1976 ANNUAL REPORT BY THE PRESIDENT

TO THE CONGRESS

ON THE ADMINISTRATION OF THE

FEDERAL RAILROAD SAFETY ACT OF 1970

A SUMMARY OF THE FEDERAL ACTIONS TO IMPROVE RAILROAD SAFETY DURING CALENDAR YEAR 1976 AND THE STATUS AND RESULTS THEREOF

PREFACE

The annual report on the administration of the Federal Railroad Safety Act of 1970 (the Act) (Public Law 91-458) during calendar year 1976 is submitted pursuant to Section 211 of the Act.

The provisions of Title II of the Act grant the Secretary of Transportation, in cooperation with the States and their regulatory agencies, broad authority to attack the problems of railroad safety. Section 202(a) of the Act, supplementing provisions of laws and regulations in effect on October 16, 1970, authorizes the Secretary of Transportation to prescribe as necessary appropriate rules, regulations, orders and standards for all areas of railroad safety. The Secretary is also authorized: (1) to waive compliance with those rules, regulations, orders or standards where waiver is in the public interest and is consistent with railroad safety (Section 202(c)); (2) to require that unsafe facilities or equipment be withdrawn from service where an emergency situation exists (Section 203) and; (3) to seek injunctive relief to insure compliance with rules, regulations, orders and standards he has issued (Section 210). Section 206 authorizes participation by States in investigative and surveillance activities, in connection with Federal rail safety regulations, through certification or agreement.

This report summarizes the efforts of the Department of Transportation and the Federal Railroad Administration during calendar year 1976 to improve railroad safety, principally through administration of Title II of the Act and addresses each of the reporting categories specified in Section 211 of that Act.

SUMMARY AND HIGHLIGHTS

During calendar year 1976 the office and staff of the Associate Administrator for Safety of the Federal Railroad Administration continued their efforts to administer an effective and comprehensive program to achieve safe operating and mechanical practices in the railroad industry. Such efforts included the enforcement of all regulations designed to promote railroad safety for employees, travellers, and the general public.

An important aspect of this safety program is the accumulation and analysis of safety data to identify and further define the critical problems in railroad safety. This includes a comparison of today's problems with historical safety trends and an effort to project the probable scope of the rail safety problem in the foreseeable future. The principal areas of the program: Train Accidents, Casualties, Passenger Train Accidents, Rail-Highway Grade Crossing Accidents, and Accident Investigation are summarized below.

From 1957 through 1974, the damage threshold for reporting train accidents was $750. However, in 1975 the threshold was increased to $1,750 to reflect changing cost factors. In the future, the monetary threshold will be recalculated and revised as necessary every two years.

TRAIN ACCIDENTS

The FRA Office of Safety has continued to analyze and to depict by contributing cause, the trends of train accidents per million train miles. The basic contributing causes analyzed are human factors, equipment defects, track defects, and miscellaneous factors.

Accidents classified as caused by human factors are those for which the cause is attributed to failure of the employee(s) to follow proper operating procedures as a result of lack of training or disregard of operating rules. Like total train accidents, those accidents caused by human factors have fluctuated over the past 12 years, although at a gradually increasing rate.

In calendar year 1975, accidents caused by human factors accounted for about 23.0% of all train accidents. Of all human factors causes, the following four general causes alone were responsible for 16.7% of all train accidents that year:

(1) failure to observe rules and instruction, 6.7%;

(2) incorrect use of switches, 3.5%;

(3) failure to properly use brakes, 3.4%; and

(4) improper speed, 3.1%.

Preliminary data for calendar year 1976 indicates that accidents per million train miles caused by human factors accounted for 23.7% of all reported train accidents.

Accidents resulting from failure or malfunction of rolling equipment components are said to be caused by equipment defects. A comparison of total train accidents and equipment defect caused train accidents shows that, like total train accidents, equipment defect accidents have increased for the past 12 years, although the rate of increase is considerably less than that for all train accidents.

During calendar year 1975, 23.7% of all train accidents were caused by equipment defects, with the following three major defects alone accounting for 19% of all train accidents:

(1) suspension system, 12.2%;

(2) draft system, 4.3%; and

(3) brakes, 2.5%.

A preliminary review of accident reports for calendar year 1976 indicates that equipment defects caused 20.8% of all train accidents per million train miles.

Accidents caused by track defects are defined as those resulting from failure or malfunction of the track structure. The pattern of track defect caused accidents per million train miles more closely resembles that of total train accidents for 1965-1976 than does either the pattern of human factors or equipment defect caused accidents. Like total train accidents per million train miles, the number of track defect caused accidents has fluctuated over the past 12 years, at quite a steep rate of increase.

During calendar year 1975, track defects caused about 39.5% of all train accidents. Three major accident causes in the track defect category, which alone resulted in 36.9% of all train accidents that year, are:

(1) track geometry defects, 18.8%;

(2) rail and joint bar defects, 11.1%; and

(3) defective frogs, switches and track appliances, 7.0%.

Preliminary statistics for calendar year 1976 showed that track defects caused 41% of all train accidents.

The final general accident category is comprised of accidents caused by miscellaneous factors which, in 1975, caused 13.8% of all train accidents. This category includes collisions with motor vehicle at grade crossing; interference with railroad operation by non-railroad employee; and over-loaded, oversized or shifted lading. The percent of train accidents caused by miscellaneous factors increased in 1976, to 14.5%.

Rail injuries include injuries to employees on duty, employees not on duty, passengers, trespassers and non-trespassers. The large increase noted in 1975 results from major changes in the definition of a reportable injury to allow comparability of railroad industry statistics with those published by the Department of Labor for other industries.

ACCIDENT INVESTIGATION

Information gathered from carrier reported accidents/incidents and casualties is often used in support of regulatory action. However, because it is based on general cause codes, a more specific source of accident information is used to supplement the data reported by the carrier. This specific informational source is the accident investigation conducted by the FRA field inspector. During calendar year 1976, the Office of Safety initiated 153 train accident investigations, of which 15 were investigated jointly with the National Transportation Safety Board. The FRA also investigated the deaths of 89 carrier employees that year. Through the investigative activities, FRA can obtain detailed information about suspected safety problem areas.

CONTENTS

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STATISTICAL COMPILATION OF THE ACCIDENTS AND CASUALTIES BY CAUSE WHICH OCCURRED IN CALENDAR YEAR 1976

- REFERENCE -

P.L. 91-458, Section 211(a)(1)

A-1 STATISTICAL COMPILATION OF ACCIDENTS AND CASUALTIES BY CAUSE WHICH OCCURRED IN CALENDAR YEAR 1976

Part 225.11 of Title 49 Code of Federal Regulations stipulates that railroads must submit monthly accident/incident reports within 30 days after expiration of the month during which the accidents/incidents occurred. (Accident/incident data for 1976 cited throughout this report is based upon final statistics for the calendar year through October, and incomplete and partially analyzed data for the remaining two months of the year.) The data, does however, provide a sound basis for describing the railroad safety picture at the end of the reporting year.

Effective January 1, 1975, the reporting criteria were revised to correct the statistical distortion in reportable train accidents caused by inflation, as well as to expand the scope of reportable train incidents. The reporting threshold, reflected in this Annual Report, is $1,750 in damages to railroad on-track equipment, signals, track, track structures, and roadbed. This monetary threshold will be evaluated and adjusted as necessary every two years to reflect future changes in the cost of repairs to railroad equipment and facilities due to railroad train accidents.

The criteria for reportability in the personal injury category also were revised to be comparable with the Department of Labor's Occupational Safety and Health Act requirements. The new criteria for reporting of personal injuries define "Reportable" as being any event arising from the operation of a railroad which results in medical treatment, restriction of work or motion, loss of workdays, loss of consciousness, or any occupational illness of a railroad employee as diagnosed by a physician.

The eight statistical compilations are arranged in a sequence intended to familiarize the reader with the accident experience during the reporting year.

Table 1: Number of Train Accidents and Damages, by Cause of Accidents, 1975-1976

Table 2: Total Casualties by Class of Persons, in Train Accidents, Train Incidents, and Non-Train Incidents, 1976

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Table 7: Casualties to Employees on Duty, by Type of Accident/ Incident, 1976

Table 8: Casualties in Accidents at Public Rail-Highway Crossing, 1976

LEGEND

K - Killed

I - Injured

C - Collisions

D - Derailments

O - Other (collision, explosion, act of God)

EOD - Employee on Duty

ENOD - Employee Not on Duty

NOC - Not Otherwised Classified

A train accident is a collision, derailment, fire, explosion or act of God involving operation of railroad on-track equipment (standing or moving) which results in more than $1,750 in damages to railroad on-track equipment, signals, track structures, and roadbed.

A train incident is an event arising from the movement of any equipment consist which results in a reportable death, injury, or illness, but less than or equal to $1,750 in damages to railroad on-track equipment, signals, track, track structure, and roadbed.

A non-train incident is any event arising from the operation of a railroad, but not from the movement of an equipment consist, which results in a reportable death, injury or illness.

Passengers - are persons on or getting on or off passenger-carrying trains under conditions not construed as trespassing.

Nontrespassers - are those persons who are lawfully on that part of railroad property which is used in railroad operation, other than employees, passengers or trespassers and persons adjacent to railroad premises when injured as the result of the operation of a railroad.

Trespassers - broadly includes not only those persons who in the ordinary acceptance of the term would be regarded as trespassers on railroad property, and as employees if trespassing, but also pedestrians and other highway travelers (including all persons in vehicles) who, in going on the crossing, pass closed gates or other similar barriers, and pedestrians who attempt to pass over or under barriers, and cars at highway grade crossings.

TABLE 1

NUMBER OF TRAIN ACCIDENTS AND DAMAGES
BY CAUSE OF ACCIDENT
1975 - * 1976

Causes	NUMBER		PERCENT OF TOTAL		DAMAGE COST ($000)		AVERAGE DAMAGE COST PER ACCIDENT	
	1975	1976	1975	1976	1975	1976	1975	1976
Track, Roadbed or Structure	3,176	4,299	39.50	41.25	$69,519	$83,657	$21,899	$19,460
Mechanical & Electrical Failures	1,906	2,174	23.70	20.86	49,722	66,342	26,087	30,516
Train Operation Human Factors	1,847	2,469	22.97	23.69	29,971	33,163	16,227	13,432
Miscellaneous Causes not Otherwise Listed	1,112	1,481	13.83	14.21	28,186	41,522	25,347	37,340
TOTAL	8,041	10,423	100.00	100.00	$177,398	$224,684	$22,062	$21,556

* Preliminary figures for 1976.

NOTE: "Preliminary" will be used on each of the following tables to indicate that statistics for November - December are not final as in the preceding months.

TABLE 2

TOTAL CASUALTIES BY CLASS OF PERSONS, IN TRAIN ACCIDENTS, TRAIN INCIDENTS AND NON-TRAIN INCIDENTS

* 1976

Class of persons	CASUALTIES			
	Numbers		% of Total by Class of Persons	
	Fatalities	Injuries	Fatal	Injured
All persons	1,654	65,252	100.00	100.00
Employees	101	58,779	6.10	90.08
Passengers	4	827	0.24	1.27
Nontrespassers	1,057	4,872	63.91	7.46
Trespassers	492	774	29.75	1.19

Comparison of Fatalities

1976 - 1975

	* 1976	1975	Percent change
All persons	1,654	1,560	+ 6.0
Employees	101	113	-10.6
Passengers	4	8	-50.0
Nontrespassers	1,057	915	+15.5
Trespassers	492	524	- 6.1

* Preliminary figures for 1976.

TABLE 3

TOTAL CASUALTIES BY TYPES OF ACCIDENTS

* 1976

TYPES OF ACCIDENT	Accidents	Fatalities		Injuries	
		Number	Percent of Total	Number	Percent of Total
Train Accidents					
Collisions	1,427	26	1.57	238	0.36
Derailments	8,069	13	0.79	476	0.73
Other	927	89	5.38	330	0.51
Subtotal	10,423	128	7.74	1,044	1.60
Train Incidents					
Coupling or uncoupling	488	4	0.24	488	0.75
Operating locomotives	457	1	0.06	474	0.73
Operating hand brakes	364	-	-	369	0.56
Operating switches	77	-	-	77	0.12
Persons on cars contacting structures	200	1	0.06	202	0.31
Getting on or off cars	2,408	18	1.09	2,417	3.70
Highway grade crossing accidents	3,499	966	58.40	3,856	5.91
Struck on track at other than public crossings	612	293	17.72	341	0.52
Miscellaneous	4,289	29	1.75	4,344	6.66
Subtotal	12,394	1,312	79.32	12,568	19.26

(cont.on next page)

* Preliminary figures for 1976.

TOTAL CASUALTIES BY TYPES OF ACCIDENTS

* 1976

TYPES OF ACCIDENT	ACCIDENTS	FATALITIES		INJURIES	
		NUMBER	PERCENT OF TOTAL	NUMBER	PERCENT OF TOTAL
Non-train Incidents					
Coupling or uncoupling	1,926	1	0.06	1,940	2.97
Operating locomotives	338	-	-	341	0.53
Operating hand brakes	736	-	-	741	1.13
Operating switches	1,913	-	-	1,937	2.97
Persons on cars contacting structures	106	-	-	107	0.16
Getting on or off cars	2,869	3	0.18	2,901	4.44
Highway grade crossing accidents	360	63	3.82	428	0.66
Struck on track at other than public crossings	247	81	4.90	171	0.26
Miscellaneous:					
a. freight, baggage, mail	188	1	0.06	194	0.30
b. windows, doors	1,170	2	0.12	1,179	1.81
c. servicing or maintenance involving train operation	1,508	3	0.18	1,521	2.33
d. stumbling, falling while on cars	550	3	0.18	559	0.86
e. stumbling, falling, not on cars	6,644	7	0.42	6,735	10.32
f. flying or falling objects, burns, and similiar causes	7,745	9	0.54	7,888	12.09

(cont. on next page)

* Preliminary figures for 1976.

TABLE 3 (cont.)

TOTAL CASUALTIES BY TYPES OF ACCIDENTS
* 1976

Types of accidents	Accidents	Fatalities		Injuries	
		Number	Percent of Total	Number	Percent of Total
g. striking or being struck by equipment, structures, or material, NOC	1,403	2	0.12	1,424	2.18
h. use of hand tools	3,908	-	-	3,985	6.11
i. inserting or removeing ties, switch timbers, tie plates and fastenings by use of hand tools	2,581	-	-	2,637	4.04
j. loading or unloading ties, switch timbers, tie plates and fastenings	1,598	-	-	1,620	2.48
k. handling material by hand	3,344	-	-	3,394	5.20
l. other causes	11,645	39	2.36	11,938	18.30
Subtotal	50,779	214	12.94	51,640	79.14
Grand Total	73,596	1,654	100.00	65,252	100.00

* Preliminary figures for 1976.

TABLE 4

CASUALTIES IN TRAIN ACCIDENTS BY CAUSE

* 1976

CAUSES	TOTAL	TRAIN ACCIDENTS			TOTAL CASUALTIES		TOTAL EOD		EOD TRAINMEN		EOD OTHER		ENOD		PASS.		NON TRES.		TRES.	
		C	D	O	K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I
Track, Roadbed or Structures																				
Roadbed	215	6	205	4	1	17	1	17	1	17	-	-	-	-	-	-	-	-	-	-
Track geometry	2,088	13	2,068	7	2	69	-	69	-	64	-	5	-	-	-	-	-	-	2	-
Rail & joint bar	1,089	17	1,072	-	1	29	1	27	-	23	1	4	-	-	-	-	-	1	-	1
Frogs, switches & track appliances	867	59	798	10	1	9	1	7	-	7	1	-	-	-	-	-	-	2	-	-
Other way & structure	28	-	26	2	-	5	-	5	-	5	-	-	-	-	-	-	-	-	-	-
Signal & communication failures	12	6	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	4,299	101	4,171	27	5	129	3	125	1	116	2	9	-	-	-	-	-	3	2	1
Equipment and Electrical Failures																				
Brakes	281	28	218	35	-	12	-	12	-	12	-	-	-	-	-	-	-	-	-	-
Trailer or container on flat car	17	4	6	7	-	4	-	4	-	4	-	-	-	-	-	-	-	-	-	-
Body	257	1	227	29	-	8	-	6	-	4	-	2	-	-	-	-	-	2	-	-
Coupler & draft system	356	40	308	8	-	37	-	14	-	13	-	1	-	1	-	17	-	4	-	1
Truck components	385	1	383	1	-	5	-	5	-	5	-	-	-	-	-	-	-	-	-	-
Axles & journal bearings	319	-	308	11	-	6	-	6	-	6	-	-	-	-	-	-	-	-	-	-
Wheels	396	-	390	6	-	15	-	8	-	7	-	1	-	-	-	5	-	2	-	-
Locomotives	121	2	24	95	-	6	-	5	-	5	-	-	-	-	-	1	-	-	-	-
General equipment & electrical failures	42	2	22	18	-	21	-	9	-	2	-	7	-	-	-	-	-	12	-	-
Subtotal	2,174	78	1,886	210	-	114	-	69	-	58	-	11	-	1	-	23	-	20	-	1

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* Preliminary figures for 1976.

TABLE 4 (cont.)

CASUALTIES IN TRAIN ACCIDENTS BY CAUSE

* 1976

CAUSES	TOTAL	TRAIN ACCIDENTS			TOTAL CASUALTIES		TOTAL EOD		EOD TRAINMEN		EOD OTHER		ENOD		PASS.		NON-TRES.		TRES.	
		C	D	O	K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I
Train Operation-Human Factors																				
Brakes, use of	308	192	108	8	-	7	-	6	-	6	-	-	-	-	-	-	-	1	-	-
Employee physical condition	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flagging, fixed, hand & radio signals	80	55	14	11	5	94	5	35	5	30	-	5	-	-	-	59	-	-	-	-
Other rules & instructions	716	532	155	29	9	41	9	41	2	25	7	16	-	-	-	-	-	-	-	-
Speed	311	137	136	38	-	37	-	37	-	25	-	12	-	-	-	-	-	-	-	-
Switches, use of	426	104	314	8	2	30	2	30	2	23	-	7	-	-	-	-	-	-	-	-
Other human factors	626	54	564	8	2	8	1	8	-	7	1	1	-	-	-	-	-	-	1	-
Subtotal	2,469	1,075	1,292	102	18	217	17	157	9	116	8	41	-	-	-	59	-	1	1	-
Miscellaneous Cause Not Otherwise Listed	1,481	173	720	588	105	584	8	155	7	131	1	24	-	-	2	220	83	197	12	12
Total (Table 4a and Table 4b)	10,423	1,427	8,069	927	128	1,044	28	506	17	421	11	85	-	1	2	302	83	221	15	14

* Preliminary figures for 1976.

TABLE 5

CASUALTIES IN TRAIN INCIDENTS BY OCCURRENCE

* 1976

OCCURRENCES	No. of ACCIDENTS	TOTAL CASUALTIES		EMPLOYEES				NON - EMPLOYEES					
				ON DUTY		OFF DUTY		PASSENGERS		NON-TRESPASSERS		TRESPASSERS	
		K	I	K	I	K	I	K	I	K	I	K	I
Coupling or uncoupling locos or cars, air or stream hose	488	4	488	4	485	-	-	-	1	-	2	-	-
Operating locos and rail motorcars	457	1	474	1	472	-	-	-	-	-	2	-	-
Operating hand brakes	364	-	369	-	367	-	-	-	1	-	1	-	-
Operating switches	77	-	77	-	76	-	-	-	-	-	1	-	-
Persons on cars contacting structures	200	1	202	1	198	-	-	-	-	-	2	-	2
Getting on or off locos or cars	2,408	18	2,417	4	2,288	-	2	2	42	-	8	12	77
Accidents at public grade crossings	3,499	966	3,856	2	77	1	1	-	8	884	3,586	79	184
Struck by or ran into locos or cars at other than public crossings	612	293	341	8	58	1	4	-	-	8	44	276	235
Miscellaneous:													
a. freight, baggage, mail	28	5	28	-	22	-	-	-	-	-	5	5	1
b. windows, doors	184	-	183	-	161	-	-	-	20	-	1	-	1
c. servicing or maintenance involving train operation	38	-	40	-	40	-	-	-	-	-	-	-	-
d. stumbling, falling while on cars	392	8	390	4	280	-	-	-	86	-	10	4	14
e. flying or falling objects, burns and other similar causes	1,276	2	1,282	1	1,250	-	1	-	31	1	-	-	-
f. striking or being struck by equipment, structures or materials	155	2	152	2	145	-	1	-	-	-	4	-	2
g. other occurrences	2,216	12	2,269	7	2,159	-	6	-	52	4	32	1	20
TOTAL T O T A L	12,394	1,312	12,568	34	8,078	2	15	2	241	897	3,698	377	536

* Preliminary figures for 1976.

CASUALTIES IN NON-TRAIN INCIDENTS, BY OCCURENCE TABLE 6

* 1976

OCCURRENCES	TOTAL INCIDENTS	TOTAL CASUALTIES		EMPLOYEES				NON-EMPLOYEES					
				ON DUTY		OFF DUTY		PASSENGERS		NON-TRESPASSERS		TRESPASSERS	
		K	I	K	I	K	I	K	I	K	I	K	I
Coupling or uncoupling locos/cars or manipulating air or stream hose	1,926	1	1,940	1	1,940	-	-	-	-	-	-	-	-
Operating locos or rail motorcars	388	-	341	-	340	-	-	-	-	-	1	-	-
Operating hand brakes	736	-	741	-	738	-	-	-	-	-	2	-	1
Operating switches	1,913	-	1,937	-	1,937	-	-	-	-	-	-	-	-
Persons on locos/cars contacting fixed structures	106	-	107	-	104	-	-	-	1	-	-	-	2
Getting on/off locos/cars	2,869	3	2,901	1	2,656	-	30	-	163	-	41	2	11
Accidents at public grade crossing	360	63	428	-	43	-	-	-	-	59	361	4	24
Struck by or ran into locos/cars at other than public crossing	247	81	171	1	61	-	2	-	1	8	24	72	83
Miscellaneous:													
a. freight, baggage, mail	188	1	194	-	186	-	-	-	4	-	2	1	2
b. windows, doors,etc.	1,170	2	1,179	1	1,109	-	19	-	20	-	30	1	1
c. servicing or maintenance involving train operation	1,508	3	1,521	2	1,516	-	-	-	-	1	5	-	-
d. stumbling, falling, NOC, on locos/cars	550	3	559	1	494	-	8	-	35	2	17	-	5
e. stumbling, falling, caught, NOC, not on locos/cars	6,644	7	6,735	5	6,170	-	294	-	44	-	205	2	22
f. flying or falling objects, burns and similar causes	7,745	9	7,888	4	7,771	-	53	-	4	-	36	5	24
g. striking or being struck by equipment, structures, or materials, NOC	1,403	2	1,424	2	1,390	-	6	-	-	-	26	-	2
h. use of hand tools	3,908	-	3,985	-	3,961	-	7	-	-	-	17	-	-
i. inserting or removing ties, switch timbers, tie plates & fastenings using hand tools	2,581	-	2,637	-	2,636	-	-	-	-	-	1	-	-
j. loading or unloading ties, switch timbers, tie plates and fastenings	1,598	-	1,620	-	1,620	-	-	-	-	-	-	-	-
k. handling materials by hand	3,344	-	3,394	-	3,373	-	4	-	-	-	17	-	-
l. other occurrences	11,645	39	11,938	14	11,563	5	148	-	12	7	168	13	47
TOTAL	50,779	214	51,640	32	49,608	5	571	-	284	77	953	100	224

* Preliminary figures for 1976.

TABLE 7

CASUALTIES TO EMPLOYEES ON DUTY BY
TYPE OF ACCIDENT/INCIDENT
* 1976

TYPES OF ACCIDENTS	ACCIDENTS	FATALITIES		INJURIES	
		Number	Percent of Total	Number	Percent of Total
Train Accidents					
Collisions	1,427	18	19.15	158	0.27
Derailments	8,069	6	6.38	264	0.45
Other	927	4	4.26	84	0.15
Subtotal	10,423	28	29.79	506	0.87
Train Incidents					
Coupling or uncoupling	486	4	4.26	485	0.83
Operating locomotives	473	1	1.06	472	0.81
Operating hand brakes	367	-	-	367	0.63
Operating switches	76	-	-	76	0.13
Persons on cars contacting structures	198	1	1.06	198	0.34
Getting on or off cars	2,280	4	4.26	2,288	3.93
Highway grade crossing accidents	75	2	2.13	77	0.13
Struck on track at other than public crossings	60	8	8.51	58	0.11
Miscellaneous	4,049	14	14.89	4,057	6.97
Subtotal	8,064	34	36.17	8,078	13.88
Non-train Incidents					
Coupling or uncoupling	1,926	1	1.06	1,940	3.33
Operating locomotives	337	-	-	340	0.58
Operating hand brakes	733	-	-	738	1.27
Operating switches	1,913	-	-	1,937	3.33
Persons on cars contacting structures	103	-	-	104	0.18
Getting on or off cars	2,650	1	1.06	2,656	4.56
Highway grade crossing accidents	40	-	-	43	0.07
Struck on track at other than public crossings	60	1	1.06	61	0.10
Miscellaneous:					
a. freight, baggage, mail	179	-	-	186	0.32
b. window, doors	1,100	1	1.06	1,109	1.92
c. servicing or maintenance involving train operating	1,503	2	2.13	1,516	2.61
d. stumbing, falling while on cars	492	1	1.06	494	0.85
e. stumbing, falling not on cars	6,149	5	5.32	6,170	10.60
f. flying or falling objects, burns, and similar causes	7,750	4	4.26	7,771	13.35
g. striking or being struck by equipment structures, or material, NOC	1,380	2	2.13	1,390	2.39
h. use of hand tools	3,948	-	-	3,961	6.81

* Preliminary figures for 1976.

(continued on next page)

CASUALTIES TO EMPLOYEES ON DUTY BY TYPE OF ACCIDENT/INCIDENT

* 1976

TYPES OF ACCIDENTS	Accidents	Fatalities		Injuries	
		Number	Percent of Total	Number	Percent of Total
i. inserting or removing ties, switch timbers, tie plates and fastenings by use of hand tools	2,598	-	-	2,636	4.53
j. loading or unloading ties, switch timbers tie plates and fastenings	-	-	-	1,620	2.78
k. handling material by hand	3,340	-	-	3,373	5.80
l. other causes	11,502	14	14.89	11,563	19.87
Subtotal	47,703	32	34.04	49,608	85.25
Grand Total	66,190	94	100.00	58,192	100.00

* Preliminary figures for 1976.

TABLE 8

CASUALTIES IN ACCIDENTS/INCIDENTS AT PUBLIC RAIL-HIGHWAY CROSSING

* 1976

Causes	Total Casualties		Employees				Non-Employees					
			On Duty		Off Duty		Passengers		Nontrespassers		Trespassers	
	K	I	K	I	K	I	K	I	K	I	K	I
Struck by train:												
Pedestrian	53	34	-	-	-	-	-	-	22	17	31	17
Motor Vehicle	867	3,060	1	92	1	1	-	26	823	2,825	42	116
Other vehicle, machine, or animal	20	25	5	2	-	-	-	-	11	19	4	4
Ran into train:												
Pedestrian (including passing over, through or under cars)	9	20	-	4	-	-	-	-	4	6	5	10
Motor vehicle	171	1,264	-	25	-	-	-	-	164	1,177	7	62
Other accidents/incidents at public crossings	6	162	4	58	-	-	-	43	1	53	1	8
Total	1,126	4,565	10	181	1	1	-	69	1,025	4,097	90	217

Total Accidents/Incidents 12,032

* Preliminary figures for 1976.

A-2

FEDERAL RAILROAD SAFETY REGULATIONS, ORDERS AND STANDARDS ISSUED BY THE FEDERAL RAILROAD ADMINISTRATION, AND PROPOSED RULES IN THESE AREAS

- REFERENCE -

P.L. 91-458, Section 211(a)(2)

A-2 ORDERS, STANDARDS, AND PROPOSED RULES RELATIVE TO RAILROAD SAFETY THAT WERE ISSUED DURING CALENDAR YEAR 1976

Railroad safety rules, regulations, and proposals thereto are promulgated under provisions of the Code of Federal Regulations, Title 49, Transportation, Parts 200-999. The items outlined below are prefixed with the appropriate Part number of Title 49 to which they apply.

Final Rules Issued

Part 215 - Freight Car Safety Standards

On May 6, 1976, a Notice of Proposed Rulemaking was published which stated that an amendment to Part 215 was being considered relative to Freight Car Safety Standards. The proposal would extend the time period for completion of the initial periodic inspection of freight cars as required by the standards. It would also resolve the problems surrounding the periodic inspection of privately owned freight cars and would permit the completion of all initial periodic inspections prior to January 1, 1979.

Comments received were generally in support of the proposal and as a result Part 215 was appropriately amended in a final regulation published on October 6, 1976.

Part 218 - Railroad Operating Rules

On July 21, 1975, a Notice of Proposed Rulemaking was published in the Federal Register stating that FRA was considering the issuance of a safety regulation to require railroads to take certain protective measures to assure the safety of railroad employees engaged in the inspecting, testing, repairing and servicing of locomotive equipment. The proposed rule would require that a blue signal be displayed at the end of a track to indicate that workmen were engaged in work that may subject them to the possibility of personal injury should the equipment be moved.

After reviewing the comments of interested parties, submitted both in writing and verbally during the public hearing, a final rule was adopted requiring blue signal protection of railroad employees working on locomotives and other rolling equipment. This final rule was published in the Federal Register on March 15, 1976.

Part 217 and 218 - Civil Penalties Railroad Operating Rules and Practices

On October 29, 1976, two notices were published in the Federal Register concerning the civil penalties to be assessed for violation of the railroad operating rules and practices set forth in Parts 217 and 218. Such civil penalties contain a schedule for violation of rules and a more punitive schedule for intentional rule violations.

Part 225 and Part 230 - Telephonic Reporting of Railroad Accidents/Incidents and Locomotive Accidents

On April 15, 1976, a final Notice of Rulemaking was published in the Federal Register to require telephonic reporting of railroad and locomotive accidents when it is specified in Parts 225 and 230 that immediate notification of such accidents was required. This telephonic requirement replaced the telegraphic notification requirement and allowed simultaneous notification of FRA and the National Transportation Safety Board, thus satisfying the accident reporting requirements of both agencies with a single phone call.

Part 225 - Reporting Threshold for Railroad Accidents/ Incidents

On November 17, 1976, a final Notice of Rulemaking was published concerning the accident/incident reporting threshold. This notice was published in accordance with the provisions of Appendix A to Part 225 which requires biennial review of the monetary damage threshold for reporting accidents/ incidents to the FRA. On the basis of the review it was determined that the reporting threshold should be increased from $1750 to $2300 to maintain parity between present and future accident/incident statistics. The published notice amended the regulation to reflect the new threshold.

Part 225 - Railroad Accidents/Incidents: Reports Classification and Investigations

On July 28, 1976, a final Notice of Rulemaking was published in the Federal Register concerning the civil penalties arising from violations of the provisions of Part 225. These penalties should be assessed in two areas one for a violation of Part 225 and a more stringent financial penalty for intentional violations of this regulation.

Part 228 - Termination of Rulemaking Proceeding Railroad "Stop and Proceed" Procedures

In response to a March 31, 1975, Notice of Proposed Rulemaking in which it was proposed that uniform minimum standards be adopted governing the operation of trains and other railroad operating equipment, several comments were written containing the opinion that a rule requiring a full stop at a permissive "Stop and Proceed" signal was not warranted since a great number of train accidents had not resulted from less restrictive rules. Comments at a public hearing also questioned the advisability of the "Full Stop" requirement on grades as well as in areas where vandalism is prevalent.

After analyzing the statistics on rear end collisions, the category which is most likely to have a correlation with the "Stop and Proceed" regulation, it was found that carriers which do not require trains to come to a full stop at a "Stop and Proceed" signal had a slightly better safety performance than those which required a full stop at such signals. Consequently, on December 29, 1976, the FRA published a notice in the Federal Register which stated that based on the comments of interested parties and the review of accidents statistics a final rule on "Stop and Proceed" would not be issued.

Part 231 - Railroad Safety Appliance Standards

Effective October 1, 1976, Parts 231.29 and 231.30, Railroad Safety Appliance Standards for road locomotives equipped with corner stairways and locomotives engaged in switching service were amended to respond to problems being encountered by railroads to reduce the cost of modifying locomotives and to improve the safety of personnel using these types of locomotives.

On December 30, 1976, the Administrator issued an amendment in Part 231.1 to extend the mandatory completion date for removal of running boards from December 31, 1976, to December 31, 1979. This rule change was proposed on November 22, 1976, and no unfavorable comments were received. This amendment involves removal of running boards from box and other house cars without roof hatches as well as modifications to ladders and handholds on box cars and other house cars with or without roof hatches.

PROPOSED CHANGES AND ADDITIONS TO SAFETY RULES ISSUED DURING CALENDAR YEAR 1976

Part 218 - Railroad Operating Rules

On March 30, 1976, a Notice of Proposed Rule Making was issued in the Federal Register proposing minimum requirements for railroad operating rules concerning the observation and communication of signal indication, speed within yard limits and the protection of trains when operating on the same track. Written comments on this proposed rulemaking were solicited and a public hearing on the rulemaking was conducted on May 14, 1976.

Part 236 - Walkways on Railroad Bridges

On November 15, 1976, the Federal Railroad Administration published in the Federal Register an Advance Notice of Proposed Rulemaking. The purpose of this Notice was to solicit views and comments from the public as to the necessity, cost and benefit to be derived from Federal regulations in the area of walkways on railroad bridges, trestles and similar structures. Comments have been received and are in the process of being analyzed.

Part 236 - Standards for the Maintenance, Inspection and Testing of Highway Grade Crossing Warning Devices

The Federal Railroad Administration in studying the need for Federal regulations to address certain aspects of the safety problems presented by the existence of railroad-highway grade crossings published in the Federal Register an Advance Notice of Proposed Rulemaking on June 28, 1976. This notice was published in an effort to inform interested persons of FRA's study and to solicit additional views and comments from the public in relation to both specific proposals presently before the FRA and general information as to the necessity, cost and possible benefit to be derived from Federal regulations in this area. Comments have been received and are being analyzed.

Part 218 - Railroad Operating Rules

On July 8, 1976, the Federal Railroad Safety Authorization Act of 1976 (PL 94-348) was enacted. This statute included a provision that the Secretary issue such rules as may be necessary to require that railroad employees (other than train or yard crews) are afforded "Blue Flag" or "Blue Signal" protection when performing inspection, testing, repairs or service to rolling railroad equipment. A Notice of Proposed Rulemaking for an amendment to Part 218 was published on November 2, 1976, to afford "Blue Flag" or "Blue Signal" protection to railroad employees (other than train or yard crews) when performing inspection, testing, repairs or service to rolling railroad equipment. In addition to displaying a "Blue Flag" or "Blue Signal" there is a proposal to require an effective locking device on the switch leading into the track upon which inspection, testing, repairs or service are being performed.

Written and oral statements from interested parties were received at a public hearing conducted on November 23, 1976, on this proposed rulemaking.

Part 221 - Rear-end Marking Devices on Passenger, Commuter and Freight Trains

On July 8, 1976, the Federal Railroad Safety Authorization Act of 1976 (PL 94-348) was enacted. This statute included a provision that the Secretary issue such rules as may be necessary to require that the rear-end on passenger, commuter and freight trains be equipped with highly visible markers.

The Federal Railroad Administration published a Notice of Proposed Rulemaking on July 16, 1973, concerning rear marking of passenger trains and on February 19, 1975, a Notice of Petition by the United Transportation Union was published in the Federal Register concerning marking of the rear-end of freight trains. Extensive comments and considerable test data were gathered as a result of these two proceedings.

It was decided to terminate the two prior proceedings and publish a Notice of Proposed Rulemaking to embody rear-end marking devices on passenger, commuter and freight trains. Accordingly such a Notice was published in the Federal Register on November 17, 1976.

Part 221 - Railroad Occupational Safety and Health Standards

On July 15, 1976, a Notice of Proposed Rulemaking was published in the Federal Register concerning the issuance of standards governing the means of egress from buildings and structures, several environmental controls and fire protection on railroad property. The substantive requirements

of the proposed standards correspond generally with those contained in the Department of Labor Standards and are proposed to be specific Railroad Occupational and Health Standards to supplement existing railroads safety regulations.

This proposed rule is based on comments received from an Advance Notice of Proposed Rulemaking issued on March 7, 1975.

Part 225 - Railroad Accidents/Incidents: Reports Classification and Investigation

On November 22, 1976, a Notice of Proposed Rulemaking was published concerning the reporting of accident/incident data by the railroads to FRA. This proposed amendment to Part 225 was the result of an effort to clarify and simplify reporting requirements. Two of the accident reports froms (FRA F 6180-55 and FRA F 6180-55a) were revised and this Notice was issued to get comments on the revision prior to the issuance of a final rule.

Part 228 - Construction of Railroad Employee Sleeping Quarters

On December 3, 1976, a Notice of Proposed Rulemaking was issued concerning the construction of sleeping quarters for train crews "within or in the immediate vicinity of any area where railroad switching or humping operations are performed." This proposed rulemaking is responsive to a statutory amendment to the Hours of Service Act which became effective on July 8, 1976.

A-3

SUMMARY OF REASONS FOR EACH WAIVER GRANTED UNDER SECTION 202(c) OF THE ACT DURING CALENDAR YEAR 1976

- REFERENCE -

P.L. 91-458, Section 211(a)(3)

A-3 SUMMARY OF REASONS FOR EACH WAIVER GRANTED DURING 1976

During 1976 the FRA determined that it was in the public interest and consistent with railroad safety to grant a total of four waivers. Two of the waivers involved provisions of the FRA Freight Cars Safety Standards (49 CFR Part 215) and two of the waivers involved provisions of the FRA Track Safety Standards (49 CFR Part 213). A brief description of the waivers follows:

Trailer Train Company (Docket No. RSFC-75-4). In a decision dated March 19, 1976, the Trailer Train Company was granted a request for an extension of the time of the periodic inspection interval (49 CFR 215.25) on three types of high utilization cars (autorack, intermodal and special use). The extended time interval was based on the relationship of the actual mile averaged for each type car to the previously established mileage interval between periodic inspection of 100,000 miles or older cars and the interval of 200,000 miles for new or reconditioned cars. The inspection time interval was increased from 12 months to 28 months on special use cars. The granting of this waiver was predicated on detailed information made available concerning the equipment including research and maintenance programs for these cars.

Norfolk and Western Railway Company (Docket No. RSFC-75-3). In decisions dated March 19 and September 10, 1976, the Norfolk and Western was granted a waiver of the periodic lubrication provisions of the Freight Car Safety Standards, initially for a group of approximately 970 covered grain hoppers and later for a group of approximately 750 gondola cars. The temporary waiver was granted for both types of cars in order to conduct a test to measure the proper relationship between lubrication intervals and the safe service life of roller bearings.

Municipality of East Troy (Docket No. RST-75-4). In a decision dated April 1, 1976, the Municipality of East Troy Railroad was granted a waiver of compliance with the cross-tie provision of the Track Safety Standards. A temporary waiver was granted in order to permit operations to continue while a tie renewal program was being undertaken to eliminate this substandard condition. The temporary waiver is subject to conditions to assure operational safety and will terminate on December 31, 1977.

Delaware Otsego Corporation (Docket No. RST-75-6). In a decision dated June 7, 1976, three small railroads in New York State were granted a waiver from provisions of the Track Safety Standards. The railroads, the Cooperstown and Charlotte Valley Railway, the Central New York Railroad

and the Fonda, Johnstown and Gloversville Railroad are all under the control of the Delaware Otsego Corporation. A temporary waiver of compliance with provisions relating to track geometry was granted to permit operations to continue over this trackage during restoration programs to eliminate the substandard conditions. These restoration programs are of varying duration with the last one to be completed by November 30, 1977. The waiver was granted subject to terms and conditions designed to ensure the safety of operations.

A-4

AN EVALUATION OF THE DEGREE OF OBSERVANCE OF APPLICABLE RAILROAD SAFETY RULES, REGULATIONS, ORDERS, AND STANDARDS ISSUED UNDER THIS TITLE

- REFERENCE -

P.L. 91-458, Section 211(a)(4)

A-4 EVALUATION OF THE DEGREE OF OBSERVANCE OF APPLICABLE RAILROAD SAFETY RULES, REGULATIONS, ORDERS AND STANDARDS

(a) FRA track inspectors along with the qualified inspectors from participating states conducted 5,251 inspections covering: (1) 127,743 miles of railroad track (2) 60,426 turnouts and (3) 142,143 records, during the 12 month period ending June 30, 1976, to determine the degree of carrier observance of the Track Safety Standards. During the course of these inspections inspectors identified, and railroad personnel corrected 42,741 defects.

(b) During 1976, FRA inspectors examined 158,700 freight cars to determine the degree of carrier observance of the Freight Car Safety Standards as prescribed under Title II. The inspectors found that 23,532 of the cars inspected were defective.

(c) Under Federal Regulation 49 CFR 217 Railroad Operating Rules and Practices, which requires all railroads to file with the Federal Railroad Administrator prior to March 1 of each year a written report with respect to operating tests and inspections conducted throughout the previous

year, submissions have been received and analyzed from approximately 158 railroads making up the general railroad system of transportation in this country.

(d) During the 12 month period ending June 30, 1976, a total of $450,380 was collected from 22 railroads for 41 cases involving 1,014 claims arising over rules and regulations promulgated pursuent to the Federal Railroad Safety Act of 1970.

From the large number of track defects and defective cars found during inspections as well as the number of claims made against the railroads for rules and regulations violations it can be concluded that the degree of observance of applicable rules and regulations by the railroad has been less than satisfactory. It is felt that the degree of compliance will improve as the carriers become more familiar with the newly promulgated regulations.

A-5

A SUMMARY OF OUTSTANDING PROBLEMS CONFRONTING THE ADMINISTRATION OF FEDERAL RAILROAD SAFETY RULES, REGULATIONS, ORDERS, AND STANDARDS ISSUED UNDER THIS TITLE IN ORDER OF PRIORITY

- REFERENCE -

P.L. 91-458, Section 211(a)(5)

A-5 SUMMARY OF PROBLEMS CONFRONTING THE ADMINISTRATION OF FEDERAL RAILROAD SAFETY RULES, REGULATIONS, ORDERS, AND STANDARDS

Many of the outstanding problems confronted by the FRA in the administration of the Federal Railroad Safety Rules in 1976 were identical to those problems which faced the FRA in previous years. Unfortunately, there are no simple, short-term solutions to safety problems which are directly related to the depressed financial condition of the rail industry. These problems will continue at least in the foreseeable future and will diminish only with a substantial improvement in the economic condition of the rail industry.

A summary of the problems confronting FRA in the administration of safety regulations, in order of priority, follows:

(a) The railroad industry continues to experience spiraling operating costs which have produced revenue losses and financial deficits. In an interim attempt to stem the increasing operating deficits, many of the Nation's railroads have resorted to deferring some of their planned maintenance programs. This practice of deferring maintenance has resulted in a steady deterioration of the rail industry's physical plant, reflected in recent years by an alarming increase in the number of track and equipment related accidents.

A substantial improvement in rail safety is therefore largely dependent on the rail industry's financial ability to maintain their physical plants.

(b) Carriers which are financially capable of improving their physical plants are often hampered by long lead times for materials delivery, which tend to delay planned maintenance programs.

(c) For the reasons stated above, voluntary compliance by the railroads is difficult to obtain. The present FRA inspection force is based on the position that the Federal and State role in rail safety primarily is one of monitoring carrier compliance with Federal Safety Regulations. The primary responsibility for compliance with applicable rail safety rules and regulations rests with the carriers. The Federal and State role appropriately is one of monitoring industry compliance through a system of periodic safety inspections and audits.

(d) The extent of and the results from State participation in the rail safety program will not be clearly determined for some time. FRA believes that the States have an appropriate role in this crucial safety area and is committed to the expansion of this Federal/State partnership to accommodate all those States which wish to participate. Standards for State participation in the various areas of the rail safety program will continue to be issued as they are developed.

A-6

AN ANALYSIS AND EVALUATION OF RESEARCH AND RELATED ACTIVITIES COMPLETED (INCLUDING THE POLICY IMPLICATIONS THEREOF) AND TECHNOLOGICAL PROGRESS ACHIEVED DURING CALENDAR YEAR 1976

-REFERENCE -

P.L. 91-458, Section 211(a)(6)

A-6 ANALYSIS AND EVALUATION OF RESEARCH AND RELATED ACTIVITIES COMPLETED DURING CALENDAR YEAR 1976

FRA's Safety Research Program is concerned with making significant improvements in the following areas:

Rolling stock safety;

Human factors in railroad operations;

Grade crossing safety;

Track safety research;

Rail safety information system.

Improvements in these areas are expected to reduce the hazards associated with railroad operations. A summary of work and experiments follows:

(a) Rolling Stock Safety

The Rolling Stock program includes projects in hazardous material transport, component failure prevention, track-train dynamics, and personnel protection.

In the hazardous material transport area the goal is to reduce the frequency and severity of accidents involving the rail transportation of flammable compressed gases, radioactive materials, and explosives. Although the number of these accidents is small in comparison with the total

number of rail accidents, a hazardous material tank car accident can cause considerably more damage than the usual railroad accident (e.g., three of the hazardous material accidents in 1974 caused damage in the 7 to 20 million dollar range). In 1976, FRA, in cooperation with the Railway Progress Institute (RPI)/Association of American Railroads (AAR), conducted a series of full scale simulated switchyard impact tests. These tests demonstrated that a combination of head shields and E-shelf couplers would be effective in reducing tank car head ruptures (and subsequent fires). In 1976, there were also continuing investigations of the effectiveness of thermal shields. Torch fire tests were conducted on both large flat plates and full scale tank cars. The tests demonstrated that there exist several commercially available thermal shields that would significantly increase the time-to-rupture and reduce the severity of the rupture for tank cars involved in fires. In addition, FRA also continued to sponsor studies relating to pressure relief systems for tank cars. In 1976, the full scale valve testing described in the 1975 report was completed and small scale valve testing and analysis was initiated to study

those flow regimes which cannot be studied by full scale testing. The analysis and testing indicate that, without thermal shields, existing pressure relief systems are inadequate in certain accident scenarios. Another 1976 effort was the Accelerated Life Test (ALT) program. In this continuing effort, tank cars outfitted with thermal shields, head shields, and improved coupling systems are being subjected to simulated in-service conditions to determine the long-term effectiveness of these safety devices. On the basis of the FRA and industry research programs FRA has developed performance specifications for certain tank cars carrying liquefied compressed gases. The Materials Transportation Bureau has incorporated these specificatins into a Notice of Proposed Rule Making (Docket HM-144). If implemented, these specifications should not only reduce the severity and frequency of rail hazardous material accidents but also give industry an opportunity to determine the most cost-effective method to comply with the specification. Future work in the hazardous material area will focus on safety problems associated with the transport of explosives, radioactive materials, and toxic substances.

The goal of the Component Failure Prevention project is to reduce the frequency and severity of accidents resulting from the deterioration and failure of critical vehicle components, such as wheels, axles, bearings, side frames, and bolsters, by developing (a) performance specifications and design guidelines for vehicle components which are less prone to failure and (b) techniques and mechanisms for predicting, detecting, and reacting to the failures which do occur. In 1976, a field test program was completed to determine the effects of both mechanical and thermal loading on the stress distribution. The field test data were found to be consistent with results obtained from the finite element analysis discussed in the 1975 report. Also, a study was completed which examined the fatigue characteristics of side frames, bolsters, and wheels. In addition, a study was completed which analyzed the reliability characteristics of roller bearing and roller bearing diagnostic systems. Future work will involve the development of improved certification procedures and performance specifications for in-service diagnosis of roller

bearings. In 1976, the development of a system to detect overheated bearings and local derailments was continued. Prototype devices were installed on four in-service cars and data is being collected. It is planned to install the system on 124 freight cars and monitor the system reliability.

The goal of the Track-Train Dynamics project is to reduce the frequency and severity of accidents caused by adverse interactions between the train and the track. In 1976 FRA became a participant in a joint industry-government program on track-train dynamics. This three year effort will result in performance specifications and design guidelines to improve the dynamic stability of trains. Because of the large number of recent AMTRAK train derailments, FRA also began an investigation of locomotive truck dynamics. Although the 1976 effort was restricted to laboratory tests, the 1977 effort will include an extensive series of field tests in cooperation wth the AAR.

The purpose of the Personnel Protection project is to protect rail vehicle occupants from fatalities and injuries due to collisions, derailments, and fires by (1) improving the structural integrity of rail vehicles and (2) protecting vehicle occupants from the effects of striking (or being struck by) components of the interiors of rail vehicles. In 1976, work continued to determine why impacted cars behave as they do (e.g., overclimb, jack-knife laterally, jack-knife vertically, or maintain longitudinal alignment). In this regard, much of the impact dynamic data obtained in the simulated tank car impact tests of the Hazardous Material Tank Car project has been found to be applicable to other types of rail cars. Future analysis and small model impact testing will be conducted with the aim of developing performance specifications for the control of post-impact motions. In 1976 preliminary interior occupant protection guidelines for passenger cars were developed. Future work will involve a refinement of these guidelines for locomotive cabs.

(b) Human Factors in Railroad Operations

Recent accident statistics indicate a small downward trend in human factors related railroad accidents. However, 23% of all railroad accidents and virtually all railroad collisions are still attributable to this broad accident cause category. Research and development efforts continue to be directed toward further reducing this accident cause factor by developing a technological data base for establishing standards of safety performance as provided for under the Federal Railroad Safety Act of 1970. Work completed or initiated in 1976 in the human factors area included (1) the award of two contracts to develop alternative deigns for a Research Locomotive and Train Handling Evaluator; (2) completion of a survey of Alcohol and Drug Abuse Programs in the railroad industry; (3) completion of a study of air contaminants present in locomotive cabs; (4) completion of a comparative analysis and evaluation of various locomotive crew alerting devices; (5) completion of the major portions of locomotive cab design development study; (6) initiation of efforts to develop a simplified locomotive in-cab noise measurement procedures; and (7) initia-

tion of a study of personal injury risks associated with working around railroad rolling stock.

The Research Locomotive and Train Handling Evaluator facility, when operational, will be FRA's primary experimental tool for evaluating train accidents caused by human error. The facility will be used to conduct experiments simulating in-service conditions; these experiments will evaluate the performance of the locomotive enginemen (1) in different locomotive cab environments, (2) with varying real-time train performance inputs; (3) in applying train handling controls and techniques, and (4) in varying accident situations.

A study entitled, "A Survey of Alcohol and Drug Abuse Programs in the Railroad Industry," which was initiated in 1975 and jointly sponsored by FRA's Office of Policy and Program Development, was completed in 1976. The study was undertaken in response to an NTSB recommendation that FRA address the problem of railroad employees' abuse of drugs and alcohol either while on duty or while subject to duty. The study has been extremely well received by the industry and has provided

FRA with a strong data base with which to continue to urge more railroads to voluntarily set up these type of programs. This course of action is proving successful and was chosen in lieu of pursuing a course of mandating, through regulation, the existence of these programs within the industry. A Phase II effort, designed to yield recommendations as to how to structure more cost-effective and efficient programs, was initiated in 1976 and will continue through 1977.

In an effort to assess the potential harmful effects of locomotive in-cab air contaminants on railroad crews, an extensive measurement program was conducted under worst-case conditions. Samples of carbon monoxide, oxides of nitrogen, total hydrocarbons, particulate matter and aldehydes in both cabs and cabooses were taken while revenue trains operated through the longest tunnels and over some of the most rugged terrain in the country. The results were compared to the acceptable guidelines for the various substances that have been published by the OSHA. Guidelines and recommendations were made as a result of the findings of the study.

Maintaining crew alertness or vigilance is a re-occurring problem in the railroad operating environment. Due to the sometimes monotonous nature of operating a diesel locomotive, especially in the early morning hours from midnight to dawn, it is difficult to maintain optimum alertness and responsiveness. Numerous locomotive cabs are equipped with mechanical or electrical devices designed to maintain crew vigilance. As a result of a study of the relative effectiveness of these devices, it has become apparent that some devices achieve this result better than others. The study has made recommendations as to how the effectiveness of alerting devices can be enhanced.

Recently there has been a dramatic increase in the consideration given to the design of the cab as a work space for train crewmen. Major portions of a study intended to evaluate the effectiveness of designs was completed in 1976. Displays, controls and work space have been developed, based on the functions performed in the cab and the needs of the people who perform these functions. A functional analysis has been completed, and several new alternative cab configurations were

evaluated in full-scale mockups. An expanded evaluation study was begun in 1976, in an effort to fully evaluate the practicality and effectiveness of the design that was deemed best overall. The results of comments and ratings made by presently employed locomotive engineers and brakemen, will be incorporated into the final design recommendations and guidelines.

The problem of accurately determining the extent of locomotive crew exposure to noise is cumbersome due to the varying nature of the noise environment and the fact that the workspace is mobile. Accordingly, efforts were initiated in 1976 to develop a simplified stationary noise test procedure which would accomplish a number of objectives. The objectives are: (1) to determine, by means of a representative sample of locomotives in operational settings, the extent of crew exposure to noise; (2) to identify simplified test procedures and measurement methodologies that can be used in an operational environment to determine whether or not an individual locomotive is capable of generating excessively high noise levels; and (3) to identify measurement techniques whereby

component sources of noise within the locomotive cab can be identified so that, if a noise problem exists on a given locomotive, the least expensive and most effective corrective actions can be taken. Testing is scheduled to continue through 1977.

Very few railroad employee injuries or fatalities occur in railroad accidents that might be appropriately termed "wrecks" or "crashes." Rather they occur predominantly in and around yards, shops and any place heavy equipment is used. A large number of these casualties are sustained by workers who typically perform manual tasks in, around, or on locomotives or rail cars. Accordingly, in 1976, efforts were initiated to determine the personal injury risk potential associated with the performance of work around this equipment. Once the hazards or risk are properly categorized and rank ordered in terms of their severity, recommendations for the development of countermeasures will be made. A pilot study of train and engine worker job categories will be made and then the effort will be expanded to other classes of workers.

In summary, research and development efforts in the human factors area are expected to help FRA, the railroad industry, and railroad labor reach their common goals of reducing human factor related accidents and improving the work environment.

(c) Grade Crossing Safety

The Grade Crossing Safety Program has the objective of achieving significant reductions in the approximately 1,126 deaths and 4,565 injuries from grade crossing accidents each year. Work on the National Railroad-Highway Crossing Inventory, funded jointly by the federal government and the railroad industry, was completed in 1975. The inventory contains approximately 402,000 entries with almost 220,000 being public grade crossings. In the Spring of 1976, update forms and procedure manuals were mailed to all railroads and states. Completed update forms are being received by FRA and the inventory data is being updated accordingly. Inventory data has been supplied to states, cities, countries and railroads who can use this data to plan and implement grade crossing upgrading programs (i.e., installation of gates and flashing lights and construction of grade separation).

FRA is sponsoring research at TSC which will develop a hazard-index formula for public grade crossings. Grade crossing accident reports and the National Rail-Highway Crossing Inventory are being linked together for use in this research. Although a number of hazard-index formulas are available, the current effort is the first attempt to use nationwide data from the National Inventory to develop a hazard formula. Following development of the hazard formula, data on the cost of crossing improvements will be incorporated for the purpose of being able to determine where to use crossing improvement funds to achieve the greatest reduction in accident probability per dollar spent on crossing improvements.

During 1976, a joint grade crossing research program was established with FHWA to improve coordination between FRA and FHWA research. Off-track train detection, constant warning time and active advance warning systems were determined to be areas for initial research through the joint program.

In addition to the joint research program with FHWA, FRA completed documentation of other research efforts directed at more effective and lower cost grade crossing warning systems. FRA also initiated a program with four railroads to identify the reduction in grade crossing accidents resulting from the installation of strobe lights on locomotives to improve their visibility to motorists at grade crossings.

(d) Track Safety Research

The primary goal of the Improved Track Structures Research program is to influence favorably track safety. Attainment is being pursued through the implementation of a three-point strategy:

- Identification of the limits to which common track systems and their constituent components can be exercised safely;
- Identification of track geometry characteristics adversely affecting rolling stock, along with stress and fatigue limits of system components and other boundary conditions that cannot be exceeded without jeopardizing train safety.
- Formulation of the identified criteria into a consistent series of recommendations to the Office of Safety.

In carrying out this strategy during 1976, the following research projects were completed, continued (having been started in a previous year) or were initiated:

(1) Program Analysis and Planning Studies

Rail Technology Review (concluded). A world-wide literature search was conducted addressing four specific topics; (1) Rail metallurgy, (2) rail stress analysis, (3) rail failure behavior and (4) non-destructive testing of rails. A final report has been produced in the form of an extensive bibliography with abstracts. These materials provide guidance for other program projects.

Analysis of the Leading Causes of Track-Related Railroad Accidents (on-going). A preliminary analysis, based on the 1967-1974 FRA accident statistics, was completed as an initial step in the project. This analysis showed that, for the period covered, sixteen accident cause factors led to 84.4% of reported accidents. The remaining 15.6% of total accidents reported to FRA were distributed among fifty-seven other cause factors.

Rail Flaw Occurrence (on-going). A contractor is reviewing with three cooperating railroads, industry generated accident data that is being correlated with much less detailed FRA data. Contributing causes of accidents are being isolated and ranked in importance.

(2) Dynamics

Track Impedance Measurement (on-going). The time-dependant resistance of track to deflection under applied load has an important influence on the effectiveness with which rolling flanged wheels interact with the supporting rails. A project, the output of which will be performance specifications for a system to measure impedance of track, neared the end of its system recommendation phase during the year. Following receipt of recommendations in 1977, a choice of a system for development will be made.

Vertical Track Stiffness (initiated). As a corollary to the preceeding effort, investigation was directed toward exploiting the concept of measuring vertical track stiffness (allied with track impedance) by comparing track geometry data independently derived by two dissimilar measuring systems

operating simultaneously. Data processing routines were developed and applied to analysis of data collected over a several-thousand foot test track having known vertical stiffness variations. Results were encouraging and further system refinement is in progress.

Parametric Studies of Vehicle-Track Interaction (initiated). This is a comprehensive effort to accept vehicle and track characterizations produced in other, subsidiary projects and through analysis, simulation and eventual field test for verification, determine the safe limits permissible in track variation for each of the prominent types of rolling stock operating today. This effort will result in recommended top speed limits for different types of equipment as a function of vehicle properties and track roughness.

Pilot Project Vehicle-Track Interaction (initiated). In order to critically assess the various technical approaches that could be applied in Parametric Studies, a pilot project is now underway to examine three already very well characterized units of rolling stock in conjunction with simplified assumptions of track geometry. The first report on this effort

was produced, will be reviewed by the concerned technical community and, upon receipt of critical commentary, the methodology employed will be refined and fed directly back into parametric studies.

Track Geometry Characterization (on-going). FRA has acquired voluminous data over the years through the operation of two different sets of track geometry measuring equipment. These data are being used to characterize different levels of track geometry quality. Representations of these qualitative levels are to be applied to driving vehicle models in the Parametric Studies project.

(3) Track Sub-systems and Components

Wheel/Rail Load Characterization (on-going). This project is producing a statistical characterization of the load environment within which industry trackage is required to function. Project results will funnel into all other Improved Track Structures Research program investigations as fundamental input. A report was issued containing a critical review of the state-of-the-art in wheel/rail load measurement.

Track Stability Analyses (on-going). Over a period of some years now, all of the relevant theories of lateral track stability advanced by various researchers have been critically analyzed. Valid elements of the approaches have been modified in this project and combined with original thought to formulate a behavioral theory appropriate to U.S. wheel loadings and track design practices. Validation of this new theoretical approach will occur soon. Three reports were issued during 1976.

Longitudinal Rail Stress Measurement (on-going). A key input to a track stability analysis is specification of longitudinal rail stress, tensile or compressive. Work is almost complete on performance specifications for a portable ultrasonic system for quickly determining longitudinal stress in rails. Operation of a bread-board system was verified, first in the laboratory and then, under closely-monitored field conditions at the Transportation Test Center near Pueblo, Colorado.

Rail Material Characterization (on-going). This project is investigating crack initiation, defect growth rates and fracture-related properties of rail steel. End products will be a failure prediction methodology and a specification of critical flaw size. Application of these results will improve current standards with respect to disposition of flawed rail and the frequency of inspection. A report covering analysis and fatigue-crack-growth test of 66 flawed rail specimens was issued.

Engineering Analysis of Stresses in Rail (on-going). The objectives of this work are to define the role of residual rail stress on flaw initiation and develop probability fracture predictions, given specific stress states, service loads and rail support conditions. A report was issued describing prior rail stress analyses, world-wide, and a preliminary model was assembled to predict rail reliability.

Sleeve Expansion of Rail Bolt Holes (concluded). Development of a circumferential compressive stress state around the periphery of a circular hole

in metals as a means of retarding the onset of cracks or the further growth of cracks is a well-established air-frame maintenance technique. Application of this cold-work technique to prolonging life of bolted rails was examined in the laboratory. Test results indicate that cold-worked rail ends may undergo up to 28 times as many cycles of deflection before failure as non-cold-worked rail. The process is now undergoing field trial on a large railroad. A Procedures and Process Specification manual was prepared.

Safe Rail Capacity (initiated). The thrust of this effort is toward providing a preliminary recommendation of safe, maximum wheel loads that can be applied to track as a function of rail size, crosstie spacing and reactive support experienced by crossties.

Track Model Verification (on-going). As reported last year, the Technical Center of the AAR, under contract with the FRA, developed a matrix of track simulation models. Verification of these models would proceed most favorably in a controlled test

environment. During 1976, construction by the AAR of a moving load laboratory, ideal for model validation testing, approached completion. The test program will start in 1977.

Ballast Consolidator Demonstration (concluded). This activity was completed in 1976 through analysis of earlier collected data. Analysis revealed that application of off-the-shelf type ballast consolidating equipment can be expected to improve resistance to buckling of newly-disturbed track an average of 40% over the resistance of similar unconsolidated track. General disturbance of track occurs routinely via the common resurfacing activity and, in warm weather, buckling due to temporarily diminished lateral ballast resistance is always a hazard especially where continuous welded rail is present. A final report discussing the entire test series was prepared.

Analysis and Design Requirements for Improved Crosstie Track (on-going). In this project an inquiry is being made into the basic role of the crosstie and associated rail-tie fastening system in order to establish comprehensive performance

criteria for each. Models were adopted from the matrix referred to above and were further refined and validated by field measurements. Parametric studies are now underway to discover the effects on the total track system of changes in any subsystem or component. A report was issued covering a description of the combined model and related verification efforts.

(e) Rail Safety Information System

During 1976 a single FRA automated track geometry inspection vehicle was utilized almost exclusively to support the Office of Safety's efforts in the enforcement of the Federal Track Safety Standards. This unit inspected some 18,000 miles of track in support of this effort. This is 1,500 miles more than was inspected in 1975 and 13,000 more than in 1974. In addition to supporting the efforts of the Office of Safety, the vehicle participated in extensive tests for FRA Research and Development Programs.

Two and one half months of inspection time were lost due to legal action involving the FRA inspection vehicle and the Missouri Pacific Railroad. The case involves the question of who, the U.S. Government or the Railroad, will accept the liability

arising from the operation of the vehicles while inspecting on railroad property. A lower court decision in favor of FRA has been appealed by the carrier. Operations have been continued while waiting for the appeals court decision.

The use of the vehicle permits a more effective use of FRA field investigators by providing them with a visible profile of the effectiveness of the carrier maintenance and inspection efforts. Using the data provided by the vehicle, the field inspectors make on-the-ground observations to determine compliance with the standards.

The instrumentation on the vehicle continues to be improved. The magnetic system recently installed in the vehicle to measure track gage is the latest development to be placed in actual operation. This improvement permits the vehicle to operate in most weather conditions. Real time data processing is presently being developed. This will permit the Standards Exception Report to be given to carrier officials and FRA field personnel at the end of each day. Existing capabilities make it necessary to process the geometry data at a computer center and then forward it to the field.

The inspection capabilities of the program will be greatly expanded in 1977 with the addition of two more geometry measuring units. Both units, which will use the latest developments in track geometry measurement techniques, will be in operation by June 1977.

One of these new units will be equipped with rail flaw detection equipment. This will serve a two fold purpose: (1) to determine carrier compliance with the rail defect sections of the track standards and (2) to be used in the development of a high-speed rail flaw detection system.

A high-rail vehicle equipped with rail flaw detection equipment and a modified geometry measuring system is presently being used at the Transportation Test Center in support of the Facility for Accelerated Service Testing (FAST) program. Field personnel from FRA Office of Safety have completed a six week training program on the use of the ultrasonic equipment installed in the vehicle. Starting in May 1977 the vehicle while still supporting the FAST program will become available for limited use by FRA in their track standards enforcement program.

A-7

A LIST, WITH A BRIEF STATEMENT OF THE ISSUES, OF COMPLETED OR PENDING JUDICIAL ACTIONS FOR THE ENFORCEMENT OF ANY FEDERAL RAILROAD SAFETY RULE, REGULATION, ORDER, OR STANDARD ISSUED UNDER THIS TITLE

- REFERENCE -

P.L. 91-458, Section 211(a)(7)

A-7 JUDICIAL ACTIONS FOR THE ENFORCEMENT OF FEDERAL RAILROAD SAFETY RULES, REGULATIONS, ORDERS, OR STANDARDS

(a) No cases involving enforcement of any rules, regulations, orders or standards issued under Title II were filed with the courts during calendar year 1976. In attempting to avoid unnecessary litigation by utilizing the compromise procedures afforded by this Act, the alleged violations issued under the various regulations promulgated pursuant to this Title have thus far been adequately settled without resort to judicial action. Congress intended for claims arising under the Federal Railroad Safety Act of 1970 to be settled in a similar manner to that involving claims arising under the Federal Claims Collection Act. 2 U.S. CODE CONG. & ADMIN. NEWS 4104, 4120 (91st Cong., 2nd Sess. 1970); 45 U.S.C. S438(c).

(b) Two cases raising issues under the Act were decided by U.S. District Courts in calendar year 1976. In Chicago Transit Authority v. Hall, the U.S. District Court for the Northern District of Illinois ruled that CTA is a "railroad" within the meaning

of the Act and, thus, is subject to FRA accident/incident reporting requirements (49 CFR Part 225). CTA had sought a judgment declaring that its rail rapid transit operation is not a "railroad." CTA appealed the case to the Seventh Circuit Court and continued to refuse to file the required accident/incident reports.

In United States v. Missouri Pacific Railroad Company, the U.S. District Court for the Eastern District of Missouri ruled that a carrier may not limit the right of FRA to inspect its trackage by use of track geometry measurement vehicles by requiring that FRA agree to indemnify the carrier for damages caused by the negligence of railroad employees engaged in hauling the cars. The railroad has appealed this case to the Eight Circuit Court.

A-8

THE EXTENT TO WHICH TECHNICAL INFORMATION WAS DISSEMINATED TO THE SCIENTIFIC COMMUNITY AND CONSUMER-ORIENTED INFORMATION WAS MADE AVAILABLE TO THE PUBLIC

- REFERENCE -

P.L. 91-458, Section 211(a)(8)

A-8 EXTENT TO WHICH TECHNICAL INFORMATION WAS DISSEMINATED TO THE SCIENTIFIC COMMUNITY AND CONSUMER-ORIENTED INFORMATION WAS MADE AVAILABLE TO THE PUBLIC

The Railroad Research Information Service (RRIS), which became operational in 1973, is a computer-based information service operated by the Transportation Research Board (TRB) with financial support from the Federal Railroad Administration (FRA). The RRIS data files currently contain over 13,000 railroad technical literature references and was increased by over 3,000 references in 1976. Since the first RRIS publication in 1973, regular Railroad Research Bulletins have been issued at six-month intervals. In October 1976, a Special Bibliography--Railroad Safety Research was published for distribution at the 13th Annual Railroad Engineering Conference at Pueblo, Colorado. The intent of this volume was to compile safety-related railroad reference information in three major areas: rail vehicle safety, track structures, and inspection and test support services. All references listed are considered pertinent to contemporary railroad safety problems.

The RRIS was established to collect the results of worldwide railroad research and to make it available to railroad companies, equipment manufacturers, research organizations,

colleges and universities and the Federal Railroad Administration. Safety research results are furnished to the TRB on a voluntary basis, by these organizations, for inclusion in the RRIS.

Information from the Grade Crossing Inventory has been provided to railroads, states, members of the Congress, government agencies, local jurisdictions, and private individuals. As an additional source of information TRB published a bibliography of grade crossing research.

In 1976, the following technical studies on railroad safety research were made available to the public through the National Technical Information Service, Springfield, Virginia 22161.

AD A007 528

TASK ANALYSIS FOR THE JOBS OF FREIGHT TRAIN CONDUCTOR AND BRAKEMAN

MAY 1975 FRA-OR&D 75-69

PB 250 063/AS

METALLURGICAL ANALYSIS OF A STEEL SHELL PLATE TAKEN FROM A TANK CAR ACCIDENT NEAR SOUTH BYRON, NEW YORK

OCTOBER 1971 FRA-OR&D 75-47

PB 250 409/AS

COMPUTER SIMULATION OF TANK CAR HEAD PUNCTURE MECHANISM

FEBRUARY 1975 FRA-OR&D 75-23

PB 250 530/AS

A METALLURGICAL ANALYSIS OF FIVE STEEL PLATES TAKEN FROM A TANK CAR ACCIDENT NEAR CRESCENT CITY, ILLINOIS

MARCH 1972 FRA-OR&D 75-48

PB 250 544/AS

A METALLURGICAL ANALYSIS OF ELEVEN STEEL PLATES TAKEN FROM A TANK CAR ACCIDENT NEAR CALLOA, MISSOURI

SEPTEMBER 1972 FRA-OR&D 75-49

PB 250 564/AS

LOCOMOTIVE TO AUTOMOBILE BASELINE CRASH TESTS

AUGUST 1975 FRA-OR&D 76-03

PB 250 587/AS

A METALLURGICAL INVESTIGATION OF A FULL SCALE INSULATED RAIL TANK CAR FILLED WITH LPG SUBJECTED TO A FIRE ENVIRONMENT

JANUARY 1975 FRA-OR&D 75-52

PB 250 607/AS

HAZARDOUS MATERIALS TANK CARS-EVALUATION OF TANK SHELL CONSTRUCTION MATERIAL

SEPTEMBER 1970 FRA-OR&D 75-46

PB 250 621/AS

LIGHTNING AND ITS EFFECTS ON RAILROAD SIGNAL CIRCUITS

DECEMBER 1975 FRA-OR&D 76-129

PB 250 731/AS

DEVELOPMENT OF ANALYTICAL FIRE MODELS

OCTOBER 1974 FRA-OR&D 75-53

PB 251 097/AS

ANALYSIS OF FINDINGS OF FOUR TANK-CAR ACCIDENT REPORTS

JANUARY 1975 FRA-OR&D 75-50

PB 251 115/AS

PROPOSED QUALIFICATION REQUIREMENTS FOR SELECTED RAILROAD JOBS

MAY 1975 FRA-OR&D 75-44

PB 251 151/AS

PREPARATION OF THE BRL TANK CAR TORCH FACILITY AT THE DOT TRANSPORTATION TEST CENTER, PUEBLO, COLORADO

SEPTEMBER 1975 FRA-OR&D 76-72

PB 255 854/AS

IMPACT PROPERTIES OF STEELS TAKEN FROM FOUR FAILED TANK CARS

JUNE 1976 FRA-OR&D 75-51

PB 255 907/AS

MECHANICAL PROPERTIES OF AAR M128-69-B STEEL PLATE SAMPLES TAKEN FROM INSULATED FIRE TESTED TANK CAR RAX 202

JUNE 1976 FRA-OR&D 76-74

PB 258 993/AS

MECHANICS OF TRAIN COLLISIONS

APRIL 1976 FRA-OR&D 76-246

PB 259 005/AS

METHODOLOGY FOR DETERMINATION OF GRADE CROSSING RESOURCE-ALLOCATION GUIDELINES

AUGUST 1975 FRA-OR&D 76-04

PB 259 901/AS

AN OPERATIONAL DEMONSTRATION OF TRAILING END VISIBILITY ENHANCEMENT DEVICES FOR COMMUTER RAILROAD TRAINS

JUNE 1976 FRA-OR&D 76-292

PB 261 110/AS

LOCOMOTIVE/CABOOSE CRASHWORTHINESS

OCTOBER 1976 FRA-OR&D 76-289

PB 261 121/AS

A MULTI-PURPOSE PROGRAM FOR COMPUTING AND GRAPHING ROOTS AND VALUES FOR ANY REAL FUNCTION

MAY 1976 FRA-OR&D 76-143

PB 258 066

SPECIAL BIBLIOGRAPHY: RAILROAD SAFETY RESEARCH

OCTOBER 1976 FRA-OR&D 76-280

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A BIBLIOGRAPHY ON RAIL TECHNOLOGY

MARCH 1976 FRA-OR&D-77-15

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A REVIEW OF MEASUREMENT TECHNIQUES, REQUIREMENTS AND AVAILABLE DATA ON THE DYNAMIC COMPLIANCE OF RAILROAD TRACK

MAY 1975 FRA-OR&D-76-70

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EVALUATION OF ANALYTICAL AND EXPERIMENTAL METHODOLOGIES FOR THE CHARACTERIZATION OF WHEEL/RAIL LOADS

NOVEMBER 1976 FRA-OR&D-76-276

PB-259 389

EFFECT OF IMPERFECTIONS ON VERTICAL TRACK BUCKLING OF RAILROAD TRACK

JUNE 1976 FRA-OR&D-76-09

*

ON THE STRESS ANALYSIS OF RAILS AND TIES

SEPTEMBER 1976 FRA-OR&D-76-284

*

ANALYSIS OF THERMAL TRACK BUCKLING IN THE LATERAL PLANE

FEBRUARY 1976 FRA-OR&D-76-276

*

FATIGUE CRACK PROPAGATION IN RAIL STEELS

JULY 1976 FRA-OR&D-77-14

*

PRELIMINARY DESCRIPTION OF STRESSES IN RAILS

NOVEMBER 1976 FRA-OR&D-76-294

*

PROCEDURES MANUAL AND PROCESS SPECIFICATION
(re. Sleeve Expanded Bolt Holes)

MAY 1976 (in publication)

*

THE EFFECTS OF ACCELERATED BALLAST CONSOLIDATION

JUNE 1976 FRA-OR&D-76-274

*

AN ANALYTIC AND EXPERIMENTAL EVALUATION OF CROSSTIE AND FASTENER LOADS

DECEMBER 1976 (in publication)

* NTIS accessioning in progress.

PROFILOMETER SENSOR REPORT

DOT-FR-75-4

*

INERTIAL ALIGNOMETER DEVELOPMENT REPORT

DOT-FR-75-6

*

PROFILOMETER SYSTEM DEVELOPMENT REPORT

DOT-FR-75-7

*

SERVOMAGNETIC GAGE SYSTEM

DOT-FR-75-8

*

COMPUTER IMPLEMENTATION OF ISO STANDARD 2631 FOR PROCESSING RIDE VIBRATION DATA

DOT-FR-75-9

*

RIDE QUALITY METER MANUAL

DOT-FR-75-10

*

METROLINER TRUCK TEST RG-125.1

DOT-FR-75-12

*

DOT TEST TRAIN PROGRAM SYSTEM INSTRUMENTATION MANUAL SEVENTH EDITION

FRA-OR&D-76-254

*

THE EFFECTS OF ACCELERATED BALLAST CONSOLIDATION

FRA-OR&D-76-274

*

TEST TRAIN PROGRAM SEVENTH PROGRESS REPORT

JUNE 1975 FRA-OR&D-76-140

*

A REVIEW OF MEASURMENT TECHNIQUES, REQUIREMENTS AND AVAILABLE DATA ON THE DYNAMIC COMPLIANCE OF RAILROAD TRACK

FRA-OR&D-76-70

*

DOT TEST TRAIN PROGRAM SYSTEM INSTRUMENTATION MANUAL SIXTH EDITION

FRA-OR&D-75-26

(a) CERTIFICATIONS FILED BY STATE AGENCIES UNDER SECTION 206(a) OF THIS TITLE WHICH WERE IN EFFECT DURING THE PRECEDING CALENDAR YEAR.

(b) CERTIFICATIONS FILED UNDER SECTION 206(a) OF THIS TITLE WHICH WERE REJECTED, IN WHOLE OR IN PART, BY THE SECRETARY DURING THE PRECEDING CALENDAR YEAR, TOGETHER WITH A SUMMARY OF THE REASONS FOR EACH SUCH REJECTION.

- REFERENCE -

P.L. 91-458, Section 211(a)(9)

A-9 CERTIFICATION OF STATE AGENCIES TO PARTICIPATE IN THE FEDERAL RAILROAD SAFETY PROGRAM

(a) During calendar year 1976 two new States, Arizona and West Virginia, were added to the total number of States certified by the Secretary. The following States are now certified:

Alabama	Arizona
Indiana	Iowa
Missouri	Nebraska
Oregon	Pennsylvania
Washington	West Virginia

Arizona, Ohio, Oregon, Pennsylvania and Washington participate in both track and freight car inspection and enforcement. West Virginia, at the present time, participates in freight car surveillance only.

(b) The following State agencies applied for certification during calendar year 1976 but were denied the same in whole or in part:

*Alabama	Connecticut
Kansas	Kentucky
Iowa	Maryland
Utah	North Carolina
West Virginia	

*Track inspectors were certified; Equipment inspectors were denied certification.

Certifications were rejected because of the lack of qualified inspection personnel on the State agency staff. Some of the States listed above will probably have completed the necessary training requirements, and will be able to apply again during the next year for certification under the trainee status.

(c) During the calendar year 1976, the FRA provided training classes at the Transportation Safety Institute for 117 State employees representing 23 States, including 11 States not now in the program, but intending to apply in fiscal year 1978.

(a) AGREEMENTS ENTERED INTO WITH STATE AGENCIES UNDER SECTION 206(c) OF THIS TITLE WHICH WERE IN EFFECT DURING THE PRECEDING CALENDAR YEAR, AND

(b) AGREEMENTS ENTERED INTO UNDER SECTION 206(c) OF THIS TITLE WHICH WERE TERMINATED BY THE SECRETARY, IN WHOLE OR IN PART, DURING THE PRECEDING CALENDAR YEAR, TOGETHER WITH A SUMMARY OF THE REASONS FOR EACH SUCH TERMINATION.

- REFERENCE -

P.L. 91-458, Sections 206(a); 211(a)(10)

A-10 STATES WHICH ARE CARRYING OUT INVESTIGATIVE AND SURVEILLANCE ACTIVITIES IN CONNECTION WITH RAILROAD SAFETY RULES AS PRESCRIBED BY THE SECRETARY OF TRANSPORTATION

(a) Agreements authorizing investigative work by the following States were in effect during calendar year 1976:

Illinois	*Minnesota
Ohio	Vermont

*Initiated in 1976.

(b) During 1976 the Secretary did not terminate any agreements that were in effect with State agencies.

B-1

RECOMMENDATIONS FOR ADDITIONAL LEGISLATION THAT THE SECRETARY DEEMS NECESSARY TO STRENGTHEN THE RAILROAD SAFETY PROGRAM

- REFERENCE -

P.L. 91-458 Section 211(b)

B-1 RECOMMENDATIONS FOR AMENDMENTS TO EXISTING RAILROAD SAFETY LEGISLATION

The Administration is considering several amendments to existing railroad safety legislation, as part of a proposed bill to increase the comprehensiveness and effectiveness of the Federal/State rail safety program.