FEDERAL RAILROAD SAFETY ACT OF 1970
Annual Reports on Implementation
(1970-1984)

1977 ANNUAL REPORT BY THE PRESIDENT

TO THE CONGRESS

ON THE ADMINISTRATION OF THE

FEDERAL RAILROAD SAFETY ACT OF 1970

OCTOBER 1978

A SU[illegible] THE FEDERAL ACTIONS TO IMPROVE RAILROAD SAFETY
DURI[illegible] FISCAL YEAR 1977 AND THE STATUS AND RESULTS THEREOF

C O N T E N T S

PREFACE

The annual report on the administration of the Federal Railroad Safety Act of 1970 (the Act) (Public Law 91-458) during calendar year 1977 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 waiver 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interest and is consistent with railroad safety (Section 202(c)); (2) to require that unsafe facilities or equipment be withdrawn from service where an emergency situation exists (Section 203) and; (3) to seek injunctive relief to insure compliance with rules, regulations, orders and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 that he has issued (Section 210). Section 206 authorizes the participation of States in investigative and surveilance activitites, 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 1977 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 the Act.

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 Otherwise Classified

A train accident is a collision, derailment, fire, explosion or act of God involving the operation of railroad on-track equipment (standing or moving) which results in more than $2,300 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 $2,300 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 operations, or on property adjacent to railroad premises when injured as the result of the operation of a railroad.

Trespassers are not only those persons who, in the ordinary acceptance of the term, would be regarded as trespassers on railroad property (including 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.

Contractor Employees are persons who are employed by a contractor engaged by a railroad to perform normal maintenance work to railroad rolling stock, track structure, bridges, buildings, etc.

A-1

STATISTICAL COMPILATION OF ACCIDENTS AND CASUALTIES BY CAUSE WHICH OCCURRED IN CALENDAR YEAR 1977

- REFERENCE -

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

A-1 STATISTICAL COMPILATION OF ACCIDENTS AND CASUALTIES BY CAUSE WHICH OCCURRED IN CALENDAR YEAR 1977

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 1977 cited throughout this report are preliminary statistics for the calendar 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 $2,300 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 those of the Department of Labor which are in accord with the Occupational Safety and Health Act. The new criteria for reporting 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.

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. The program compares 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.

TRAIN ACCIDENTS

The FRA Office of Safety has continued to analyze and 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 for want of training or disregard of operating rules. Like total train accidents, the number of accidents caused by human factors has fluctuated over the past 12 years, although at a gradually increasing rate.

Accidents caused by all human factors in calendar year 1976 accounted for 23% of all reported train accidents. Preliminary data for 1977 indicate that human factors accounted for about 25.1%. Of all human factors causes, four were responsible for 17% of all train accidents that year:

(1) failure to observe rules and instructions	7.1%
(2) incorrect use of switches	4.6
(3) failure to properly use brakes	3.2
(4) improper speed	2.1
TOTAL-1977	17.0%

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

A review of accident reports for calendar year 1976 indicates that equipment defects caused 21.2% of all train accidents. During 1977, 19.8% were caused by equipment defects with the following four major defects alone accounting for 13.1% of all train accidents:

(1) wheels	4.0%
(2) truck components	3.6
(3) coupler and draft system	3.2
(4) brakes	2.3
TOTAL-1977	13.1%

Accidents caused by track defects are defined as those resulting from failure or malfunction of the track structure. The pattern of those accidents per million train miles more closely resembles that of total train accidents for 1965-1977 than does either the pattern of human factors or equipment defect caused accidents.

Statistics for calendar year 1976 show that track defects caused 41.6% of all train accidents that year. During 1977, track defects caused about 41.5%. Three major accident causes in the track-defect category, which alone resulted in 39% of all train accidents, are:

(1) track geometry defects	18.9%
(2) rail and joint bar defects	11.5
(3) defective frogs, switches and track appliances	8.6
TOTAL-1977	39.0%

The final general accident category is comprised of accidents caused by miscellaneous factors which, in 1977, caused 13.7% of all train accidents. This category includes collisions with motor vehicles at grade crossings; interference with railroad operations by non-railroad employees; and overloaded, oversized or shifted lading. The percent of train accidents caused by miscellaneous factors in 1976 was 14.2%.

The nine 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 Accident, 1976-1977

Table 2: Total Casualties by Class of Person, in Train Accidents, Train Incidents and Non-Train Incidents, 1977

Table 3: Total Casualties by Types of Accidents, 1977

Table 4: Casualties in Train Accidents by Cause, 1977

Table 5: Casualties in Train Incidents by Occurrence, 1977

Table 6: Casualties in Non-Train Incidents by Occurrence, 1977

Table 7: Casualties to Employees on Duty by Type of Accident/Incident, 1977

Table 8: Casualties in Accidents/Incidents at Public Rail-Highway Grade Crossings, 1977

Table 9: Casualties in Accidents/Incidents at All Rail-Highway Grade Crossings, 1977

TABLE 1

NUMBER OF TRAIN ACCIDENTS AND DAMAGES
BY CAUSE OF ACCIDENT
1976 - 1977 *

Causes	NUMBER		PERCENT OF TOTAL		DAMAGE COST ($000)		AVERAGE DAMAGE COST PER ACCIDENT	
	1976	1977	1976	1977	1976	1977	1976	1977
Track, Roadbed or Structure	4,260	4,291	41.57	41.46	$85,537	$91,361	$20,079	$21,291
Mechanical & Electrical Failures	2,174	2,050	21.21	19.81	68,573	69,300	31,542	33,805
Train Operation Human Factors	2,360	2,595	23.03	25.07	31,939	65,578	13,533	25,271
Miscellaneous Causes not Otherwise Listed	1,454	1,413	14.19	13.65	40,941	48,220	28,171	34,126
TOTAL	10,248	10,349	100.00	100.00	$226,990	$274,459	$22,150	$26,520

* Preliminary figures for 1977.

TABLE 2

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

1977 *

Class of persons	CASUALTIES			
	Number		% of Total by Class of Persons	
	Fatalities	Injuries	Fatal	Injured
All persons	1,569	68,135	100.00	100.00
Employees	106	62,033	6.76	91.04
Passengers	2	519	0.13	0.76
Nontrespassers	983	4,827	62.65	7.08
Trespassers	475	717	30.27	1.05
Contractor Employees	3	39	0.19	0.06

Comparison of Fatalities

1977 - 1976

	1977 *	1976	Percent change
All persons	1,569	1,684	- 6.83
Employees	106	109	- 2.75
Passengers	2	5	-60.00
Nontrespassers	983	1,112	-11.60
Trespassers	475	458	+ 3.71
Contractor Employees	3	N/A	-

* Preliminary figures for 1977.

TABLE 3

TOTAL CASUALTIES BY TYPES OF ACCIDENTS

1977 *

TYPE OF ACCIDENT		Accidents	Fatalities		Injuries	
			Number	Percent of Total	Number	Percent of Total
Train Accidents						
Collisions		1,475	5	0.32	215	0.32
Derailments		7,981	11	0.70	373	0.55
Other		893	95	6.05	281	0.41
Subtotal		10,349	111	7.07	869	1.28
Codes	Train Incidents					
001-059	Coupling/uncoupling locomotives/cars/ manipulating air/steam hose	756	8	0.51	770	1.13
101-119	Operating locomotives	910	-	-	943	1.38
151-159	Operating rail motor car or					
950-959	on-track work equipment	325	-	-	367	0.54
201-209	Operating hand brakes	310	3	0.19	302	0.44
301-309	Operating switches	111	-	-	104	0.15
401-409	Persons on locomotives/cars contacting fixed structures	294	8	0.51	284	0.42
501-519	Getting on /off locomotives/cars	2,484	30	1.91	2,462	3.61
609	Public rail-highway grade crossing	3,852	879	56.02	4,132	6.06
701-709	Struck by or ran into locomotives/cars at other than public crossings	816	404	25.75	486	0.71
	All Other Incidents	4,761	42	2.68	4,954	7.27
Subtotal		14,619	1,374	87.57	14,804	21.73

(cont. on next page)

* Preliminary figures for 1977.

TABLE 3 (cont.)

TOTAL CASUALTIES BY TYPES OF ACCIDENTS (con't)

1977 *

TYPES OF ACCIDENT		Accidents	Fatalities		Injuries	
			Number	Percent of Total	Number	Percent of Total
Codes	Non-train Incidents					
001-059	Coupling/uncoupling locomotives/cars/manipulating air/steam hose	1,917	-	-	1,923	2.82
301-309	Operating switches	2,088	-	-	2,033	2.98
501-519	Getting on/off locomotives/cars	2,618	1	0.06	2,611	3.83
802-825	Servicing or maintenance of equipment	13,165	1	0.06	13,884	20.38
852-889	Maintenance of way and structures	18,007	14	0.89	18,540	27.21
901-904	Involving freight, baggage, express or mail	301	-	-	317	0.47
908-919	Involving windows, doors, etc.	1,189	3	0.19	1,216	1.78
920-927	Involving passenger car doors	34	-	-	37	0.05
930-939	Stumbling, slipping, falling, caught, not on cars	4,634	12	0.76	4,675	6.86
940-949	Flying/falling objects, burns and simular causes	1,897	10	0.64	2,034	2.99
960-969	Assault	274	2	0.13	287	0.42
	All Other Incidents	4,927	41	2.61	4,907	7.20
Subtotals		51,051	84	5.35	52,464	77.00
Grand Total		76,019	1,569	100.00	68,137	100.00

* Preliminary figures for 1977.

TABLE 4

CASUALTIES IN TRAIN ACCIDENTS BY CAUSE

1977 *

CODES	CAUSES	TOTAL ACCIDENTS	TRAIN ACCIDENTS			TOTAL CASUALTIES		EMPLOYEES ON DUTY						ENOD		PASSENGERS ON TRAIN		NON-TRESPASSERS		TRESPASSERS		CONTRACTOR EMPLOYEES	
								TOTAL		TRAINMEN		OTHER											
			C	D	O	K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I
	Track, Roadbed or Structures																						
101-109	Roadbed	219	1	217	1	-	26	-	26	-	26	-	-	-	-	-	-	-	-	-	-	-	-
110-129	Track geometry	1,960	16	1,942	2	-	53	-	50	-	40	-	10	-	-	-	3	-	-	-	-	-	-
130-149	Rail & joint bar	1,188	11	1,176	1	-	44	-	44	-	44	-	-	-	-	-	-	-	-	-	-	-	-
160-179	Frogs, switches & track appliances	891	68	806	17	-	5	-	5	-	4	-	1	-	-	-	-	-	-	-	-	-	-
180-189	Other way & structure	22	2	16	4	-	5	-	5	-	5	-	-	-	-	-	-	-	-	-	-	-	-
200-209	Signal & communication failures	11	7	3	1	-	2	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
	Subtotal	4,291	105	4,160	26	-	135	-	132	-	121	-	11	-	-	-	3	-	-	-	-	-	-
	Equipment & electrical failures																						
400-410	Brakes	233	32	164	37	-	10	-	10	-	10	-	-	-	-	-	-	-	-	-	-	-	-
411-429	Trailer or container on flat car or body	244	10	201	33	1	13	-	10	-	9	-	1	-	-	-	-	1	2	-	1	-	-
430-439	Coupler & draft system	327	32	288	7	-	24	-	16	-	16	-	-	-	-	-	5	-	3	-	-	-	-
440-449	Truck components	372	3	365	4	-	9	-	9	-	7	-	2	-	-	-	-	-	-	-	-	-	-
450-459	Axles & journal bearing	299	-	291	8	-	7	-	7	-	7	-	-	-	-	-	-	-	-	-	-	-	-
460-469	Wheels	412	12	398	2	-	19	-	12	-	8	-	4	-	-	-	7	-	-	-	-	-	-
470-479	Locomotives	100	-	13	87	-	8	-	8	-	8	-	-	-	-	-	-	-	-	-	-	-	-
480-499	Other equipment & electrical failures	63	3	41	19	-	2	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
	Subtotal	2,050	92	1,761	197	1	92	-	74	-	67	-	7	-	-	-	12	1	5	-	1	-	-

* Preliminary figures for 1977.

TABLE 4 (cont.)

CASUALTIES IN TRAIN ACCIDENTS BY CAUSE

1977 *

CODES	CAUSES	TOTAL ACCIDENTS	TRAIN ACCIDENTS			TOTAL CASUALTIES		EMPLOYEES ON DUTY						ENOD		PASSENGERS ON TRAIN		NON-TRESPASSERS		TRESPASSERS		CONTRACTOR EMPLOYEES	
								TOTAL		TRAINMEN		OTHER											
			C	D	O	K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I
	Train Operation-Human Factors																						
500-509	Brakes, use of	328	196	113	19	-	22	-	22	-	22	-	-	-	-	-	-	-	-	-	-	-	-
510-513	Employee physical condition	3	3	-	-	-	7	-	7	-	3	-	4	-	-	-	-	-	-	-	-	-	-
519-529	Flagging, fixed, hand & radio signals	79	55	17	7	-	26	-	26	-	25	-	1	-	-	-	-	-	-	-	-	-	-
530-544	Other rules & instruction	731	553	140	38	1	70	1	69	1	56	-	13	-	-	-	-	-	1	-	-	-	-
550-559	Speed	222	76	131	15	1	33	1	33	1	29	-	4	-	-	-	-	-	-	-	-	-	-
560-563	Switches, use of	474	139	324	11	1	45	1	27	1	24	-	3	-	8	-	10	-	-	-	-	-	-
570-599	Other human factors	758	108	623	27	-	28	-	24	-	23	-	1	-	-	-	2	-	2	-	-	-	-
	Subtotal	2,595	1,130	1,348	117	3	231	3	208	3	182	-	26	-	8	-	12	-	3	-	-	-	-
700-799	Miscellaneous cause not otherwise listed	1,413	148	712	553	107	409	9	190	9	158	-	32	-		-	49	91	153	7	17	-	-
	GRAND TOTAL	10,349	1,475	7,981	893	111	867	12	604	12	528	-	76	-	8	-	76	92	161	7	18	-	-

* Preliminary figures for 1977.

TABLE 5

CASUALTIES IN TRAIN INCIDENTS BY OCCURRENCE

1977 *

CODES	OCCURRENCE	TOTAL ACCIDENTS	TOTAL CASUALTIES		EMPLOYEES ON DUTY						ENOD		PASSENGERS ON TRAINS		NON-TRESPASSERS		TRESPASSERS		CONTRACTOR EMPLOYEES	
					TOTAL		TRAINMEN		OTHER											
			K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I
001-059	Coupling or uncoupling locos or cars, air or stream hose	756	8	770	8	764	8	746	-	18	-	1	-	-	-	4	-	-	-	1
101-119	Operating locomotives	910	-	943	-	940	-	910	-	30	-	-	-	-	-	3	-	-	-	-
151-159	Operating track motor car or	325	-	367	-	358	-	34	-	324	-	1	-	-	-	8	-	-	-	-
950-959	On-track work equipment																			
201-209	Operating hand brakes	310	3	302	3	299	3	288	-	11	-	1	-	-	-	2	-	-	-	-
301-309	Operating switches	111	-	104	-	103	-	100	-	3	-	-	-	-	-	1	-	-	-	-
401-409	Person on locos/cars contacting fixed structures	294	8	284	7	279	6	270	1	9	-	-	-	-	-	2	1	3	-	-
501-519	Getting on/off locos/cars	2,484	30	2,462	8	2,324	8	2,257	-	67	-	2	-	54	-	9	22	73	-	-
609	Public rail-highway grade crossing	3,852	879	4,132	3	98	2	82	1	16	-	2	-	4	825	3,876	51	152	-	-
701-709	Struck by or ran into locos/cars at other than public crossings	816	404	486	18	107	10	68	8	39	-	3	-	2	30	85	355	288	1	1
---	All other occurrences	4,761	42	4,954	20	4,607	11	3,712	9	895	-	7	2	181	9	80	11	78	-	1
	GRAND TOTAL	14,619	1,374	14,804	67	9,879	48	8,467	19	1,412	-	17	2	241	864	4,070	440	594	1	3

* Preliminary figures for 1977.

CASUALTIES IN NON-TRAIN INCIDENTS BY OCCURRENCE
1977 *

TABLE 6

CODES	OCCURRENCE	TOTAL ACCIDENTS	GRAND TOTAL		EMPLOYEES ON DUTY						EMPLOYEES NOT ON DUTY		PASSENGERS ON TRAINS		NON-TRESPASSERS		TRESPASSERS		CONTRACTOR EMPLOYEES	
					TOTAL		TRAINMEN		OTHER											
			K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I	K	I
001-059	Coupling/uncoupling locos/ cars or manipulating air/ steam hose	1,917	-	1,923	-	1,921	-	1,718	-	203	-	-	-	-	-	2	-	-	-	-
301-309	Operating switches	2,088	-	2,033	-	2,031	-	1,839	-	192	-	-	-	-	-	2	-	-	-	-
501-519	Getting on/off locos/cars	2,618	1	2,611	-	2,445	-	1,760	-	685	-	19	-	112	1	25	-	9	-	1
802-825	Servicing or maintenance of equipment	13,165	1	13,884	1	13,790	-	164	1	13,626	-	55	-	-	-	33	-	3	-	3
852-889	Maintenance of way and structure	18,007	14	18,540	12	18,540	-	78	12	18,350	-	52	-	-	1	50	-	-	1	10
901-904	Involving freight, baggage, express, or mail	301	-	317	-	308	-	21	-	287	-	2	-	4	-	3	-	-	-	-
908-919	Involving windows, doors, etc.	1,189	3	1,216	1	1,153	-	294	1	859	-	12	-	7	2	43	-	1	-	-
920-927	Involving passenger car doors	34	-	37	-	29	-	8	-	21	-	-	-	8	-	-	-	-	-	-
930-939	Stumbling, slipping, falling, caugh, NOC	4,634	12	4,675	2	4,106	1	1,852	1	2,254	-	297	-	50	6	201	4	15	-	6
940-949	Flying/falling objects, burns and similar causes	1,897	10	2,034	-	1,950	-	1,072	-	878	1	25	-	8	3	25	6	18	-	8
960-969	Assault	274	2	287	1	265	-	93	1	172	1	14	-	1	-	6	-	1	-	-
	All other occurrences	4,927	41	4,907	8	4,515	4	1,908	4	2,607	-	108	-	12	14	206	18	58	1	8
	GRAND TOTAL	51,051	84	52,464	25	50,941	5	10,807	20	40,134	2	584	-	202	27	596	28	105	2	36

* Preliminary figures for 1977

TABLE 7

CASUALTIES TO EMPLOYEES ON DUTY BY TYPE OF ACCIDENT/INCIDENT
1977 *

TYPES OF ACCIDENTS	ACCIDENTS	FATALITIES		INJURIES	
		NUMBER	PERCENT OF TOTAL	NUMBER	PERCENT OF TOTAL
Train Accidents					
Collisions	1,475	2	1.92	199	.32
Derailments	7,981	6	5.77	289	.47
Other	893	4	3.85	116	.19
Subtotal	10,349	12	11.54	604	.98
CODES Train Incidents					
001-059 Coupling/uncoupling locos/cars or manipulating air/steam hose	743	8	7.69	764	1.24
101-119 Operating locomotives	905	-	-	940	1.53
151-159 Operating track motorcar					
950-959 or on-track work equipment	321	-	-	358	.58
201-209 Operating hand brakes	306	3	2.89	299	.49
301-309 Operating switches	109	-	-	103	.17
401-409 Persons on locos/cars contacting fixed structures	284	7	6.73	279	.45
501-519 Getting on/off locos/cars	2,309	8	7.69	2,324	3.78
609 Public rail-highway grade crossing	76	3	2.89	98	.16
701-709 Struck by or ran into locos/cars at other than public crossings	114	18	17.31	107	.17
- - - All other occurrences	4,453	20	19.23	4,607	7.50
Subtotal	9,620	67	64.43	9,879	16.07

* Preliminary figures for 1977.

TABLE 7 (cont.)

CASUALTIES TO EMPLOYEES ON DUTY BY TYPE OF ACCIDENT/INCIDENT (cont'd)

1977 *

TYPES OF ACCIDENTS		ACCIDENTS	FATALITIES		INJURIES	
			NUMBER	PERCENT OF TOTAL	NUMBER	PERCENT OF TOTAL
CODES	Non-Train Incidents					
001-059	Coupling/uncoupling locos/cars or manipulating air/steam hose	1,890	-	-	1,921	3.13
301-309	Operating switches	2,069	-	-	2,031	3.31
501-519	Getting on/off locos/cars	2,415	-	-	2,445	3.98
802-825	Servicing or maintenance of equipment	13,056	1	.96	13,790	22.45
852-889	Maintenance of way and structures	17,849	12	11.54	18,428	30.00
901-904	Involving freight, baggage, express or mail	283	-	-	308	.50
908-919	Involving windows, doors, etc.	1,104	1	.96	1,153	1.88
920-927	Involving passenger car doors	26	-	-	29	0.05
930-939	Stumbling, slipping, falling, caught NOC	4,053	2	1.92	4,106	6.69
940-949	Flying/falling objects, burns and similar causes	1,815	-	-	1,950	3.18
960-969	Assault	250	1	.96	265	.43
- - -	All other occurrences	4,538	8	7.69	4,515	7.35
Subtotal		49,348	25	24.03	50,941	82.95
GRAND TOTAL		58,968	104	100.00	61,424	100.00

* Preliminary figures for 1977.

TABLE 8

CASUALTIES IN ACCIDENTS/INCIDENTS AT PUBLIC RAIL-HIGHWAY GRADE CROSSINGS

1977 *

TYPE OF COLLISION AND VEHICLE/PERSON INVOLVED	TOTAL		EMPLOYEES ON DUTY		EMPLOYEES NOT ON DUTY		PASSENGERS ON TRAINS		NON-TRESPASSERS		TRESPASSERS		CONTRACTOR EMPLOYEES	
	K	I	K	I	K	I	K	I	K	I	K	I	K	I
STRUCK BY TRAIN														
Automobile	443	2,057	3	28	–	–	–	3	415	1,949	25	77	–	–
Truck	136	455	1	19	–	1	–	1	135	419	–	15	–	–
Truck-Trailer	39	188	3	49	–	–	–	–	35	135	1	4	–	–
Bus	6	39	–	1	–	–	–	–	6	19	–	19	–	–
School Bus	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Motorcycle	6	3	–	–	–	–	–	–	6	3	–	–	–	–
Pedestrian	63	40	–	–	–	–	–	–	45	25	18	15	–	–
Other	20	108	1	13	–	–	–	–	18	85	1	10	–	–
TOTAL	713	2,890	8	110	–	1	–	4	660	2,635	45	140	–	–
RAN INTO TRAIN														
Automobile	83	914	–	15	–	–	–	–	82	859	1	40	–	–
Truck	39	230	–	6	–	–	–	–	39	220	–	4	–	–
Truck-Trailer	18	65	–	10	–	–	–	13	18	42	–	–	–	–
Bus	–	–	–	–	–	–	–	–	–	–	–	–	–	–
School Bus	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Motorcycle	16	33	–	–	–	–	–	–	16	28	–	5	–	–
Pedestrian	1	6	–	–	–	–	–	–	–	3	1	3	–	–
Other	6	38	–	–	–	–	–	–	5	35	1	3	–	–
TOTAL	163	1,286	–	31	–	–	–	13	160	1,187	3	55	–	–

* Preliminary figures for 1977.

TABLE 8 (cont.)

CASUALTIES IN ACCIDENTS/INCIDENTS AT PUBLIC RAIL-HIGHWAY GRADE CROSSINGS (cont'd)

1977 *

TYPE OF COLLISION AND VEHICLE/PERSON INVOLVED	TOTAL		EMPLOYEES ON DUTY		EMPLOYEES NOT ON DUTY		PASSENGERS ON TRAINS		NON-TRESPASSERS		TRESPASSERS		CONTRACTOR EMPLOYEES	
	K	I	K	I	K	I	K	I	K	I	K	I	K	I
GRAND TOTAL														
Automobile	526	2,971	3	43	-	-	-	3	497	2,808	26	117	-	-
Truck	175	685	1	25	-	1	-	1	174	639	-	19	-	-
Truck-Trailer	57	253	3	59	-	-	-	13	53	177	1	4	-	-
Bus	6	39	-	1	-	-	-	-	6	19	-	19	-	-
School Bus	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Motorcycle	22	36	-	-	-	-	-	-	22	31	-	5	-	-
Pedestrian	64	46	-	-	-	-	-	-	45	28	19	18	-	-
Other	26	146	1	13	-	-	-	-	23	120	2	13	-	-
TOTAL	876	4,176	8	141	-	1	-	17	820	3,822	48	195	-	-

* Preliminary figures for 1977.

TABLE 9

CASUALTIES IN ACCIDENTS/INCIDENTS AT ALL RAIL-HIGHWAY GRADE CROSSINGS

1977 *

VEHICLE & PERSON INVOLVED	TOTAL		EMPLOYEES ON DUTY		EMPLOYEES NOT ON DUTY		PASSENGERS ON TRAINS		NON-TRESPASSERS		TRESPASSERS		CONTRACTOR EMPLOYEES	
	K	I	K	I	K	I	K	I	K	I	K	I	K	I
Automobile	551	3,060	3	46	-	-	-	3	521	2,892	27	119	-	-
Truck	186	751	1	31	-	1	-	1	185	699	-	19	-	-
Truck-Trailer	62	292	3	72	-	-	-	23	58	193	1	4	-	-
Bus	6	39	-	1	-	-	-	-	6	19	-	19	-	-
School Bus	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Motorcycle	24	36	-	-	-	-	-	-	24	31	-	5	-	-
Pedestrian	67	46	-	-	-	-	-	-	48	29	19	17	-	-
Other	29	163	1	13	-	-	-	-	25	138	3	12	-	-
TOTAL	925	4,387	8	163	-	1	-	27	867	4,001	50	195	-	-

* Preliminary figures for 1977.

A-2

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

-REFERENCE -

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

A-2 FEDERAL RAILROAD SAFETY REGULATIONS, ORDERS AND STANDARDS ISSUED BY THE FEDERAL RAILROAD ADMINISTRATION, AND PROPOSED RULES IN SUCH AREAS

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.

Part 218 - Railroad Operating Rules

(a) Yard Limits
On August 1, 1977, "Yard Limits" which governs the controlled movements of trains and engines within designated portions of the main track on a railroad became effective.

(b) Flag Protection
On August 1, 1977, "Flag Protection" which identifies the circumstances under which flag protection is to be provided and the manner in which it is to be provided to protect a train under circumstances under which it could be overtaken by a following train became effective.

(c) Blue Signal Protection of Workmen
"Blue Signal Protection of Workmen" which prescribes minimum requirements for the protection of railroad employees working on, under, or between railroad rolling equipment became effective on June 1, 1976. This Regulation was last amended on August 31, 1977. A public meeting was held on March 22, 1978, to solicit comments from both railroad industry and labor in an effort to resolve some of the controversial issues which have been brought to the attention of FRA.

Part 220 - Radio Standards and Procedures

On August 1, 1977, "Radio Standards and Procedures" which establishes uniform and detailed guidelines governing the use of radio for railroad operating purposes became effective.

Part 221 - Rear End Marking Devices

"Rear End Marking Devices - Passenger, Commuter and Freight Trains," the regulation dealing with increasing the conspicuity of the rear of a train occupying the main track through the use of highly conspicuous marking devices, was finalized and now requires installation by July 1, 1978.

Part 225 - Railroad Accidents/Incidents Reporting Classification and Investigations

On January 6, 1977, a minor amendment was effected to Appendix B of Part 225 which substitutes the word "telephonic" for "telegraphic" in the Schedule of Civil Penalties.

Several revisions of the regulations which govern the reporting of railroad accidents/incidents became effective February 1, 1977. The revisions deleted duplicate reporting instructions and revised reporting forms in order to provide additional accident information.

Miscellaneous Notices Relative to Safety Regulations

1. An Advance Notice of Proposed Rule Making was published on March 10, 1977, for the purpose of gathering information relative to the use of improved glazing in the windows of locomotive cabs, passenger and commuter cars, rail-rapid transit cars, and cabooses.

2. On November 15, 1976, the Federal Railroad Administration published in the Federal Register an Advance Notice of Proposed Rulemaking (ANPRM). 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. After detailed studies and analysis of the comments submitted in response to the ANPRM, the FRA decided to terminate this rulemaking procedure.

3. An Advance Notice of Proposed Rule Making was published on April 13, 1977, to gather additional data on minimum safety and health requirements for railroad cabooses.

A-3

SUMMARY OF REASONS FOR EACH WAIVER GRANTED UNDER SECTION 202(c) OF THE ACT DURING CALENDAR YEAR 1977

-REFERENCE -

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

A-3 SUMMARY OF REASONS FOR EACH WAIVER GRANTED DURING 1977

During 1977 the FRA determined that it was in the public interest and consistent with railroad safety to grant a total of twenty-two waivers. Six of the waivers involved provisions of the FRA Freight Car Safety Standards (49 CFR Part 215); fourteen of the waivers involved the provisions of the FRA Railroad Operating Rules (49 CFR Part 218); and two of the waivers involved the provisions of the FRA Track Safety Standards (49 CFR Part 213). A brief summary of the actions follows:

Freight Car Safety Standards. FRA granted waivers in six instances where the petitioner requested authority to operate small groups of freight cars under restrictive conditions. The waivers were granted to the Great Western Railway (Docket No. RSFC-74-3); Monsanto Chemical Company (Docket No. RSFC-74-11); Seaboard Coast Line Railroad (Docket No. RSFC-74-17), Maine Central Railroad (Docket No. RSFC-75-5); Atchison, Topeka and Santa Fe Railroad (Docket No. RSFC-75-6); and Columbia and Cowlitz Railroad (Docket No. RSFC-75-26).

Railroad Operating Rules. FRA granted waivers in seven instances where the petitioners requested authority to conduct their operations without full compliance with the blue signal provisions of the regulations (49 CFR 218.25) at specifically identified locations. These waivers were granted to Consolidated Rail Corporation (Docket No. RSOR-76-3); Washington Terminal Company (Docket No. RSOR-76-4); Belt Railway of Chicago (Docket No. RSOR-76-6); Chicago and North Western Railroad (Docket No. RSOR-76-9); Chicago, Milwaukee, St. Paul and Pacific Railroad (Docket No. RSOR-76-10); Chicago Union Station Company (Docket No. RSOR-77-1); and Chicago, Rock Island and Pacific Railroad (Docket No. RSOR-77-10).

FRA granted waivers in seven instances where the petitioners requested authority to conduct their branch line type operations without full compliance with the flag protection provisions of the regulations (49 CFR 218.37) at specifically identified locations. These waivers were granted to the Chicago, Milwaukee, St. Paul & Pacific Railroad (Docket No. RSOR-77-4); Missouri Pacific Railroad (Docket No. RSOR-77-5); Burlington Northern Railroad (Docket No. RSOR-77-6); Soo Line Railroad (Docket No. RSOR-77-12) Chicago, Rock Island and Pacific Railroad (Docket No. RSOR-77-13); Louisville and Nashville Railroad (Docket No. RSOR-77-14); and Seaboard Coast Line Railroad (Docket No. RSOR-77-17).

A-4

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

- 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 ISSUED UNDER TITLE II

(a) During the year ending June 30, 1977, FRA track inspectors, along with the qualified inspectors from participating states, conducted 5,349 inspections covering: (1) 140,060 miles of railroad track; (2) 65,490 turnouts; and (3) 154,629 records. These were to determine the degree of carrier observance of the Track Safety Standards. During these inspections 47,620 defects were identified by inspectors and corrected by railroad personnel.

(b) During 1977, FRA inspectors examined 349,000 freight cars to determine the degree of carrier compliance with the Freight Car Safety Standards. Inspectors found 40,335 defective cars.

(c) During 1977, FRA inspectors examined 260,000 Hours of Service records and 75,000 Accident/Incident reports. In the area of Blue Signal Protection of Workmen, 2,400 inspections were performed.

(d) During the 12 months ending September 30, 1977, $1,951,200 were collected from 28 railroads for 89 cases involving 4,878 claims arising under rules and regulations promulgated pursuant to the Federal Railroad Safety Act of 1970.

AUTOMATED TRACK INSPECTION PROGRAM -ATIP

To assist Federal and state track inspectors in the performance of their assigned duties, the FRA Office of Safety is increasing the use of sophisticated track measuring equipment. During 1977, a single automated track inspection unit was utilized almost exclusively to support the Office of Safety's effort in the enforcement of the Federal Track Safety Standards. This unit inspected some 28,000 miles of track.

The capabilities of the Automated Track Inspection Program have been greatly expanded with the addition of two more geometry measuring units. These units which use the latest developments in track geometry measuring techniques were placed in service in November 1977 and January 1978, respectively. With the added vehicles,the projected schedule for 1978 calls for the survey of 65,000 miles of main track.

These vehicles enhance the productivity of FRA field investigators by providing them with a visible profile of the effectiveness of the carrier's maintenance and inspection efforts. This is accomplished by measuring track gage, cross level, profile and curvature and by providing the field inspector with data in both analog and digital form.

A new track geometry unit that has ultrasonic flaw detection capabilities and provides computer data is now being phased into the program. It is designated as the T_6 unit, and will probably be fully operational in the next year.

A hi-rail vehicle equipped with ultrasonic rail flaw detection equipment and a modified geometry measuring system is presently being tested at Transportation Systems Center, Cambridge, Massachusetts. This vehicle is to be used by FRA regional track personnel in their track standards enforcement program.

The vehicle will be used on relatively slow speed track (30 mph and less) to detect rail defects described in Section 213.113 of the Track Safety Standards. Also, because of its slow operating speed, the FRA Track Inspector will be able to observe and evaluate the condition of the entire track structure at the same time.

The modified geometry system provides analog data in only two basic parameters - gage and crosslevel. Once a suspected geometry defect is visually sighted, the chart recorder can be analyzed to determine the magnitude of the defect.

A-5

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

Most of the problems FRA encountered in administering its regulations in 1977 were the same as those faced in previous years. Unfortunately, there are no simple, short-term solutions to safety problems directly related to the depressed financial condition of the railroad industry. These problems probably will continue in the foreseeable future and will diminish only with a substantial improvement in the industry's financial condition.

A summary of the problems FRA is encountering, in order of priority, follows:

(a) Rail industry operating costs which have produced revenue losses and financial deficits continue to spiral. In an attempt to stem these increasing operating deficits, many railroads have resorted to deferring much of their planned maintenance programs. This practice has resulted in a steady deterioration of the rail industry's physical plant and, consequently, in an alarming increase in the number of track and equipment related accidents. Until the rail industry's financial situation improves, therefore, increased Federal and State inspections will be required to detect and correct deteriorating track and equipment conditions which result in accidents.

(b) Those railroads which are financially capable of improving their physical plants face another obstacle. They often are hampered by long lead times for materials delivery. This further delays planned maintenance programs and increases the need for adequate inspections.

(c) For the reasons stated above, it is difficult to obtain voluntary railroad compliance. The present FRA inspection force is based on the position that the Federal and state role in rail safety is primarily one of monitoring carrier compliance with Federal safety regulations. Primary responsibility for rules compliance 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) State participation is still in the developing stage. However, based upon the states participating and those planning to do so, there is now reason for optimism that the states will significantly contribute to the rail safety inspection program. Standards for state participation in the various areas of the rail safety program will continue to be issued as they are developed.

ACCIDENT INVESTIGATION

Information gathered from carrier reported accidents/incidents and casualties is often used in support of regulatory action. However, because that information 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 1977, the Office of Safety initiated 156 train accident investigations, of which 2 were investigated jointly with the National Transportation Safety Board. The FRA also investigated the deaths of 101 carrier employees that year. Through the investigative activities, FRA obtains detailed information about suspected safety problem areas.

A-6

AN ANALYSIS AND EVALUATION OF RESEARCH AND RELATED ACTIVITIES COMPLETED (INCLUDING THE POLICY IMPLICATIONS THEREOF) AND TECHNOLOGICAL PROGRESS ACHIEVED DURING CALENDAR YEAR 1977

- REFERENCE -

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

A-6 AN ANALYSIS AND EVALUATION OF RESEARCH AND RELATED ACTIVITIES COMPLETED (INCLUDING THE POLICY IMPLICATIONS THEREOF) AND TECHNOLOGICAL PROGRESS ACHIEVED DURING CALENDAR YEAR 1977

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; and

Automated Rail Vehicle and Off-Track Detection Systems.

FRA expects improvements in these areas to reduce the hazards associated with railroad operations. A summary of work and experiments in these five areas follows:

(a) Rolling Stock Safety

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

The goal of projects in the hazardous material transport area is to reduce the frequency and severity of accidents involving rail transportation of flammable compressed gases, radioactive material and explosives. Although the number of these accidents is small when compared to the total number of rail accidents, a hazardous material tank car accident can cause considerably more damage than other railroad accidents (e.g., three of the hazardous material accidents in 1974 caused damage in the $7 to $20 million 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 preventing tank car head ruptures and subsequent fires.

In 1977, FRA completed performance specifications for a certain type of pressurized tank car used in rail transport of ammonia and liquefied flammable gases. This type of tank car has been involved in several recent railroad accidents which resulted in extensive injuries, fatalities and property damage. The specifications contain requirements for tank car head protection systems, coupler vertical restraint systems and thermal shield systems and are intended to reduce the severity of accidents involving these tank cars.

The Materials Transportation Bureau has incorporated these specifications into a Rulemaking (Docket HM-144) which calls for a four-year national retrofit program of the existing fleet. 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 of complying with the specifications. 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. This goal will be reached 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. Activities in the area of Component Failure Prevention and Detection include determining: (1) the service lives of railroad bearings; (2) the service loads encountered by vehicle components in revenue service; (3) the feasibility of on-board devices that detect overheated bearings and local derailments; and (4) the feasibility of using acoustic signatures, ultrasonic techniques and the Barkhausen effect to detect defective wheels. Work in this area will continue with increased emphasis on translating test results into specific recommendations for improved component designs and inspection techniques.

In the Occupant Protection area, work is directed at reducing injuries and fatalities sustained by rail vehicle occupants in collisions and derailments. Accomplishments in 1977 include interior design change recommendations and crashworthiness design guidelines. Additionally, FRA has sponsored eight full scale impact tests which provided important data for understanding and modeling impact dynamics. A small scale impact testing program has been undertaken to provide a screening mechanism to evaluate the effectiveness of impact controlling countermeasures before full scale field tests are undertaken. FRA also sponsored a series of impact tests to evaluate the effectiveness of various glazing materials in providing occupant protection from bullets, rocks and other objects directed at train windows. Performance specifications for glazing materials are being formulated. FRA also continued its efforts to develop performance specifications for the interior of passenger cars, so passengers are not injured by sharp objects during a collision or derailment.

Many railroad accidents occur through adverse, often obscure, interactions of the train and track, even though neither is inherently defective. To identify and correct the incompatibilities between track and train, FRA continued its participation in the joint Track-Train Dynamics (TTD) program in 1977. During this year, the following two programs were completed: Fatigue Life Analysis Program (FLAP), which predicts the fatigue life of critical vehicle components; and the COMET program, which predicts stresses in vehicle components under various load conditions. Current efforts in the TTD program are aimed at using the research findings to develop performance specifications for vehicle and track components.

(b) Human Factors in Railroad Operations

A review of railroad accidents indicates that two major areas of concern are appropriate for human factors related research. The first deals with those accidents that are attributable, in some part, to human miscalculation or oversight. Currently, about 20-25% of all train crashes are attributable to this broad cause category. The second area in which research may be beneficial deals with those accidents that result in personnel casualties (deaths and/or injuries). With the exception of grade crossing

accidents, which account for the highest total number of railroad related deaths, these casualties do not typically result from crash-type accidents. They occur in typical railroad occupational settings and are sustained by a wide range of railroad employee types. FRA's human factors safety research efforts are directed at producing practical countermeasures for these safety problem areas.

A 1976 survey of alcohol and drug abuse programs in the railroad industry noted a wide range of program types, approaches and success rates within the industry. The study was 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 types of programs. In 1977 a contractor was selected and work was begun on Phase II effort, designed to yield recommendations as to how to structure more cost-effective and efficient programs. Guidelines for formulating and operating optimal programs will be developed.

Two similar but distinct proposals for a research locomotive and train handling evaluator were developed under previously completed contracts in 1977. These proposals were analyzed and the best features of both synthesized into one comprehensive specification for the completed system. A detailed procurement plan also was developed in 1977. The procurement process is continuing with contract award anticipated before the end of 1978. When operational, the facility will be FRA's primary experimental tool for evaluating train accidents as influenced by human factors. It will be used to conduct experiments simulating in-service conditions to allow evaluation of the effect on train handling of: (1) different locomotive cab environments; (2) selected real-time train performance indicators/aids; (3) various train handling controls and techniques; and (4) varying accident scenarios.

Vandalism, especially in large urban areas, continues to result in an alarming number of train crew injuries and, in some cases, in derailments or other damage to railroad property, equipment or ladings. One method of effectively handling this problem is to increase the communications effectiveness of railroad security forces in metropolitan areas. It is hypothesized that

linking all forces with a shared communications network will increase their effectiveness. FRA is evaluating one system to accomplish this linking. Guidelines for its further use will result from this project.

Previously completed studies identified the air contaminant levels in diesel locomotives and compared the results to the acceptable guidelines for the various substances as published by OSHA. In 1977, FRA completed a study which assessed the irritating and discomforting effects of these levels and put them in perspective in the railroading context.

The data collection and reduction phases of the locomotive in-cab noise assessment program were completed in 1977. The purpose of the program is threefold: 1) to assess the degree of noise exposure experienced by locomotive crews during typical shifts; 2) to develop simplified stationary noise test procedures to be used in lieu of continuous, shift-length measurements; and 3) to identify potentially troblesome in-cab noise sources so quick, cost-effective remedial action can be taken. The program will continue through 1978 with a recommended test procedure being the major program output.

As previously mentioned, very few railroad employee injuries or fatalities occur in train accidents 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 routine tasks in, around or on locomotives or rail cars. In 1977, a contractor was selected and major contract effort was begun to determine the personal injury risk potential associated with work performance around equipment. Once the hazards or risks are properly categorized and ranked in terms of their severity, recommendations for the development of countermeasures will be made. The first of a planned series of similar studies will focus on the train and engine worker job categories. Upon successful completion of this study, the effort will be expanded to other classes of employees.

(c) Grade Crossing Safety

The Grade Crossing Safety Program includes research in the areas of developing concepts for effective and credible train detection devices and the means for enhancing train conspicuity at grade crossings. Train detection research, as well as other research in the motorist warning area, is included in a joint program with FHWA. The AAR, RPI and the Brotherhood of Railway Signalmen are actively interested in this program.

Work in the area of locomotive conspicuity has involved securing the cooperation of four railroads in equipping varying numbers of their locomotives with strobe lights in addition to those already so equipped. In all, about 185 locomotives were equipped by August 1977. The strobe lights are intended to improve the locomotive's conspicuity at grade crossings. The four railroads have agreed to collect comparative safety effectiveness and maintenance data on the strobe-equipped locomotives and other non-equipped locomotives. Once these data are available, FRA will determine the benefits of this device in reducing grade crossing accidents.

In another project, FRA has sought means of improving grade crossing motorist alerting system components. In this regard, FRA published several reports describing methods of lowering the cost of drop gates, increasing the effectiveness of lighted motorist warning devices, detecting the presence of a train and activating the motorist alerting devices. The information in these reports is being used by railroads to assist them in specifying grade crossing warning system components.

In 1977, FRA initiated a joint program with FHWA to begin work on off-track train detection, constant warning time and active advance grade crossing warning. The first project area will yield concepts for detecting the presence of a train that do not involve conventional track-based circuitry and could potentially enhance maintainability. Under the FRA/FHWA program, the agencies will investigate various detection and activation techniques that integrate train speed and distance

from the crossing. This project will result in activation of a motorist warning system a constant, reliable time before the train reaches the crossing. During the third joint project FRA and FHWA will investigate the safety effectiveness of installing active motorist warning systems some predetermined distance "up" the road from the grade crossing. Such a system would give the motorist advance warning of both the presence of a grade crossing and a train at the crossing, thereby facilitating a safe reaction on the part of the motorist.

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 about 402,000 entries; of these, almost 220,000 are public grade crossings. In the spring of 1976, updated forms and procedure manuals were mailed to all railroads and states. Completed forms now are being supplied to states, cities, counties and railroads for use in planning and implementing grade crossing upgrading programs (i.e., installation of gates and flashing lights and construction of grade separation). A handbook containing more than one hundred tables, maps and graphs of grade crossing inventory statistics was published in June 1977.

At TSC, FRA is sponsoring research which has developed a hazard-index formula for public grade crossings. Grade crossing accident reports and the National Rail-Highway Crossing Inventory are being linked for use in this research. Although a number of hazard-index formulas are available, the current effort is the first use of nationwide data from the National Inventory in developing 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.

To better understand state management of the Federally funded grade crossing program and to identify opportunities for improving program administration, FRA sponsored a Transportation Systems Center effort to conduct case studies in five states. The studies have been completed and a report approved for publication. Besides providing insight into program administration, the report also offers constructive recommendations which will require Federal, state and industry cooperation. Followup is planned.

During the summer of 1977, FRA initiated an effort to document and assess the benefits and costs of placing reflectors on the sides of all railroad rolling stock. A report soon will be published. A preliminary finding indicates that while reflectorization may be cost-beneficial, it will not be as cost-beneficial as existing alternative grade crossing safety programs.

(d) Track Safety Research

The primary goal of the Improved Track Structures Research Program is to reduce track caused accidents. One approach to this program emphasizes research to improve the current Track Safety Standards based on rigorous, technically sound modification, which reflect a better understanding of existing problems of the track and vehicle interactions, and changing loading environment. The second emphasis area is on the establishment of a new approach for the Track Safety Standards which reflects a shift, ultimately, to a performance specification basis, rather than the design specification approach. The third area of emphasis is on activities which could improve track safety through implementation of research results without regulatory action. These emphasis areas address:

- Identification of safe structural load capacity for existing and new track for a variety of loading conditions and design variables;

- Identification of limiting speeds, loading conditions and vehicle characteristics reflecting the dynamic interaction of the vehicles and track;

° Identification of the requirements for rail flaw detection and inspection frequencies based on rail age, usage and service loading conditions.

The technical data generated through the research program are used to formulate recommendations to the Office of Safety for use in the rulemaking process and for direct use by the industry in improving safety.

During 1977, the following research activities were active in the accomplishment of these objectives:

- Analysis of the Leading Causes of Track-Related Railroad Accidents (ongoing). Analyses based on the 1975 FRA accident statistics were completed. The results were used to help set priorities and define research projects for future improvement in the accident statistics.

- Track Impedance Measurement System (ongoing). This project was essentially completed in 1977 with a set of draft specifications for a system to measure the load/deflection characteristics, statically and dynamically, of a loaded track structure. This activity will be integrated into the work to define performance specifications for the load carrying capacity of track structures.

- Vertical Track Stiffness (ongoing). A complementary effort to the Impendance Measuring System noted above was the effort directed at using track geometry measurements to develop a measure of the ability of the track to resist vertical load. During 1977, an over-the-road test demonstrated the feasibility of this approach and investigated the application of results to defining problem "soft spots" requiring maintenance before a safety problem developed.

- Parametric Studies of Vehicle-Track Interaction (ongoing). This activity was continued into 1977 with the development of methodology to carry out the studies and the development of the description of the characteristics of the existing vehicle fleet and track geometry. The ultimate result will be the identification of the limiting vehicle speeds for a variety of track geometry conditions.

- Pilot Project for Vehicle-Track Interaction (ongoing). In order to apply the general methodology to be used in the parametric studies on a trial basis, to guide the analytical studies, to start the validation process and to assess the derailment tendencies of a six axle locomotive due to the dynamic interaction of the track and locomotive, a pilot project was established. Two SDP-40F locomotives of the type involved in several AMTRAK derailments over the past several years were tested over a representative track test site on a participating railroad. A reference set of six axle locomotives of a different design was also tested for comparison. The test and basic analysis were completed during 1977, with the results to be presented to the Office of Safety early in 1978. The output could be in the form of recommendations for changes in the operating limits for these locomotives on curves.

- Wheel/Rail Load Characterization (ongoing). This project is a basic supporting project for several other track program projects. It will produce statistical characterization of the load environment that the track must be expected to withstand and will form the basis of much of the work on performance specifications for track strength.

- Track Buckling Analysis (ongoing). The results of earlier analytical studies were applied in the stipulation of safe rail laying and/or working temperatures for continuously welded rail to preclude either

rail pull-apart due to cold weather or track buckling due to excessive longitudinal stresses induced by hot temperatures or train action loads. The results, planned for validation in 1978, will be available in the form of recommendations for a Track Safety Standard.

- Longitudinal Rail Stress Measurement (ongoing). A key ingredient in the successful utilization of track buckling analysis data is the ability to measure the existing rail stress. During 1977, the first step in developing this capability was completed with the demonstration of a portable relative stress measuring device. Although additional feasibility and application improvements appear to be required to achieve the desired result for a continuous measuring system, this was an important step in the overall goal for this system.

- Rail Material Characterization (ongoing). This project investigates the properties of rail with regard to crack initiation, defect growth rates and fracture related properties. The output will feed the following studies directed toward the ability to predict flaw growth rates and rail life. The information from this project, essentially completed during 1977, will be used to help set inspection frequency requirements for flaw detection based on the material and load environment and expected usage.

- Engineering Analysis of Stresses in Rail (ongoing). This project, essentially completed during 1977, in conjunction with other material and load characterization projects, will be used to predict rail life and flaw growth behavior.

- Field Verification Sleeve Expansion of Rail Bolt Holes (ongoing). During 1977, field testing of this aerospace technique continued on a large railroad to obtain actual service experience on the technique. The approach applies a compressive stress region around the periphery of rail joint bolt hole, preventing or reducing crack propagation in the vicinity of the bolt hole.

- Safe Rail Capacity Study (ongoing). A preliminary definition of the safety loads for specific rail sizes and tie spacings was completed. The basis of the study was the limiting stress level established in the rail which prevents the onset of fatigue damage. The approach will permit recommendations to be made to address the load carrying capacity and inspection requirements for various rail sizes and track designs.

- Analytical Studies on the Effects Track Geometry Deviation on Vehicle Dynamic Performance (ongoing). A preliminary study was completed on a rail car which analytically showed the relative effects of various combinations of track geometry deviations on the performance characteristics of the vehicle as a function of speed. Outputs from additional studies will include recommendations for safety vehicles operating limits as a function of track geometry deviations/combinations or changes to the Track Safety Standards to reflect the effects of various track geometry characteristics.

(e) Automated Rail Vehicle and Off Track Detection Systems

During most of 1977 a single FRA automated track geometry inspection vehicle was used to support Office of Safety enforcement of the Federal Track Safety Standards. In November 1977, a second research vehicle was added. Together, these units were used to inspect 28,000 miles of track. This is 10,000 miles more than that inspected in 1976 and 11,500 miles more than in 1975. With both vehicles in operation, about 4,500 miles of track are inspected each month. Besides supporting the efforts of the Office of Safety, the vehicles have been used in such tests as the six-axle locomotive behavior field tests for FRA Research and Development Programs.

These vehicles permit 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 data provided by the vehicles, the field inspectors are able to make on-the-ground observations to determine compliance with the standards.

Vehicle instrumentation continues to be improved. Improvements developed during 1977 include:

- Low-speed (0-40 m.p.h.) profilometer
- All-weather alignometer
- On-board track geometry report generation software
- Automated gate control for rail flaw system
- Automated lateral control for rail flaw system
- Automated obstacle protection control for rail flaw system
- Automated pattern recognition system for rail flaw system

New software allows real time data processing on the vehicles, rather than at an off-line remote site. The new software, along with previously developed systems, has been installed on FRA track inspection cars which are the only vehicles capable of measuring compliance with the Federal Track Safety Standards.

In 1978, the inspection capabilities of the program will be expanded with the addition of one more track geometry measuring vehicle. This unit, which uses the latest developments in track geometry measurement techniques and rail flaw detection equipment, will be operational in 1978. It will serve a two-fold purpose by determining carrier compliance with the rail defect sections of the track standards and by aiding the development of more advanced high-speed rail flaw detection systems.

A high-rail vehicle equipped with rail flaw detection equipment and a modified geometry measuring system still is used at the Transportation Test Center in support of the Facility for Accelerated Service Testing (FAST) program. In addition, the vehicle is available for limited use by FRA inspectors. A second highway-rail system scheduled for delivery in July 1978 is expected to provide rail flaw detection at speeds up to 20 m.p.h. The emphasis on the highway-rail system development is to provide a reliable 25 m.p.h. capability with equipment operated and maintained by personnel with limited technical backgrounds.

Development of a 50 m.p.h. rail flaw detection system continued, with the operational evaluation of the prototype (T-6) system during the last quarter of 1977. Inspection speeds up to 25 m.p.h. were achieved. Based on the results from T-6 and current laboratory research, a specification for a prototype production rail flaw system for a rail-bound vehicle will be formulated by mid-1978.

Research will continue to improve the sensor design, automatic equipment control and data processing techniques for both highway-rail and rail-bound vehicles during 1978. Research will include development of magnetic sensors to complement ultrasonic capabilities and advanced pattern recognition techniques to insure that all defects specified in the FRA Track Safety Standards can be detected and reliably classified by type, size, location and orientation.

In the Safety Life Cycle Program area, efforts continue to develop a methodology for minimizing the potential for accidents of new/modified rail vehicle systems by: (1) developing guidelines for assessing the safe life of new rail vehicles; (2) establishing test, inspection and acceptance procedures for evaluating the safe life of new or modified rail vehicles; and (3) developing computer methods, analytical techniques and mathematical models for predicting the safe life of new rail vehicles.

In 1977, a preliminary review was conducted of the rail industry to assess the technology that is available in the rail vehicle safe life prediction and evaluation area. Also developed was a preliminary general methodology outline for assessing the safe life of a new or modified rail vehicle. Additionally, in 1977 FRA initiated a study to determine the effectiveness of various approaches for producing safe life cycle prediction guidelines for sideframes, wheels and axles. The result of this work will be available in mid-1978.

Detection of faulty rail vehicle components and unsafe performance characteristics is another area of vital interest to FRA as part of its effort to reduce the number of train accidents caused by component failures. Wheels, bearings and dynamic performance failures have been major contributors to compoment related accidents. In 1977, FRA actively conducted R&D to find a solution to detecting critical vehicle conditions before an accident occurs.

To study the problem of wheel tread cracks, and automated ultrasonic wheel tread crack detection system and a sticking brake detection device were purchased, and system verification tests were initiated. Future plans call for extensive tests to establish a data base for detecting tread cracks under various operating conditions.

Wheel plate crack studies of operational parameters which affect the reliability and false alarm rate of an acoustic signature inspection system were initiated. Theoretical and experimental studies were undertaken. Since preliminary data indicate a high false alarm rate, efforts will be directed through improved data analysis at reducing this rate.

Feasibility studies in 1976 indicated that defective roller bearings can be detected in a wheel shop by ultrasonics. A contract was awarded to construct such a device for R&D testing in a railroad wheel shop beginning in 1978.

Under- or over-lubrication of bearings also can be detected with ultrasonics. A contract was awarded to construct such a device for R&D testing in a railroad wheel shop; testing will begin in 1978.

FRA has initiated efforts to develop an R&D wayside research capability to: (1) test the practicality of outputs from the preceding studies; (2) increase the reliability of inspecting a moving consist; and (3) detect defective conditions that occur only in a dynamic mode. A study on the subject entitled, "Wayside Derailment

Inspection Requirements Study for Railroad Vehicle Equipment," has been completed and published. As a consequence, various devices will be installed at TTC in a wayside track to provide a test bed for developing an integrated wayside capability to detect faulty components and unsafe rail vehicle performance conditions. As part of this installation, a means of inspecting and assessing the operating conditions of each freight car's brake system as the train rolls by will be developed and tested. The first part of the test installation will be completed in 1978.

A-7

A LIST OF COMPLETED OR PENDING JUDICIAL ACTIONS FOR THE ENFORCEMENT OF ANY FEDERAL RAILROAD SAFETY RULES, REGULATIONS, ORDERS, OR STANDARDS ISSUED UNDER THIS TITLE ALONG WITH A BRIEF STATEMENT OF THE ISSUE

-REFERENCE-

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

A-7 A LIST OF COMPLETED OR PENDING JUDICIAL ACTIONS FOR THE ENFORCEMENT OF ANY FEDERAL RAILROAD SAFETY RULES, REGULATIONS, ORDERS, OR STANDARDS ISSUED UNDER THIS TITLE ALONG WITH A BRIEF STATEMENT OF THE ISSUE

No cases involving enforcement of any rules, regulations, orders or standards issued under Title II were filed with the courts during calendar year 1977. In attempting to avoid unnecessary litigation by utilizing the compromise procedures afforded by this Act, the alleged violations committed 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. § 438(c).

Five cases raising issues under the Act were decided in the Federal courts in calendar year 1977. Two of those cases involved appeals from lower court decisions which were rendered in calendar year 1976.

In Chicago Transit Authority v. Hall, the United States Court of Appeals for the Seventh Circuit reversed the decision of the lower court and held that CTA was not a "Railroad" within the meaning of the Federal Railroad Safety Act of 1970 and, thus, is not subject to FRA accident/incident reporting requirements (49 CFR Part 225). The decision effectively removes all rail rapid transit operations from the coverage of the 1970 Act.

In United States v. Missouri Pacific Railroad Company, the United States Circuit Court for the Eighth Circuit affirmed a lower court ruling 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 U.S. district court cases involved the issue of threshold powers available to FRA under the Act. In Delaware and Hudson Railway Company v. United States, the railroad was successful in obtaining a temporary restraining order barring FRA inspectors from safety inspections on the property of the railroad. The United States counterclaimed, citing the authority contained in the 1970 Act to conduct inspections of rail facilities at reasonable times and in a reasonable manner. However, before a hearing on the merits of the respective claims, the parties entered into a Stipulation of Dismissal whereby the railroad agreed not to obstruct any lawful inspections by FRA.

In Illinois Central Gulf Railroad v. United States, the railroad obtained a temporary restraining order enjoining enforcement by FRA of Emergency Order No. 6, which prohibited use by the railroad of a segment of its line in the State of Missouri. Before a hearing on the permanent injunction could be heard, the railroad diverted substantial resources to the affected track, bringing the track into compliance with applicable regulations within a week. As the emergency ceased to exist, the Administrator withdrew the Emergency Order prior to the hearing on the merits, rendering the case moot.

The United States was an Intervening Plaintiff in a suit brought by twenty-three railroads operating in the State of Illinois against the Illinois Commerce Commission, Atchison, Topeka & Santa Fe Railway v. Illinois Commerce Commission, Northern District of Illinois. The United States and the railroads were successful in their contention that Section 203 of the Federal Railroad Safety Act preempted state action in attempting to regulate the handling of certain types, of tank cars containing hazardous materials. Plaintiffs argument was based on the fact that the Secretary of Transportation had already promulgated rules and regulations which governed the handling of such tank cars. The court followed the expressed Congressional mandate of rational uniformity of railroad safety regulation in reaching its decision.

A-8

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. The RRIS data files currently contain almost 16,000 railroad technical literature references and were increased by approximately 2,600 references in 1977. Since the first RRIS publication in 1973, regular Railroad Research Bulletins have been issued at six-month intervals. In 1977, two special bibliographies were published by RRIS; one on international rail-related documents reviewed by FRA through its bilateral agreements with other countries and the other on railroad electrification.

The RRIS was established to collect the results of worldwide railroad research and to make them 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 for inclusion in the RRIS.

Information from the Grade Crossing Inventory, completed in 1975 through the combined efforts of Federal and state governments and the railroad industry, has been provided to railroads, states, members of Congress, government agencies, local jurisdictions and private individuals. As an additional source of information, TRB published a bibliography of grade crossing research. In June 1977, FRA published a summary of the statistics contained in the inventory.

In 1977, the following technical studies on railroad safety research were made available to the public through the National Technical Information Service in Springfield, Virginia.

1. PB 264-215
   MATERIALS EVALUATION STUDY - BALLAST AND FOUNDATION MATERIALS RESEARCH PROGRAM
   FRA-OR&D-77-2

2. PB 271-393
   MEASUREMENT PLAN FOR THE CHARACTERIZATION OF THE LOAD ENVIRONMENT FOR CROSS TIES AND FASTENERS
   FRA-OR&D-77-3

3. PB 265-724
POTENTIAL MEANS OF COST REDUCTION IN GRADE CROSSING AUTOMATIC GATE SYSTEMS VOLUME I, PB 265-725 VOLUME II
FRA-OR&D-77-6

4. PB 266-784
IMPROVEMENT OF THE EFFECTIVENESS OF MOTORIST WARNINGS AT RAILROAD - HIGHWAY GRADE CROSSING
FRA-OR&D-77-7

5. PB 265-355
TRAIN GENERATED CONTAMINANTS IN THE TRAIN CREWS WORKING ENVIRONMENT
FRA-OR&D-77-8

6. *
FLAW DETECTION IN RAILS
FRA-OR&D-77-10

7. PB 271-216
STRESS MEASUREMENTS IN RAILROAD WHEELS VIA THE BARKHAUSEN EFFECT
FRA-OR&D-77-11

8. *
A SUMMARY OF PSYCHOLOGICAL RESEARCH ON VIGILANCE AND AN INVESTIGATION OF THE FACTORS AFFECTING VIGILANCE OF RAILWAY CREWS
FRA-OR&D-77-12

9. PB 272-062
FATIGUE CRACK PROPAGATION IN RAIL STEELS
FRA-OR&D-77-14

10. PB 275-046/AS
A BIBLIOGRAPHY ON RAIL TECHNOLOGY
FRA-OR&D-77-15

11. PB 272-066
METHODS FOR JOINING OF RAILS: SURVEY REPORT
FRA-OR&D-77-16

12. PB 265-751
THE CAUSE OF THERMAL FATIGUE CRACKING IN METROLINER WHEELS
FRA-OR&D-77-17

13. PB 271-244
WAYSIDE DERAILMENT INSPECTION REQUIREMENTS STUDY FOR RAILROAD VEHICLE EQUIPMENT
FRA-OR&D-77-18

14. PB 266-368
REPORT ON THE US-USSR TRACK METALLURGY INFORMATION EXCHANGE
FRA-OR&D-77-19

15. *
DEVELOPMENT OF PERFORMANCE SPECIFICATIONS FOR LPG TANK CARS
FRA-OR&D-77-20

16. *
RAILROAD TANK CAR SAFETY VALVE TEST PROGRAM
FRA-OR&D-77-21

17. PB 266-273
MAINTAINING ALERTNESS IN RAILROAD LOCOMOTIVE CREWS
FRA-OR&D-77-22

18. *
EIGHTH PROGRESS REPORT
FRA-OR&D-77-25

19. *
A MATHEMATICAL COMPUTER SIMULATION OF THE DYNAMICS OF A FREIGHT ELEMENT IN A RAILROAD FREIGHT CAR
FRA-OR&D-77-28

20. PB 275-177
FAST TRACK STRUCTURES PERFORMANCE
FRA-OR&D-77-29

21. PB 272-721
HANDBOOK FOR RAILROAD TRACK STABILIZATION USING LIME SLURRY PRESSURE INJECTION
FRA-OR&D-77-30

22. PB 271-412
ANALYSIS OF KANSAS TEST TRACK BEAM RESPONSE
FRA-OR&D-77-31

23. *
FACILITY FOR ACCELERATED SERVICE TESTING: BALLAST & SUBGRADE MATERIAL EVALUATION
FRA-OR&D-77-32

24. *
NONDESTRUCTIVE MEASUREMENT OF LONGITUDINAL RAIL STRESSES: PART I - APPLICATION OF THE ACOUSTOELASTIC EFFECT TO RAIL STRESS MEASUREMENT, PART II -ULTRASONIC PULSE PROPAGATION IN THE COLD WORKED LAYER OF RAILROAD RAIL
FRA-OR&D-77-34

25. PB 272-612
US-USSR RAIL INSPECTION INFORMATION EXCHANGE
FRA-OR&D-77-35

26. PB 273-354
INNOVATIVE CONCEPTS & TECHNOLOGY FOR RAILROAD—HIGHWAY GRADE CROSSING MOTORIST WARNING SYSTEMS, VOLUME I, VOLUME II
FRA-OR&D-77-37

27. PB 272-931/AS
RAIL INSPECTION SYSTEM ANALYSIS & TECHNOLOGY SURVEY
FRA-OR&D-77-39

28. PB 275-166/AS
LATERAL RESISTANCE OF RAILROAD TRACK
FRA-OR&D-77-41

29. *
LOCOMOTIVE & TRAIN HANDLING EVALUATOR DEFINITION: CONCEPT II, INTERIM REPORT
FRA-OR&D-77-55

30. *
LOCOMOTIVE & TRAIN HANDLING EVALUATOR DEFINITION: CONCEPT II, FINAL REPORT
FRA-OR&D-77-56

31. *
LOCOMOTIVE AND TRAIN HANDLING EVALUATOR DEFINITION: CONCEPT III, INTERIM REPORT
FRA-OR&D-77-57

32. *
STRESS ANALYSIS TECHNOLOGY FOR THE RAILROAD INDUSTRY
FRA-OR&D-77-59

33. *
THEORETICAL MANUAL AND USER"S GUIDE FOR COMENT-X
FRA-OR&D-77-60

34. *
PB 275-035/AS
LATERAL STABILITY OF BALLAST: BALLAST AND FOUNDATION MATERIALS RESEARCH PROGRAM
FRA-OR&D-77-61

35. PB 275-102/AS
A STUDY OF RAILROAD BALLAST ECONOMICS
FRA-OR&D-77-61

36. *
REPORT ON THE 5TH INTERNATIONAL WHEELSET CONGRESS, TOKYO, JAPAN
FRA-OR&D-77-65

37. *
RESEARCH LOCOMOTIVE AND TRAIN HANDLING EVALUATOR: SOFTWARE & INPUT OUTPUT REQUIREMENTS AND PERFORMANCE MEASURES
FRA-OR&D-77-70

38. *
AN ANALYTICAL AND EXPERIMENTAL EVALUATION OF CONCRETE CROSS TIE AND FASTENER LOADS
FRA-OR&D-77-71

39. *
THE APPLICATION OF QUASI - LINEARIZATION TECHNIQUES TO RAIL VEHICLE DYNAMIC ANALYSIS
FRA-OR&D-77-72

40. *
RAILWAY SAFETY ENVIRONMENT, VOLUME I - IV
FRA-OR&D-77-73

41. *
PARAMETRIC STUDY OF TRACK RESPONSE
FRA-OR&D-77-75

42. *
REFURBISHMENT OF RAILROAD CROSS TIES
FRA-OR&D-77-76

43. SUMMARY STATISTICS OF THE NATIONAL RAILROAD - HIGHWAY CROSSING INVENTORY FOR PUBLIC AT-GRADE CROSSINGS
FRA-OPPD-77-8 PB 271 - 334

* NTIS ACCESSIONING IN PROGRESS

A-9

CERTIFICATION BY STATE AGENCIES UNDER SECTION 206(a), STATE PARTICIPATION IN THE FEDERAL RAILROAD SAFETY PROGRAM

-REFERENCE-

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

A-9 CERTIFICATION BY STATE AGENCIES UNDER SECTION 206(a), STATE PARTICIPATION IN THE FEDERAL RAILROAD SAFETY PROGRAM

(a) At the end of calendar year 1977 a total of 10 states were certified to participate in the Federal Railroad Safety Program. They are as follows:

Alabama	Minnesota
Arizona	Oregon
Iowa	Pennsylvania
Maryland	Washington
Michigan	West Virginia

Alabama, Arizona, Oregon, Pennsylvania and Washington participate in both track and freight car inspection and enforcement. The States of Iowa and Minnesota participate only in the track program, while Maryland and West Virginia are participating in the freight car surveillance program only.

None of the states that applied under the regulations were denied certification or recertification during calendar year 1977.

The States of Indiana, Missouri and Nebraska, which had been certified for track in 1976, did not attain the prescribed level of manpower effort in the time period specified by 49 CFR Par 212.23(b) and are now participating by agreement.

The following states are in the process of recruiting qualified personnel and anticipate applying for certification or agreement in 1978:

Arkansas	Maine	Rhode Island
Florida	Massachusetts	South Carolina
Kansas	New Jersey	Utah
Louisiana	North Carolina	Virginia
		Wisconsin

During calendar year 1977, the FRA provided training classes at the Transportation Safety Institute for 184 state employees representing 28 states which include nine states contemplating participation in the safety law enforcement program.

A-10

AGREEMENTS ENTERED INTO WITH STATE AGENCIES UNDER SECTION 206(c) OF THE ACT

-REFERENCE-

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

A-10 AGREEMENTS ENTERED INTO WITH STATE AGENCIES UNDER SECTION 206(c) OF THE ACT

Agreements authorizing investigative work by the following states were in effect during calendar year 1977:

Connecticut	Missouri
Illinois	Nebraska
Indiana	New Hampshire
*Maryland	New York
Minnesota	Ohio
	Vermont

*Under agreement for track program only. Currently certified for freight car inspection program.

During 1977 the Secretary did not terminate any agreements that were in effect with state agencies.

B

RECOMMENDATIONS FOR ADDITIONAL LEGISLATION TO STRENGTHEN THE NATIONAL RAILROAD SAFETY PROGRAM

-REFERENCE-

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

B RECOMMENDATIONS FOR ADDITIONAL LEGISLATION TO STRENGTHEN THE NATIONAL RAILROAD SAFETY PROGRAM

The Federal Railroad Administration has proposed legislation that would amend the Federal Railroad Safety Act of 1970 in the following respects:

1. The Secretary would be provided with a longer time period (90 days after receipt of a notice of a violation) within which to assess a civil penalty before a participating state could seek injunctive relief for such violation. The Act currently provides the Secretary with an insufficient period of time (90 days after a violation occurs) to assess a penalty.

2. A clarification would be inserted to show that enactment of the Independent Safety Board Act of 1974 (49 U.S.C. 1901 et seq.), which established the National Transportation Safety Board as an independent agency, did not remove the Department's authority to investigate railroad accidents.

3. Private agents of the Department, who assist in inspecting and examining rail facilities and equipment, would, during the course of such inspections, be considered employees of the government for purposes of the Federal Tort Claims Act. This amendment would eliminate the need to acquire expensive liability insurance to protect the Department from claims arising from the conduct of its safety activities when private agents are used.

4. Authorization language would be inserted to allow appropriations for fiscal years 1979 and 1980 for the Department's rail safety program. The bill would permanently authorize funds appropriated for research and development, automated track inspection and the state safety grant program to remain available until expended. The separate authorizations and limitations for the Office of Safety are eliminated as unnecessary, as they would be included in the basic authorizations.

5. The proposed legislation also would amend the Hours of Service Act to extend the hours of service limitations of this Act to common carriers engaged in interstate or foreign commerce by railroad. The Act presently does not cover hours of service of employees during intrastate movements, even though the carrier is otherwise engaged in interstate and foreign transportation. Excessive time on duty of employees during purely intrastate movements directly affects safety in interstate and foreign transportation. The amendment will make the Act apply to common carriers engaged in interstate or foreign commerce by railroad irrespective of whether an employee's period of service in question was actually involved in interstate or foreign commerce.

6. Finally, the penalty provisions of several related rail safety Acts would be amended to allow FRA to assess penalties for violations within the penalty range established by law. Presently these Acts provide that after FRA determines that a violation has occurred, and a settlement is not reached, a suit must be brought in a Federal district court for recovery of a penalty within the penalty range ($250 - $2,500). This present procedure creates an incentive for carriers to refuse administrative settlements at amounts higher than $250.