pieces, and braces, locomotive Frames, tender		1 1			9	1		16	4	5
25	Gages and gage fittings, air Gages and gage fittings, steam		·						8	<u>3</u>	<u>î</u>
26	Gages and gage fittings, steam		9			1			5	2	1
27	Gage cocks. Grate shakers and fire doors.		1 -	1		4			i	3	2
28	Grate shakers and fire doors		1			18			16	21	1
29	riangnoids		1 9			7		1	1	10	3
30	Injectors, monerative	1	1 9			i	2		1 1	2	
31	Injectors and connections.  Inspections and tests not made as required.		. 4	2		37	7		21	$2\overline{5}$	11
32	Inspections and tests not made as required					3			- î	8	î
33	Lateral motion Lights, eab and classification			1		8			11	ĭ	î
34	Lights, eab and classification					3			5		
35 36	Lights, headlight Lubricators and shields					2				3	
37	Mud rings					2			11		
38	Mud rings		1 1			2			1		
39	Packing nuts. Packing, piston rod and valve stem Pilots and pilot beams.		1 3			20	1		4	12	3
40	Pilots and pilot beams		4	1		28	1		14	3	
41	Plugs and studs	<b>-</b>	1			1			8	7	~~
42	Reversing gear		1	1		$\frac{1}{19}$	1		1		;
43	KOOS, Main and side, crankning and collars		1 9	1 1		33			9 11	6 11	9
44	Salety valves	l	1			1			11	11	9
45	Sanders		1			7	1		9	23	3
46	Sanders Springs and spring rigging		4	4		45	î		21	51	17
47	Squirt nose		1			2					انتيب
48 49	Stav botts		1 1			4	1			2	
50	Stay bolts, broken										
51	Steam pipes Steam valves					2			6	6	3
52	Steps.				[	3			2	3	
53	Tanks and tank valves				]	18 17	1		2	. 8	8
54	Telltale holes		0			17	2		10	13	5
55	I HUOLLIE AND INTOLLIE LIGGING					26				14	
56	Trucks, engine and trailing		i			11	3	:	3	12	3
57	Trucks, tender		8			20	i	~	9	14	6
58	valve motion		Ĭ	i		-9	1		8	9	4
59	Washout plugs					8	2		<u> </u>	5	*[
60	Stokers.			2		2	2		6	8	7
61 62	Water glasses, fittings, and shields		2	1		34			12	11	16
63	Wheels.					13			8	6	1
₩.	Miscellaneous—Signal appliances, badge plates, brakes (hand).		1	~		23	2		7	12	5
	- , , , , , , , , , , , , , , , , , , ,					!	!				
J	Number of defects		92	19		744	68	4	417	500	170
- 1	Locomotives reported	11	32	120	10				:		
	Locomotives inspected		161	75	10	557 603	266 421	23	437	466	
	Locomotives defective		17	5		156	20	28 1	1, 178	769 122	751
	Locomotives defective Percentage of inspected found defective		10.6	6.7		25. 9	4.8	3. 6	106 9. 0	15. 9	54 7. 2
	Locomotives ordered out of service					11			3. 0	20. 9	1.4

Pennsylvania-Reading Seashore Lines	Pittsburgh & Lake Erie	Reading	Richmond, Fredericks- burg & Potomac	River Terminal	St. Louis-San Francisco	St. Louis Southwestern	Seaboard Air Line	Southern Pacific, lines east	Southern Pacific, lines west	Spokane, Portland & Seattle	Terminal R. R. Association of St. Louis	Union Pacific	Virginlan	Wabash	Roads with less than 10, and industrial loco- motives	Total defects
									43			6	3		19	229 5
									$^{11}_{2}$							5 17 3
															2	105 84
									45 10 17 156 87 32			6			5	84 43
				2				1	156			18 25	10		49	636 241
				1					87						20	241
									32 4			4			6	19
									7						2	100 19 11 256
				1				1	58 3			13			1	7
				3					112 21	1		19	1		2 5 5 49 20 8 6 2 25 1 18 12	387 130 20 133 69 226
									5			4				20
								1	48 10			4	1		21 9 6	133
								1	70						6	226
									e e			, 1			1 1	20
									14	1					3	27
									19			1			13	100
									1			3	6		4	20 27 100 11 42 61
									26 37			2	2		4 8	61 116
									17			1 2 1 2 10	3		5	116 107 110 35 406 26 65 35
									18			10	1		21	110 35
									22 95	1		35 1	3		28	406
				1				1	3 15	<b>-</b>		1 4			4 5	26 65
- <b></b> -									2			11	1		2	35
								1	7			1 3			3	47
									10						6	33 233 122 39
									$\begin{bmatrix} 63 \\ 17 \end{bmatrix}$			9			26 11	233 122
									9			1			2	39
									38			6			12	10
				6					44			9	3	3	39	221
				1					12 39			11	1		33 33 13 14 4 4 8 8 5 21 22 28 4 4 5 26 66 26 11 11 22 39 22 10 37 37 31	151 221 22 155 551 27 55
				1					203			11 23 3 7	2	i	37	551
									11			7			10	55
	-								13	3					14	27 58
									13	)		10 5 11 13				33
		.							30 86	)		11	3	2	25 31 2 14 11 12	157 269
	-								i a	3					2	208
				. 1					28 43	3		4 7 8			14	179 153
<del></del> -	-1								. 7	7				2		129
									41	1 7		2 8	] 1	1 :	10	114 73
												. 3			. 3	58
				.					57					5	1 12	218 94
				2	2				37			18			12	
		-	-	-		-		-	-		-	-		-	-	
				19	-	<u> </u>			1, 89		5					7, 350
1	6 60	34					30	4.	5 59	$egin{array}{cccc} 1 & 14 \ 1 & 23 \ \end{array}$		1 512 2 742			5 538 2 521	8, 892 12, 128
	-		5	. 6	3		. 1	'	1, 561 508	8	1 :	1 78	1.	5	1 116	1,784
	.			75.0		-		3. 9	32.		50.6	10. 5	30.	0 50.0	0   22.3	14.1

Table VIII .- Number of locomotive units other than steam inspected,

	Parts defective, inoperative or missing, or in violation of the rules	Akron, Canton & Youngs- town	Aliquippa & Southern	Alton & Southern	Ann Arbor	Apalachicola Northern	Atchison, Topeka & Santa Fe	Atlanta & St. Andrews Bay	Atlanta & West Point	Atlantic Coast Line	Baltimore & Obio	Bangor & Aroostook	Belt Railway of Chicago
1	Air compressors						20		1	8	19		
2	Axles, truck and driving								<u>-</u> -				
4 5	Boilers						12			1	4		
6 8	Brake equipment Cabs and cab windows		1 2		<u>î</u>		90 37	1	2	31 17	44 25	3	$\frac{1}{2}$
9	Cab cards						9			2 20	5 14	2	
10	Cab floors, aprons and deck plates.						146			20	14		1
11	Clutches									5	10		
12	ers, magnet valves and switch						•				10		
13	groups. Coupling and uncoupling de-						1				2		
14	vices. Current collecting apparatus												
16	Draft gear						3 10			4	5		
17 18	Draw gear Driving boxes, shoes, and wedges_										25		
20	Frames or frame braces			1			123	1	3	13	1 24	<u>-</u> -	
22 23 24 25	Gages or fittings, air			1			6		ĭ	3	3		
24	Gages or fittings, steam						2						
26	Handholds						11				2		
28	Inspections and tests not made as required.						10						1
29 30	Insulation and safety devices Internal-combustion engine de-				<u>-</u> -		301	1	1 17	73	11 55	4	
l !	fects, parts and appurtenances.												
32 33	Jumpers and cable connectors						12				1		
35 36	Lateral motion, wheels Lights, cab and classification						2			<u>-</u> 2	1		
37	Lights, headlight									1	4		
39 40	Moters, volt and ampere Motors and generators Pilots and pilot beams						44	1		10	25		
42	Pilots and pilot beamsPlugs and studs									3	1		
43 44	Quills												
46	Rods, main, side, and drive shafts.												- <b>-</b>
48	Sanders		1				45		2	33 1	16 5		2
49	Springs and spring rigging, driving and truck.									1	"		
51 53	Stav bolts, broken or defective						11		<u>-</u> -	<u>-</u> -			
54	Steam pipesSteps, footboards, et cetera			1			21		i	14	3		
55	Switches, hand-operated, and fuses.												
56	Transformers, resistors and rheo-		- <b></b>						<b>-</b>				
57	stats. Trucks						28		1	7	12		4
59 60	Water tanks									1			
	shields.								1				
61 62	Warning signal appliances Wheels						9		1	3	3		
63	Miscellaneous						20		1	11	16		
ŀ	Number of defects		4	3	2		994	4	33	265	340	10	12
	Locomotive units reported	15	14	17	24	11	1,663	15	28	564	965	41	52 96
	Locomotive units inspected Locomotive units defective	18	28 3	14 1	20 1	5	6,658 504	17 2	71 7	1,740 110	3,388 191	49 5	4
	Percentage of inspected found		10.7	7. 1	5.0		7.6	11.8	9.9	6.3	5.6	10.2	4.2
	defective. Locomotive units ordered out of					<b>-</b> -					1		<b>-</b>
	service.					<u> </u>			<u> </u>			Í	

T i	<u> </u>	ective			ī	1	1	- 1	- 1	l.	- 1				ઝ	- 1	8	St.	
Bessemer & Lake Erie	Birmingham Southern	Boston & Maine	Butte, Anaconda & Pacific	Camas Prairie	Canadian National	Canadian Pacific	Canton	Central of Georgia	Central Railroad of New Jersey	Charleston & Western Carolina	Chesapeake & Ohio	Chicago & Eastern Illinois		Indiana	Chicago, Burlington Quincy		00	Chicago, Milwaukee, S Paul & Pacific	
		6						13	1	1	3		11		1	1	1	5	1 2
2	2 4	12 38 8 5 51	3	1		1 1 1 7		36 15 1 15	10 3		1 18 7 1 4	3	2 2 113 51 4 43		17 12	1 30 26 13	1 3	1 11 130 78 1 85	1 4 5 6 10
								7		<u>-</u> -	2		38		11	2	5	25	11 12
						1		1	1				<b>2</b> 9		11	3		18	13
	2	5 2 4	<u>-</u> -			<u>2</u>		1 3 1	<u>2</u> -		2 1		4		14	3 6 4	2	14 20 11	1 1 1 1 2 2 2 2 2 2 2 2 2 2
	 2					5			2		5		16 2 59		2 	4 1 21	3	15 1 50	2 2
		40 2 2				1		15 6 2					1	<b>-</b>	1		 2	1 2 1	2 2
		3				1		3	9				12 3		3	3		8 8	
	3	5 126				16		1 79	7	1	1 15		2 115		3 36	3 52	2	7 150	3
 		1				1		3			1 1		3 3 2 3		2	1		10 28 6 1	4
																1		1	
	6	12	1			11		6	1		1	1	51 6		5 2	15	1	1 46 3	
 																			1
	6	7 15				7 2		15 3		1	30	1	85 15		7 6	18 20	1	58 28	
		9						3 17	1	2	<u>4</u> 1		1 44		3	6		5 39 3	
		3													3			3	'
			.	·				11	1		1		70		2	56	2	94	1
	1	1 2				1			3	-					2	ļ		94 1 1	
		1				12		4 4 13	2		$\frac{2}{4}$		1 15 25		1	1 2 8		17 25	
2	26	389	9	1		70	-	286	47	-	109	5	832		171	295	25	1,012	
67 111 2	20 12 3	357 1,352 180	34 85 4	10 13 1	152 11	31 89 28 31. 5	10	129 485 76 15. 7	186 410 30 7.3	31 79 6	720 1,473 43 2, 9	97	621 1,894 240 12. 7	14 16	0 5	142 361 60 16.6	57 231 14 6.1	301	
1.8	25.0	13.3	4.7	7.7		01.0		4	1	1	1 0	"	3	1				. 6	

23

				,			arree o	00000	,, 0,00	210 60		uvop	occou
	Parts defective, inoperative or missing, or in violation of the rules	Chicago River & Indiana	Chicago, Rock Island & Pacific	Chicago, St. Paul, Minne- apolis & Omaha	Chicago South Shore & South Bend	Cincinnati Union Termi- nal	Cleveland Union Termi- nals	Clinchfleld	Colorado & Southern	Colorado & Wyoming	Conemaugh & Black Lick	Delaware & Hudson	Delaware, Lackawanna & Western
1 2 4	Air compressors  Axles, truck and driving  Batteries		39 1	1					1			4	1
5	Boilers		9	2									
6 8	Brake equipment Cabs and cab windows		353 87	19 10				1	2			6 6	9 7
9	Cab cards		15	1				1					8
10	Cab floors, aprons and deck plates.		121	12				1	1			17	8
11 12	Clutches Controllers, relays, circuit breakers, magnet valves and switch		2 59	3				····i					1
13	groups. Coupling and uncoupling devices.		33	4								1	2
14	Current collecting apparatus												
16 17	Draft gear		36	5					1			15	
18	Driving boxes, snoes and wedges.		13	4									
20 22 23 24	Frames or frame braces		95	1 18								33	<u>-</u> -
23	Gages or fittings, air		13					3					4
24	Gages or fittings, steam		5 2	;									
25 26	Gears and pinions Handholds		20	2								8	6
28	Inspections and tests not made		15	2									
29 30	as required. Insulation and safety devices Internal-combnstion engine defects, parts and appurtenances.		26 241	<b>2</b> 5				1 9	2			159	2 26
32	Jack shafts									~~			
33 35	Jumpers and cable connectors Lateral motion, wheels		20					. 1				1	3
36	Lights, cab and classification		5										
37 39	Lights, headlight Meters, volt and ampere		4 3										
40	Motors and generators		54	6								5	7
42	Phots and phot beams		4										
43 44	Plugs and studs												
46	Rods, main, side, and drive												
48	shafts. Sanders		180	6				1				10	6
49	Springs and spring rigging, driv-		7	16									
51	ing and truck. Stay bolts, broken or defective												
53	Steam pipes		26										
5 <b>4</b> 55	Steps, footboards, et ceteraSwitches, hand-operated, and		61	3								4	7
00	fuses.											1	
56	Transformers, resistors and rheo- stats.		1					1					
57	Trucks		72	32				1				1	2
59	Water tanks		5										
60	Water glasses, fittings and shields.												
61	Warning signal appliances		20	1									
62 63	Wheels		10 83	1								1	$\frac{2}{3}$
00	Miscellaneous											11	
-	Number of defects		1, 752	179				22	8			287	103
	Locomotive units reported	27	531	69	20	14	27	64	31	19	27	181	215
	Locomotive units inspected		2, 462	306	48	9		187	318	53	40	1,064	555
	Locomotive units defective Percentage of inspected found		500 20.3	43 14. 1				9 4.8	$0.6^{2}$			166 15. 6	38 6.8
	defective.		20.3	14. 1				4.0	0.0			10.6	İ
	Locomotive units ordered ont of		8									1	1
	service.		!										

<sup>&</sup>lt;sup>1</sup> Atchison, Topeka & Santa Fe.

Denver & Rio Grande Western	Detroit & Toledo Shore	Detroit Terminal	Detroit, Toledo & Ironton	Donora Southern	Duluth, Missabe & Iron Range	Duluth, South Shore &	Elgin, Joliet & Eastern	Erie	Florida East Coast	Fort Dodge, Des Moines & Southern	Fort Worth & Denver	Georgia & Florida	Georgia	Grand Trunk Western	Great Northern	Green Bay & Western	Gulf Coast Lines	Gulf, Colorado & Santa Fe
2		1					ii	i					2		1			
4								l						1	2			
25 13		4			2	1	ī	7 27	1		5	3	ī	44	1 43	4	3	1
1					2	1	1 7	5	$\begin{vmatrix} 3\\2\\1 \end{vmatrix}$	1				30	1			
11							7	21	1	1	1	1		4	14	1	4	1
13											<u>i</u>	<sub>1</sub>		<u>i</u>	8			
1								3	1	4				1	3			
									l									
7						i		1	1					3	5			
					1		13					1		2	16			
26	2					3	6	34	2		2	<u>ī</u>		10	25			2
3								2						1	7			
1														2	6			
3							$\frac{2}{2}$	2		1		i			$\frac{3}{2}$			
2 44						<b>4</b>	4	40 32	18			1		3 10	1 36	1	1	3
4								1	1						8			<b>-</b> -
16								ī			2				2			
														2				
14						1	3	12 1	3					7	9		1	
																		<sup>1</sup>
12					4		5	11	,		9			11	11		1	
ĩ								1				12	1		8			
									<i>-</i>									
$\frac{2}{15}$					<u>1</u>	ī		5	1		4 1	6	<u>î</u>	<sub>11</sub>	2 3			5
1																		- <b>-</b>
									- <b></b>									
7					2	3		3				6	1	3	55			
								6	- <b></b>									
,															1			
3							<u>â</u>	4			2	2			33			
18								6	1					4	- 8		1	
250	2	6			13	15	50	227	28	10	27	36	6	150	330	6	12	10
229	16	15	38		29	24	146	480	100	16	35	12	31		627	17	92	
, 767 56	1		66	7	33 4	54 4	16	1, 306 108	247 21	30 4	118 10	27 9	6	30	1,666 140	3	280 5	6
3. 2	1.5	3. 4			12.1	7.4	10.3	8.3	8. 5	13. 3	8. 5		6. 5	11.9	8.4	3. 0	1.8	1.0
	'						2			- !		1						

Table VIII.—Number of locomotive units other than steam inspected,

	Parts defective, inoperative or missing, or in violation of the rules	Gulf, Mobile & Ohio	Houston Belt & Terminal	Illinois Central	Illinois Terminal	Indiana Harbor Belt	Indianapolis Union	International-Great Northern	Jacksonville Terminal	Kansas City Southern	Kansas C	Kansas, Oklahoma & Gulf	Kentucky & Indiana Terminal
1 2 4 5 6 8	Air compressors.  Axles, truck and driving.  Batteries.  Boilers.  Brake equipment.  Cabs and cab windows.  Cab eards.  Cab floors, aprons and deck	1 1 24 3	2	<u>-</u> 2 <u>-</u> 20		4		<u>-</u> 2		<u>1</u> <u>-</u> - <u>62</u> 9	$\frac{3}{2}$	 2 1	
10 11 12	plates. Clutches_ Controllers, relays, circuit break- ers, magnet valves and switch	18	<b>-</b>	11	<u>1</u>					9		<b>-</b>	
13 14 16	Coupling and uncoupling devices.  Current collecting apparatus  Draft gear	1 <u>-</u> 3						1		3 1 2	 	1	
17 18 20 22 23	groups. Coupling and uncoupling devices. Urrent collecting apparatus. Draw gear. Driving boxes, shoes and wedges. Frames or frame braces. Frule system Gages or fittings, air. Gages or fittings, steam. Gears and pinions. Handholds.	13 1		27		1		1		1 15 2		1	
24 25 26 28	Inspections and tests not made			. '	2					<u>2</u>			
29 30 32 33	Insulation and safety devices Internal-combustion engine de- fects, parts and appurtenances. Jack shafts Jumpers and cable connectors				l	i	1	4	ł		l	l.	
35 36 37 39	letts, parts and appuremates. Jumpers and cable connectors. Lateral motion, wheels. Lights, cab and classification. Lights, headlight. Meters, volt and ampere. Motors and generators. Pluots and pilot beams. Plugs and studs. Quills.	1 1 1 5		1  5		1		2		1 14	1		
40 42 43 44 46	Rods, main, side, and drive												
48 49 51	shafts. Sanders. Springs and spring rigging, driving and truck. Stay bolts, broken or defective.	14 2		37 1						8			
53 54 55	ing and truck. Stay bolts, broken or defective. Steam pipes. Steps, footboards, et cetera. Switches, hand-operated, and fuses.	1		1		2	2						
56 57 59 60	Transformers, resistors and rheo- stats. Trucks	٤	9	ě	5								
61 62 63	shields. Warning signal appliances Wheels Miscellaneous	<del>-</del>		1	ı İ		5		2	:	-		-
	Number of defectsLocomotive units reportedLocomotive units inspectedLocomotive units defective		5 27 7 90	388 1, 19	5 50 1 11	11:	2 1	4 27:	1 10 41	1 564 - 79	1 6	5 5 4	5 23 9 9
	Percentage of inspected found defective. Locomotive units ordered out of service.	5.9		3.9		8 4.		3.		14. (	5, 9	8.	

found defective, and ordered from service, et cetera—by carriers—Continued

1   32   1   32   1   32   1   33   3   3   3   3   3   3   3	Lake Superior & Ish- peming	Lake Terminal	Lehigh & Hudson River	Lehigh & New England	Lehigh Valley	Long Island	Louisiana & Arkansas	Louisville & Nashville	Maine Central	Manufacturers Railway	Minneapolis & St. Louis	Minneapolis, Northfield & Southern	Minneapolis, St. Paul & S. S. Marie	Minnesota Transfer	Mississippi Central	Missouri-Illinois	Missouri-Kansas-Texas	Missouri Pacific	Monessen Southwestern	
1	1					1 1	4	1 41 10 21	2 7		5	1 5	2	1 1 1		1	2 16 4	1 1 69 9 2 23		1 1 1 1
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				<b>-</b> -		1					4			1				_		1
3					1	2	1 2	30 9 1	9 1		3 16 2	1	2	3 3  1			1 2 1	5 1 1 1 46 7 3		1 1 1 1 2 2 2 2 2 2 2 2 2
32     4     1     4     5     26       2     32     4     1     4     5     3       3     1     2     3     7     14       5     3     7     14     5       5     3     7     14       5     3     7     14       5     3     7     14       5     3     7     14       5     3     7     14       5     3     7     14       5     3     7     14       6     3     3     3     3       7     2     1     4     3     3       8     1     3     3     25     1     115     456       11     21     13     32     225     76     28     517     94     12     81     10     201     18     10     15     216     675     12       34     5     9     81     73     23     211     29     520     39     37     7     890     2,200     12				1	1 37	1	<u>ī</u> ō	1 115	14		5	2	4	5			1 29			24.53
1 2 3 1 2 3 1 3 5 3 7 14 5 2 1 4 5 3 7					8	1		5 28			1		1				10	7 1 2 15 2		4 4 4 4
1 1 21 13 32 225 76 28 517 94 12 81 10 201 18 10 15 216 675 12 34 5 9 81 732 53 2171,389 274 23 211 29 520 39 37 7 890 2,200 12					2				4 1 3		1 		 3					3		4
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$																		5		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					7 	1		5	1			2	1	4			 			
11 21 13 32 225 76 28 517 94 12 81 10 201 18 10 15 216 675 12 34 5 9 81 732 53 2171,389 274 23 211 29 520 39 37 7 890 2,200 12					2									25		1	<u> </u>	20		1
	11 34	21 5	13	-	225 732 51	76 53	28 217 8	517 1, 389	94 274	12 23	81 211	10 29 2	201 520 18	18 39 6	37	15 7 1	216 890 59	675 2, 200 165	12	

Table VIII .-- Number of locomotive units other than steam inspected,

	Parts defective, inoperative or missing, or in violation of the rules	Monongahela Connecting	Monongahela	Montour	Nashville, Chattanooga & St. Louis	Newhurgh & South Shore	New Orleans Public Belt	New York Central	New York, Chicago & St. Louis	New York, New Haven & Hartford		New York, Susquehanna & Western	Norfolk Southern
ľ							ĺ	0.0				. ]	
$\frac{1}{2}$	Air compressors				3			30		14			
4	Axles, truck and driving				4			5		4			
5	Boilers				1.			36		51			
6	Brake equipment	7		4	11 8			193 155	9 4	115 24			1
8 9	Cabs and cab windows				°			10		20			
10	Cab floors, aprons and deck	2			6			237	6	111			
	plates. Clutches.				İ		-					ĺ	
11	Clutches.				19			109		28			
12	Controllers, relays, circuit break- ers, magnet valves and switch				1.5			100		-			
- 1	grouns.										ļ		
13	Coupling and uncoupling de-							7					
	vices.												
14 16	Current collecting apparatus Draft gear				1			39		9			
17	Drow gear				1			68					
18	Driving boxes, shoes and wedges.							35 2		17			
20 22 23	Frames or frame braces				3			317	1	89			1
22	Fuel system Gages or fittings, air				5			53		5			
24	Gages or fittings, steam							9		7			
25	Gears and ninions							14	1	10			
26 28	Handholds Inspections and tests not made							31		4			
28	as required.												
29	Insulation and safety devices						<u>-</u> -	14	9	314			
30	Internal-combustion engine de-	2			38		2	538	9	914	1		
32	fects, parts and appurtenances.  Jack shafts									<del>.</del>			
33	Jumpers and cable connectors				2			40		12			
35	Total motion whoole							10		5			
36	Lights, cab and classification Lights, headlight					<b>-</b>		4	í				
37 39	Meters, volt and ampere							7	î	1			
40	Motors and generators				13			67	1	24			
42	Pilots and pilot beams							16		4	~		
43	Plugs and studs									2			
44 46	Quills Rods, main, side, and drive												
	shafts.	1						101	١.	10	İ		
48	Sanders			1	9		3	181 59	4	42 18	1		
49	Springs and spring rigging, driving and truck.							00		10	1		
51	Stay bolts, broken or defective			<del>-</del>				==					
53	Steam pipes							27 95	2	28 19			
54 55	Steps, footboards, et cetera Switches, hand-operated, and	1						2		2			
	fuses.				1			_					
56	Transformers, resistors and rheo-												
57	stats. Trucks							188	1	33	19		
59	Water tanks							2		6			
60	Water glasses, fittings and shields				·			3		4 2			
61	Warning signal appliances	3						14 33		1 2			1
62 63	Wheels				1			121		85			
00										1 110			I
	Number of defects	15		ŧ	129		5	2, 771	43	1, 113	25		:
	Locomotive units reported	26	25	10	132	15	14	1, 979	248	483	46		
	Locomotive units inspected	44	60	27	437	1 5	22	5, 965	569	01,054	178	€	9
	Locomotive units defective	.  9			5 45		. 1	951	.] 18	304	2 4		9
	Percentage of inspected found defective.	20. 5		18. 5	5 10.3		4.5	15. 8	2.6	28.8	3.4		2.
	Locomotive units ordered out of	2						14		. 8	3		
	service.	-		1		1							
	!	}	1	1	1	1	1	Ł	I	1	i .	1	1

found defective, and ordered from service, et cetera—by carriers—Continued

Northern Pacific	Northern Pacific Terminal	Northwestern Pacific	Pacific Electric	Patapsco & Back Rivers	vania	Pennsylvania-Reading Sea- shore Lines	Peoria & Pekin Union	Philadelphia, Bethlehem & New England	Piedmont & Northern	Pittsburgh & Lake Erie	Pittsburgh & West Virginia		Richmond, Fredericksburg & Potomac	River Terminal		Sacramento Northern	St. Louis-San Francisco	St. Louis Southwestern
Norther	Norther	Northw	Pacific ]	Patapsc	Pennsylvania	Pennsy]	Реогіа б	Philade	Piedmo	Pittsbu	Pittsbu	Reading	Richmo	River T	Rutland	Sacrame	St. Loui	St. Loui
1			1		14							1				3	23	3
3 43 25	2		4		1 7 118 33 5 106					3	4	5	6 3		1	1	7 1 63 41	34 1
3 14			7		106					1 2	3		1		2		23 23	7
16					42				1			ī					6	9
1					11												1	1
<u>4</u>			1		1 12 2 2							1			1	i	7	2 5
15 5			9		1 49 4						3	2	1 				51 7 3	15 2
6	i				4 9 1												<u>9</u>	1 2
<b>4</b> 9			10		14 176				2			<u>-</u> 2	5		16	2	4 158	51
					14				- <b></b>		<u>-</u>						5	
2					4												3 2	1
9			ī		1 46 9							2	1 4 1		2	1	10	1
					20													
8 16			2		77 12								1		2		32 16	6
					2								2				2	
					44				1			2			2		1 <del>6</del>	
 52			3		30		- <b></b>				1		2		1		20	
1					7				i				1			1 1		
19 8					21					1 3 2					1 2		5 1 16	4
309		20			921		15		5	13	12	16	===		30		536	150
$\begin{array}{c} 385 \\ 1,021 \\ 135 \end{array}$	16 46 3	1	108 17	16 	2, 318 5, 794 449 7. 7	37 49	15 20	49 39	18 44 3 6.8	124 208 10		360 857 13	236		16 76 14 18. 4	47	415 1,687 141	117 487 41

Table VIII.—Number of locomotive units other than steam inspected,

or missing, or in violation of the rules		Table VIII.— $\Lambda$	umo	ет ој	toca	mou	ve ur	nns c	nner	inan	3160	0110 01	Spec	,,
1		Parts defective, inoperative or missing, or in violation				1			International	Portland &	& Highspire		Coal & Iron Division	Terminal R. R. Association of St. Louis
13   Coupling and uneoupling devices oliceting apparatus.   3   1   32   16   1   1   1   15   17   18   17   18   17   18   17   18   17   18   17   18   17   18   17   18   17   18   18	2 4 5 6 8 9 10	Bollers.  Brake equipment.  Cabs and cab windows.  Cab cards.  Cab floors, aprons and deck plates.  Clutches.  Controllers, relays, circuit breakers, magnet valves and	1	1 1 53 30 6 43	1	13	8 7 159 55 4 158	1 19 15 199 53 4 79	2	14		1 2	37 18	2 1
Frames or frame braces.   32	14 16 17	Coupling and uncoupling devices. Current collecting apparatus Draft gear Draw gear. Draw gear		3			32	9						
as required.    1	20 22 23 24 25 26	Frames or frame braces. Fuel system Gages or fittings, air. Gages or fittings, steam. Gears and pinions.		32 9			168 13 16 12	12 6 1 9		3				1
Rods, main, side, and drive shafts.	29 30 32	as required. Insulation and safety devices Internal-combustion engine de-		116		13	10 393	9 370	1					3
Rods, main, side, and drive shafts.	35 36 37 39 40	Jumpers and capie connectors Lateral motion, wheels Lights, cab and classification Lights, headlight Meters, volt and ampere Motors and generators	1	7	2	2	57 7 80	2 6 8 89		2				
Springs and cruck   Stay bolts, broken or defective   2   30   3   40   55   1   3   15	43 44 46 48	Rods, main, side, and drive shafts.		56			62	103		1			21 1	5
Transformers, resistors and rheostats.   3	51 53 54	driving and truck. Stay bolts, broken or defective Steam pipes Steps, footboards, et cetera Switches, hand-operated, and		30		3	3 40	16 55		1		3	15	3
61 Warning signal appliances. 1 2 3 14 5 4 1 63 Miscellaneous 1 14 1 75 47 1 1 1 75 47 1 1 1 75 47 1 1 1 75 47 1 1 1 75 47 1 1 1 1 75 47 1 1 1 1 75 47 1 1 1 1 75 47 1 1 1 1 75 47 1 1 1 1 75 47 1 1 1 1 75 47 1 1 1 1 75 47 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	57 59	Transformers, resistors and rheostats.	.	3		2	24	62 2				3	10	
Locomotive units reported	62	Warning signal appliances		14		-!	75 75	14 5 47				38	1	
Locomotive units ordered out of service.		Locomotive units inspected Locomotive units defective. Percentage of inspected found defective. Locomotive units ordered out of	7.	2 1, 499 4 173 7 11. 5	0.	1 82: 2 3: 8 4.6	1 4, 495 649 0 14.	5 3, 305 9 493 4 14. 9	1: 1: 10.	$     \begin{array}{ccc}       2 & 91 \\       9 & 271 \\       2 & 34      \end{array} $	18	64 16 25.0	18 15 83. 3	81 5 13 16. 0

ound defective, and ordered from service, et cetera—by carriers—Continued

found	defe	ctive,	and	order	ed fr	om s	servi	ce, et	cete	ra—	by car	rrier	s—C	ontin	ued		
Texas & Pacific	Texas Mexican	Toledo, Peoria & Western	Toledo Terminal	Toronto, Hamilton & Buffalo	Union Pacific	Union Railroad	Union Railway	Virginian	Wabash	Washington Terminal	Waterloo, Cedar Falls & Northern	Western Maryland	Western Pacific		Roads with less than 10, and industrial locomotive units	Total defects	
					23		1								17	419	1
					<u>-</u>										<u>3</u>	7 83	1 2 4 5 6 8 9
2	<u>i</u>				$\frac{2}{102}$	<sub>1</sub>	7	<u>-</u> 5	16 3	<u>-</u>			1 9	3	124	203 2, 790	6
					15 18	1	7 2	5 <b>2</b>	3 1	1			12 1		124 36 16 36	1, 073 150	8
1					38			5	8				4		36	1,677	10
										- <b>-</b>					23	$\begin{array}{c} 2\\802\end{array}$	11 12
					58			2					5		23	802	14
					2		1	1					1		4	204	13
					<u>1</u> 9											15 336	14 16
					1											140	16 17 18 20 22 23 24 25 26 28
	'				9		- <b>-</b>								11 2	249 14 1,833	20
	- <b>-</b>				59 16	2	3	1	3				12		45 3	1,833 226	22
																48 27	24
					5	2								i	18	219 183	26
					10			3	2				1		22		
<u>î</u>					333	7	8		12				$\frac{2}{32}$	<b>-</b>	$\frac{2}{113}$	188 5, 035	29 30
								2							<u>2</u>	2 214	32
					23											39	35
			- <b>-</b>		39 7			2					8		3 1	39 198 33 43	36
									1						1	43 880	39 40
									3						22 3	71	32 33 35 36 37 39 40 42 43 44
																22	43
															7	7	46
					55		1	18	7				8		26	1, 492 306	48 49
					ь			1					1		6	300	1
					5				1				<u>ī</u>		1	177	51 53
					22 18			1					6		50	737 38	54 55
					1.10											3	1
	- <b></b> -																
		8			21 1		1	1	4				6		23	1, 054 31 16	57 59
																16	60
					8		   <i>-</i> -		. 3				2		2 35	152	61 62
		1			3 111								11		20	898	63
4	1	9			1, 073	15	25	47	65	2			134	4	694	22, 618	
205	===	<del></del>		10	1,070				276	26		109	166	14	1, 232	28, 100	
559	25	18	57		4, 957	78	57	135	[1,035]	14	l 5			17	2, 273	85, 897 8, 129	
0.5	4.0				8.4			11. 1					6.6		10.5	9.5	
					6	1						.	1		15	127	-
1	1	<u> </u>					1	i	1	1	1	<u> </u>	1	l .	<u> </u>	t	