U.S. Department
of Transportation

**Federal Railroad
Administration**

# The President's 1984 Annual Report to the Congress on the Administration of the Federal Railroad Safety Act of 1970

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

## Office of Safety

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# MANDATE

The relevant portions of Section 211 of the Federal Railroad Safety Act of 1970 (Public Law 91-458, October 16, 1970, 45 U.S.C. 440), require the following:

SEC. 211. ANNUAL REPORT.

(a) The Secretary shall prepare and submit to the President for transmittal to Congress on or before July 1 of each year a comprehensive report on the administration of this title for the preceding calendar year. Such report shall include, but not be restricted to:

(1) a thorough statistical compilation of the accidents and casualties by cause occurring in such year;

(2) a list of Federal railroad safety rules, regulations, orders, and standards issued under this title in effect or established in such year;

(3) a summary of the reasons for each waiver granted under section 202(c) of this title during such year;

(4) an evaluation of the degree of observance of applicable railroad safety rules, regulations, orders, and standards issued under this title;

(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;

(6) an analysis and evaluation of research and related activities completed (including the policy implications thereof) and technological progress achieved during such year;

(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;

(8) the extent to which technical information was disseminated to the scientific community and consumer-oriented information was made available to the public;

(9) a compilation of-

(A) certifications filed by State agencies under section 206(a) of this title which were in effect during the preceding calendar year, and

(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; and

(10) a compilation of-

(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.

(b) The report required by subsection (a) of this section shall contain such recommendations for additional legislation as the Secretary deems necessary to strengthen the national railroad safety program.

# INTRODUCTION

The President's 1984 Annual Report describes the efforts of the Department of Transportation and the Federal Railroad Administration to improve railroad safety through the administration of the Federal Railroad Safety Act of 1970 (45 U.S.C. 421, 431 et seq.) during calendar year 1984.

SECTION I

# ACCIDENT TRENDS

## Accident Statistics

Train accidents decreased by 0.2 percent in 1984 compared to 1983. Normalized by train-miles, the decrease was 6 percent. A summary of accident/incident statistics is found in Appendix A.

Total railroad-related injuries increased 10.8 percent in 1984 compared to 1983. The railroads must report all employee injuries to FRA under OSHA reporting requirements and over 85 percent of the total number of injuries involved railroad employees. Figures for 1984 show that most of the increase in the injuries in 1984 was comprised of a 10.3 percent increase in the total number of employee injuries (from 29,761 in 1983 to 32,812 in 1984). This total injury figure is, however, misleading. The OSHA reporting requirements are very broad. Therefore, FRA injury statistics include not only injuries sustained in train accident and occupational injuries related to railroad operations, but a large number of workplace injuries as well. The majority of these workplace injuries are minor in nature and some are not even related to train movements. In 62 percent of the reportable injury cases the employee was able to report for his next tour of duty. Such things as sprained ankles sustained by employees on railroad property during a lunch time basketball game are reportable under OSHA requirements. Although the reportable injury statistics present a somewhat distorted view of the railroad safety picture, if FRA rules did not parallel the OSHA reporting requirements, the railroads would have to report to OSHA as well as FRA, creating a unnecessary burden and expense.

Of the total number of fatalities reported last year, 92 percent occurred at a rail-highway crossing or involved a trespasser. Total railroad-related fatalities increased 16.2 percent in 1984 compared to 1983. The number of on-duty employee fatalities in 1984 was 59 compared to 61 in 1983. (A summary of fatalities for 1983 and 1984 is contained below in Table 1.)

FATALITIES
Table 1

| Category | 1983 | 1984 |
|---|---|---|
| Grade Crossings | 575 | 649 |
| Trespassers | 400 | 499 |
| Employees on Duty | 61 | 59 |
| Passengers | 4 | 12 |
| Other (Contractor personnel, employees not on duty etc.) | 33 | 28 |
| Total Number of Fatalities | 1,073 | 1,247 |

## SECTION II

## RULES AND REGULATIONS

A list of the Federal regulations issued under the provisions of the Federal Railroad Safety Act of 1970 and in effect during 1984 is contained in Appendix B.

The following final rules were issued by the Federal Railroad Administration (FRA) during 1984:

- Signal and Train Control. A final rule was published on January 26, 1984, based on a cooperative agreement between labor and management. The revisions reduce the reporting requirements, streamline requests for modifications, and provide economic benefits.

- Hump Yards. A final rule on hump yards was published on February 22, 1984. This regulation protects trainmen coupling airhoses in hump yards.

- Adjustment of Monetary Threshold. A final rule was issued on December 16, 1984, to increase the monetary threshold from $4,500 to $4,900 for reporting railroad accidents/incidents.

- On November 7, 1984, FRA issued guidelines containing performance criteria for the flammability and smoke emission characteristics of materials to be used in the construction of new or rebuilt rail passenger cars.

## SECTION III

## WAIVER PETITIONS

During 1984, the Federal Railroad Administration (FRA) received 290 petitions to waive specific requirements of FRA safety regulations issued under Section 202(c) of the Federal Railroad Safety Act of 1970 or other provisions of the railroad safety laws[1/]. Table 2 lists each category, gives its corresponding citation in the regulations, and notes the approvals granted.

The FRA Office of Safety reviews and rules on all petitions for permanent or temporary waivers and exemptions from railroad safety rules.

Table 2 Waiver Petitions

| Category | Petitions Received, 1984 | Petitions Approved, 1984 |
|---|---|---|
| Signal Systems (49 CFR 235 and 236) | 165 | 154 |
| Track Safety Standards (49 CFR 213) | 10 | 11[2/] |
| Railroad Operating Rules (49 CFR 217, 218, 220 and 228) | 24 | 28[2/] |
| Motive Power and Equipment Rules (49 CFR 215, 221, 223, 229, 230, 231 and 232) | 91 | 56 |
| | 290 | 249 |

Source: FRA, Office of Safety.

Public Hearings

BS-AP-No. 1954: On January 27, 1982, the Burlington Northern Railroad Company submitted an application to discontinue the automatic block signal system between Sapulpa, OK, milepost 437.3, Oklahoma City, OK, milepost 538.5 on January 27, 1982. The traffic consisted of an average of 3.87 trains per day. The signal equipment was obsolete, and repair parts were not available. The application was denied on July 30, 1982.

1/ For statistical purposes FRA has included some waiver requests that involve regulations issued under other statutory provisions. For example, FRA has included the Locomotive and Safety Appliance Standards.

2/ The number of petitions acted upon exceeded the number of petitions received in 1984, since there was a carryover from 1983.

The Burlington Northern Railroad Company requested reconsideration of the application on June 6, 1983. Another field investigation was conducted, and because of considerable public interest in the application, a public hearing was held on February 16, 1984, in Oklahoma City. After careful consideration of the information obtained from FRA's field investigation and information presented at the public hearing, the FRA granted conditional approval of the application on April 20, 1984.

BS-AP-No. 2228: Consolidated Rail Corporation submitted an application to discontinue (i) the traffic control system between "CP Union City," milepost 103.8, and "CP Anoko" milepost 192.6; (ii) the automatic block signal system between "CP Anoka" and "Race," milepost 196.0; (iii) the traffic control system between "Race" and "CP Kenneth," milepost 203.0, on the Columbus, Ohio to Chicago, Illinois main line; and (iv) the traffic control system between "Van," milepost 71.4, and "Clymers," milepost 66.2, on the Frankfort Secondary track. A field investigation was conducted and because of considerable public interest in the application, a public hearing was held on April 5, 1984, in Indianapolis. After reviewing the information obtained from FRA's field investigation and information presented at the public hearing, the FRA approved the application with conditions, on August 15, 1984.

BS-AP-No. 2294: The Illinois Central Gulf Railroad Company and the Missouri Pacific Railroad Company submitted a joint application to discontinue the manually controlled mechanical interlocking and install an electrically locked gate, in lieu thereof, normally lined against the Illinois Central Gulf Railroad Company where one track of the Illinois Central Gulf Railroad crosses at grade one track of the Missouri Pacific Railroad at East Monroe, LA. The interlocking was installed to protect a heavy volume of passenger and freight traffic at high speeds. Today there are no passenger trains on either railroad, and the maximum authorized speed on the Illinois Central Gulf Railroad is 10 mph and 20 mph on the Missouri Pacific Railroad. Because of the public interest in the application, a public hearing was held on October 16, 1984, in Monroe, LA. After reviewing the information obtained from FRA's field investigation and information presented at the public hearing, the FRA approved the application on December 6, 1984.

BS-AP-No. 2174, BS-AP-No. 2178, and BS-AP-No. 2179: The Chicago and North Western Transportation Company submitted on May 26, 1983, three applications to discontinue manually controlled interlocking protecting movements over drawbridges and to install "STOP" signs, in lieu thereof, as follows:

| Application No. | Name | Location |
|---|---|---|
| BS-AP-No. 2174 | Kinnickinnic River | Chase, WI |
| BS-AP-No. 2178 | Milwaukee River | Milwaukee, WI |
| BS-AP-No. 2179 | Kinnickinnic River | St. Francis, WI |

A field investigation was conducted for each application, and because of public interest in the applications, a public hearing was held for all three applications on February 14, 1984, in Milwaukee. After careful consideration of the information obtained from FRA's field investigation and information presented at the public hearing, the FRA approved applications BS-AP-No. 2174 and BS-AP-No. 2178 and denied application BS-AP-No. 2179 on April 20, 1984.

## SECTION IV

## EVALUATION OF COMPLIANCE

In recent years, the Federal Railroad Administration (FRA) has used safety assessments as an important compliance tool. In 1984, FRA completed five system assessments: the Delaware and Hudson; New York City Subway; Amtrak's Northeast Corridor; Amtrak track nationwide; and the Burlington Northern. These types of assessments offer distinct advantages over individual compliance inspections situations when an overall view of a railroad's safety program is required, and it is essential to address systemic problems through contact with high-level railroad officials.

In 1984, 325 FRA safety inspectors were employed--the first time that FRA achieved its goal of filling inspector positions to the authorized ceiling. The practical benefits of this successful hiring program are shown in the number of safety inspections performed by FRA in 1984. A total of 64,201 inspections were performed, an increase of 6 percent over 1983. The 1984 total included 17,387 track inspections; 4,417 signal inspections; 21,571 equipment and locomotive inspections; 12,571 operating practices inspections; and 8,255 hazardous materials inspections. These routine inspections focused on compliance at particular locations.

## SECTION V

## SUMMARY OF OUTSTANDING PROBLEMS

The Federal Railroad Administration (FRA) has targeted several safety issues for special emphasis:

- Control of alcohol and drug use in railroad operations
- Rail-highway crossing safety
- The use of alternative techniques for making intermediate terminal air brake tests
- Blue signal protection for noncrew members
- Rear-end marking device inspection by noncrew members at crew change points
- Placement of hazardous materials cars in trains without a caboose
- Communications, including radio standards, procedures, system design, and performance
- Railroad locomotive safety
- Overheated wheels
- Use of TOFC/COFC equipment for hazardous materials transportation

Alcohol and Drugs. From January 1975 through December 1984, alcohol and drugs have been involved in 48 accidents/incidents resulting in 37 fatalities, 80 injuries, and about $20.4 million in railroad property damage. (These figures understate the extent of the problem.) On June 12, 1984, FRA issued a Notice of Proposed Rulemaking covering prohibition, testing for cause, post-accident testing, pre-employment drug screens, improved reporting, and identification/rehabilitation of troubled employees. Hearings were held in Denver, Chicago, New Orleans, and Washington, D.C. A final rule is expected in mid-1985.

Rail-Highway Crossing Safety. Rail-highway grade crossing accidents account for over one-half of the fatalities attributable to railroad operations. Annually, approximately 7,000 accidents continue to produce about 600 deaths and 2,500 injuries. Public hearings were held in St. Paul and Washington, D.C.

Power Brake Rule. The railroads propose to install a telemetry device at the rear of a train to replace the existing method of testing the air brake system before departure. This provides an advantage over the existing method of using a gauge at the rear of the train by providing a continuous reading indicating brake pipe pressure in the locomotive cab. (FRA) has undertaken a comprehensive test program to insure that this new brake test system performs appropriately in the railroad environment. Test data are presently being analyzed. A public hearing concerning the proposed rule change will be scheduled for 1985.

Blue Signal Protection. The existing regulations should be changed to reflect changes being made to the Rear-End Marking Device rules. The changes will assure that nontrain crew members, performing the tasks of installing, removing or servicing rear-end marking devices, receive adequate protection where their personal safety warrants blue signal protection. A Notice of Proposed Rulemaking is scheduled for October 1985.

Rear-End Marking Devices. The existing Federal regulation requires that inspection of rear-end markers be performed only by crew members of the outbound train. When cabooses are not used, the railroads contend that it is cumbersome and costly for these crew members to continue to make these observations, and railroads want to be able to use other employees. They argue that limiting the observations to on-coming crews is not related to safety. (FRA) will issue a Notice of Proposed Rulemaking on this issue in 1985.

Placement of Hazardous Materials Cars. The rail industry has begun eliminating cabooses from trains. Current Federal regulations do not prohibit placement of hazardous materials cars at the rear of a train when there is no caboose. However, this practice may increase the potential for a catastrophic release of hazardous materials when other car types are not at the end of the train to buffer the impact between the hazardous materials and oncoming locomotives. A survey of railroad practices concerning the placement of hazardous materials cars in cabooseless trains will be conducted in 1985.

Radio Standards and Procedures. Radio communications has become a vital element in the safe and efficient control of train movements and is now universally used. While many railroads still have extensive signals with traffic control capability, the use of radio has evolved from a backup or a supplement to standard railway signal system to a system of equal importance in non-signaled territory. Railroad radio communication, however, is not problem free, nor has its maximum potential for improving safety been fully achieved. Mandatory use, proper equipment and system design, as well as maintenance adequacy, continue to be issues for discussion. Through proper use of the radio, accidents can be avoided and the safety of railroad operations enhanced.

Satellite technology will soon be commercially available to the railroad industry. It envisions a capability to transmit and receive digital messages, as well as to accurately and reliably determine train speed and location. Satellite service is likely to become an integral part of new train control systems in areas where risk of accident in rail transport can be reduced by improved communications and information. Because of all these developments, (FRA) will assess and seek public comment on the adequacy of current radio practices, the effectiveness of current rules, and the need to modernize the communication networks consistent with new technology.

Locomotive Safety. Focusing the efforts of labor, management, suppliers and the Federal Government on specific locomotive safety problems is an appropriate FRA initiative. Although there are specific safety rules dealing with locomotive cab design, a wide mix of relevant problems remain to be resolved either through research, industry practice, or Federal regulation. The railroad industry is examining solutions that may negate the need for Federal regulatory action. However, the most critical needs must be defined, and priorities must be set.

Overheated Wheels. The FRA defective wheel rule addressing discoloration criteria for overheated freight car wheels has met with mixed interpretation since the 1980 rule change was adopted. On April 4, 1985, FRA amended the 1980 rule to eliminate confusion about the location of the discoloration on the wheel. FRA has held public hearings to gain additional information concerning the application of the rule to specific wheel designs, namely curved plate wheels, and to evaluate the need for a test program through a temporary waiver of the rule.

Use of TOFC/COFC Equipment for Hazardous Materials Transportation. FRA is exploring issues created by the increasing number of petitions seeking authority to use over-the-road highway trailers and intermodal tank cars in TOFC/COFC service for transportation hazardous materials. An Advanced Notice of Proposed Rulemaking hearing has been held.

## SECTION VI

## RESEARCH AND TECHNICAL ADVANCES

In 1984, the Federal Railroad Administration's (FRA) research and development program continued to emphasize safety research in three major areas: (1) equipment, (2) track, and (3) track-train interaction. These programs are conducted with the cooperation of the railroad industry, as well as some cost-sharing.

(1) The Equipment, Operations, and Hazardous Materials Program focuses on the safe performance of critical equipment, components, operating practices, and hazardous materials transport. In general, FRA research involves rail vehicles, their operation, and the movement of hazardous materials in rail operations.

(2) The Track Safety Program is concerned with improving the safety of the track structure, including all its critical components and elements of the right-of-way.

(3) Unlike the two preceding programs, the Track-Train Safety Testing Program examines rail system operations as a whole. While the equipment and track programs concentrate on research to control accidents resulting from deficiencies in rail vehicle design and operation, or in mechanical failure of the track structure, there remains the accident resulting from the interactive response between the vehicle and the track under certain operating conditions or speeds.

### Completed Research

#### Equipment

- End-of-Train Markers. A study was completed to determine if reflective (passive) markers are effective end-of-train markers. Full-scale field testing was performed, and the results of the tests were compiled, analyzed, and presented for further technical review.

- Boxcar Safety Testing. A study was made and a report published on the safety limits of 70-ton boxcars with shifting plywood lading.

- Locomotive Track Hazard Detector. Testing was completed and an operations manual prepared for a device that can be mounted on a locomotive to detect potentially dangerous track irregularities.

- 100-Ton Covered Hopper Car Test. FRA has completed tests to determine the dynamic characteristics of covered hopper cars that contribute to their derailment tendencies.

Hazardous Materials

- Handling Guide. Recommendations have been completed for the development of a hazardous materials handling guide designed to assist shippers, railroad personnel, and safety inspectors.

- Risk Assessment--Rail Transport. A methodology was developed for estimating the risk of transporting a specific dangerous commodity over a specific railroad route.

Track

- Concrete Ties. A study of safety inspection criteria for concrete ties and fasteners was completed, and a draft report was written. An assessment of the technical results of the tests and further analyses developed criteria that can be used by railroad and Federal safety inspectors to assess the safety of concrete tie installations.

- High-Alloy Rail. A study initiated as part of the investigation into the cause of the Amtrak derailment near Marshall, TX, in November 1983, was completed. The Task Force evaluating the technical aspects of the rail failure published its report acknowledging that the alloy rail involved in the accident had lower fracture toughness than standard rail and that residual stresses in the rail were present and contributed to the rail failure. Recommendations for additional research were included.

Track-Train Interaction

- Prototype Car Evaluation. Reports were prepared on the test results of a prototype high-performance covered hopper car developed by the industry under the auspices of the Track Train Dynamics Program. The new car was designed to overcome the adverse vehicle dynamic response experienced by earlier covered hopper designs. The new car design was an improvement over the earlier designs in all critical dynamic response performance areas.

- Simuloader. The Union Tank Car Company donated its Simuloader Facility to the Department of Transportation for use at the Transportation Test Center. This facility permits the testing of freight car bodies for fatigue life and damage studies at significantly lower energy costs than existing testing systems. The facility was dismantled and shipped to the Test Center, where it will be reassembled for use by FRA and the industry.

## Ongoing Research

### Equipment

- Hollow Axle-Bearing Failures. The FRA continued to monitor commuter cars equipped with hollow axles for evidence of potential axle-bearing failures. A test was successfully completed to determine length of time before a failure of a known defective bearing installation. The test also supplied needed information to confirm the failure mechanism and to establish inspection frequency requirements in order to detect dangerous bearings before failures are likely to occur.

- Wheel Safety. The 3-year, Government-industry program to improve wheel safety performance through technically sound wheel-removal criteria and to establish guidelines for safe design and operation has been ongoing since 1983.

- New Trucks and Lightweight Freight Cars. New freight car truck designs continue to be evaluated in the field and in the laboratory. Additional efforts have been initiated to examine the safety limits and characteristics of new lightweight freight cars before they are exposed to widespread service.

- Dragging Brake Detection Device Testing. In 1984, a project was initiated to test a device that may be capable of detecting freight cars with stuck brakes as they exit a yard. Such a device will prevent unnecessary damage to wheels and track, conditions known to cause accidents.

### Operating Practices

- Locomotive Engineer Data Base. In 1984, a project was initiated to design a comprehensive data storage and retrieval system to capture, for future use, all relevant information from the Research and Locomotive Evaluator Simulator (RALES). These data will be available for a variety of research activities, including train handling and locomotive engineer performance.

- Locomotive Engineer Training and Evaluation. The FRA and the Illinois Central Gulf Railroad began a jointly funded project in 1984 to develop and test a retraining program for locomotive engineers and to develop performance criteria and testing measurements for locomotive engineers. Utilizing the RALES facility, this program is expected to lead to safer train-handling practices.

Hazardous Materials

- Emergency Response Guidelines for Railroad Accidents. Work is nearing completion on a guideline manual designed to assist railroads in the development or improvement of plans to respond to emergency situations involving hazardous materials.

- Evaluation of Hazardous Material Protective Clothing and Personal Equipment. Efforts have continued to determine the usefulness and limitations of available protective clothing and personal equipment in accidents involving hazardous materials. Early findings have led to a shift in emphasis to provide more rapid access to large quantities of information for accident site management.

- Tank Cars. Research continues in the evaluation of thermal protection and puncture resistant systems for tank cars carrying chlorine and for aluminum tank cars carrying a variety of dangerous commodities. The dynamic characteristics of jumbo tank cars, as they may affect derailments, are being studied. Safe methods and criteria for determining the remaining structural integrity of the tank cars following an accident are also being examined.

- Product-Release Detection. In 1984, work began on a remote sensing device capable of identifying a variety of hazardous materials. The device would be used by emergency response teams to identify the commodity involved and the severity of the emergency following an accident involving hazardous materials.

- Intermodal. In 1984, FRA initiated a study on the safety implications of transporting hazardous materials in highway tank trailers and containers on railroad flatcars.

- Classification. A project to develop hazard profiles for a variety of dangerous materials shipped by rail was started in 1984. It emphasizes the multiple hazard potential of these commodities when they become mixed after an accident.

- Spent Nuclear Fuel Casks. Analyses and tests of the containers used to transport nuclear materials by rail will determine whether the containers remain safe after an accident.

Track

- High-Alloy Rail. Joint Government-industry research was initiated to determine the fracture toughness characteristics of alloy rail and the role of roller-straightening in the buildup of residual stresses on the rail. The research is expected to define any special handling and/or installation requirements for alloy rail as compared to standard rail.

- Rail Defect Detection. The recently developed rail defect detection device that uses electromagnetic acoustic transducer (EMAT) technology will be tested, using a field quality test unit on the Facility for Accelerated Service Testing (FAST). This device may offer significant improvements in detecting rail defects under rail conditions such as shelling, lubrication, and rust (which inhibit existing devices).

- Track Buckling. Field testing continues at a revenue service site of a cooperating railroad and at the FAST to define the effects of traffic volume and train action on stress-free rail conditions. This information is necessary to define the desired initial rail-laying temperature and the requirements for inspection to prevent buildup of undesirable internal rail stresses known to lead to track buckling.

- Performance Standards. Work continued on developing new performance standards as alternatives to the existing design standards. Performance standards specify how the track should perform to achieve safe operations. These standards will provide railroads with greater flexibility in meeting safety requirements.

  Demonstrations of a track cross-level index standard continued on the track of a cooperating railroad. In this demonstration, the track had an index value slightly in excess of the proposed limit, and two of five test cars exhibited wheel lift, thereby confirming the limiting condition and the testing approach. The proposed cross-level standard was accepted by the industry committee working on the performance standards program, and several railroads have decided to use the proposed standard on a voluntary basis.

At the Transportation Test Center in Pueblo, CO, testing continued on higher speed vehicle-track interaction, track buckling, and rail integrity standards. The vehicle-track interaction test was completed for the medium-speed range. Perturbations were installed in a track to help define limiting track geometry conditions and track strength requirements. A test was completed on dynamic track buckling to demonstrate the effects of track uplift on buckling probability caused by vehicle motion over the track. Also, a test was completed on detail fracture growth rates to determine the effectiveness of temporary remedial actions.

A trial application of the "clustering" effect on rail flaw inspections is continuing with a cooperating railroad. Other railroads will be solicited in 1985 for the field application work. Further tests of a rail flaw inspection requirement will continue with tests to evaluate bolt-hole crack growth under heavy train traffic.

Track-Train Interaction

- Track-Train Dynamics Program. The Track-Train Dynamics Program is jointly sponsored by the FRA, the Association of American Railroads, the Railway Progress Institute, and the Canadian Government. Test and analysis methods to measure track strength are continuing. Under this program, a vehicle to measure track strength and evaluate derailment processes will be designed by the industry. A second prototype high-performance covered hopper car developed by the industry will undergo testing in 1985 to determine its safety characteristics.

- Facility for Accelerated Service Testing (FAST). The FRA and the railroad industry cosponsor the operation of FAST, a 4.8-mile, closed-loop track at the Transportation Test Center. This facility is used to obtain life-cycle safety performance data for vehicle and track components through the operation of a freight train over the loop. The FAST reduces the time required to obtain information under controlled conditions, as opposed to relatively uncontrollable revenue service testing. A FAST cut-off loop, opening in 1985, will reduce the cost of obtaining data on accelerated rail defects.

  A pilot test confirmed the validity of the method that will be used in 1985 for a major test of rail bolt-hole growth. The effects of lubrication on rail flaw initiation were evaluated.

A test was initiated to determine the effects of allowable tolerances of freight car trucks on the operational performance of the car. The effects of train traffic on the degradation rate of track geometry, particularly the cross-level index, are also being studied. This information will be used to develop inspection frequency requirements.

## SECTION VII

## JUDICIAL ACTIONS

The following briefly describes the judicial actions taken under the Federal Railroad Safety Act of 1970 and other safety statutes and include actions completed during 1984 or thereafter, as well as those currently pending.

Completed

United Transportation Union (UTU) v. Dole (N.D. Ill.): July 1983 suit by the UTU and one individual railroad employee seeking an FRA emergency order and injunctive relief, alleging that the Norfolk & Western's (N&W) sleeping quarters in its Calumet switching yard in Chicago do not comply with the "clean, safe, and sanitary" standard of the Hours of Service Act (45 U.S.C. § 62(a)(3)) and that the N&W violated the "new construction" prohibition of the Act (45 U.S.C. § 62(a)(4)) when it began housing employees from a particular seniority district at the facility in 1981. FRA investigated and found no violations. The court approved a settlement reached by the parties and dismissed the case without prejudice on June 1, 1984.

Brotherhood Railway Carmen v. Dole (S.D. Tex.): July 1983 suit by the Carmen, the UTU, and two individual railroad employees (similar in theory and demands to the case brought earlier by Carmen in the Southern District of California, see below) involving the Southern Pacific's alleged violations of the railroad safety laws at Glidden, TX. The court approved a settlement reached by the parties and dismissed the case without prejudice on February 26, 1985.

United Transportation Union v. Dole (W.D. Tex.): March 1984 suit by the UTU and one individual railroad employee seeking an FRA emergency order and injunctive relief, alleging that the Southern Pacific's sleeping quarters at its Hearne, TX, switching yard do not comply with the "clean, safe, and sanitary" standard of the Hours of Service Act (45 U.S.C. § 62(a)(3)). FRA had investigated similar complaints made by letter in the summer of 1983, and found the quarters in compliance. A subsequent investigation also found no violations. The court approved a settlement reached by the parties and dismissed the case without prejudice on November 16, 1984.

Pending

Railway Labor Executives Association (RLEA) v. Dole (D. Ore. and 9th Cir.): April 1983 suit by the RLEA and an individual railroad employee challenging FRA's alleged failure, on a national basis, to enforce the railroad safety laws and seeking an emergency order and other relief. The plaintiffs allege that FRA has a mandatory duty to cite all violations that come to its attention and that it lacks prosecutorial discretion. On November 3, 1983, the district court dismissed the case on the ground that the plaintiffs lacked standing. The RLEA appealed on December 7, 1983. On May 17, 1985, the Ninth Circuit affirmed the district court, ruling that the plaintiffs lacked standing to sue for an order directing FRA to assess civil penalties or otherwise enforce the railroad safety laws. The panel also held that FRA's exercise of its prosecutorial discretion is nonreviewable.

Brotherhood Railway Carmen v. Dole (S.D. Cal. and 9th Cir.): April 1983 suit by the Carmen and one individual railroad employee alleging rail employees are exposed to death or injury due to FRA's failure (i) to order the Atchison, Topeka & Santa Fe Railway (Santa Fe) to cease using unqualified trainmen (as opposed to carmen) to perform air brake inspections and tests, and (ii) to assess penalties for violations of various Federal railroad safety laws. The case arose from the furlough of carmen by the Santa Fe. The plaintiffs sought an emergency order and injunctive relief. Soon after the filing of the complaint, the Santa Fe intervened. An FRA investigation of an earlier Carmen complaint did not reveal any evidence that unqualified Santa Fe employees were performing air brake inspections at San Diego. It did, however, disclose other violations of the safety laws, for which FRA has filed civil penalty claims against the railroad. At a hearing on May 20, 1983, the court denied the plaintiffs' request for an FRA emergency order and a preliminary injunction. On February 23, 1984, the court granted FRA's dispositive motion, on the grounds that the plaintiffs lacked standing, and that even if they had standing, FRA was entitled to summary judgment on the merits. A notice of appeal to the Ninth Circuit was filed on March 15, 1984. Briefs were filed in July and August 1984. Oral argument was indefinitely postponed pending a decision by another Ninth Circuit panel in Railway Labor Executives' Association v. Dole (see above). FRA recently filed motion for summary affirmance based on the Ninth Circuit decision in that case.

Brotherhood Railway Carmen v. Dole (E.D. Wash.): July 1983 suit by the Carmen, the UTU, and two individual railroad employees (similar in theory and demands to the case brought earlier by the Carmen in the Southern District of California) involving alleged violations of the railroad safety laws by the Union Pacific and the Burlington Northern at Spokane. On August 26, 1983, the plaintiffs' requests for FRA emergency order and a preliminary injunction were denied. FRA's answer was filed on September 19, 1983.

Brotherhood Railway Carmen v. Dole (E.D. Ky.): July 1983 suit by the Carmen, the UTU, and one individual railroad employee (similar in theory and demands to the case brought earlier by the Carmen in the Southern District of California) involving alleged violations of the railroad safety laws by the Seaboard System in Hazard and Dent, KY. On May 24, 1985, the district court granted FRA's dispositive motion, dismissing the case on the grounds that (i) the plaintiffs were not entitled to an emergency order because they had not alleged facts sufficient to establish an imminent hazard and (ii) the plaintiffs lacked standing because the injury is speculative and cannot be fairly traced to lack of administrative action.

Brotherhood Railway Carmen v. Dole (S. D. Ohio): July 1983 suit by the Carmen, the UTU and two individual railroad employees (similar in theory and demands to the suit in the Southern District of California) involving alleged violations of the railroad safety laws by the Baltimore & Ohio at Zanesville, OH. FRA's motion for dismissal or summary judgment was filed on March 30, 1984; the plaintiffs' opposition, on May 9, 1984; and FRA's reply, on May 29, 1984. On June 12, 1985, FRA moved for leave to file as additional authority the recent decision in Railway Labor Executives' Asociation v. Dole. FRA intends to file a similar motion regarding the recent decision in Brotherhood Railway Carman v. Dole (E.D. Ky.).

Brotherhood Railway Carmen v. Dole (N.D. Ill.): June 1984 suit by the Carmen, the UTU, and two individual railroad employees (similar in theory and demands to the case brought earlier by the Carmen in the Southern District of California) involving alleged violations of the railroad safety laws by the Illinois Central Gulf Railroad at Bloomington, IL. FRA's motion for dismissal or summary judgment was filed on March 1, 1985; the plaintiffs' opposition, on April 19; and FRA's reply, on April 25. On May 30, 1985, FRA delivered a letter to the district court informing it of the recent decision in Railway Labor Executives' Associations v. Dole. FRA intends to deliver a similar letter to the judge regarding the recent decision in Brotherhood Carmen v. Dole (E.D. Ky.).

United Transportation Union v. Dole (D. Kans. and 10th Cir.): July 1983 suit by the UTU, the Brotherhood of Locomotive Engineers, and two individual railroad employees alleging (i) that the St. Louis Southwestern Railway Company's (SSW) proposed rehabilitation and reuse of its Kansas City Dormitory would constitute "construction" or "reconstruction" of employee sleeping quarters located within one-half mile of switching, in violation of the Hours of Service Act (45 U.S.C. § 62(a)(4)) and implementing regulations (49 C.F.R. § 228.101(c)), and (ii) that the quarters fail to conform to the "clean, safe, and sanitary" standard of the Act (45 U.S.C. § 62(a)(3)). The plaintiffs sought an emergency order and injunctive relief, arguing (i) that although the dormitory was originally used as sleeping quarters between 1967 and 1980 and was, therefore, exempted or "grandfathered," with other dormitories in existence when the location restrictions were passed in 1976, SSW's disuse of the dormitory for 3 years had extinguished the exemption, (ii) that rehabilitation costs will exceed the regulatory maximum for "grandfathered" facilities, and (iii) that the SSW's acquisition of the dormitory from another railroad in 1980 and use of it as sleeping quarters would be "construction" under the regulations by "acquisition and use of an existing building." The court granted partial summary judgment for FRA on June 1, 1984, rejecting the plaintiffs' "acquisition and use" theory. On July 19, 1984, SSW was granted leave to intervene. A trial was held on September 17 and 18, 1984. The court ruled in favor of FRA on all issues on October 23, 1984, and judgment for FRA was entered on November 23, 1984. The plaintiffs filed a notice of appeal to the Tenth Circuit on January 18, 1985. The plaintiffs allege that the district court erred in its findings of fact (to be specified in their brief) and in several of its conclusions of law, e.g., that the SSW's rehabilitation and reuse of the dormitory would not violate the Hours of Service Act. In February 1985, SSW filed a motion to dismiss or affirm on the grounds that the appeal was not in good faith. The plaintiffs filed an opposition to that motion in April 1985.

Southern Railway Company v. Riley (N.D. Ga.): October 1984 suit by the Southern Railway Company seeking to vacate the FRA Administrator's decision that Southern "knowingly" violated the Hazardous Materials Regulations. Narrowly interpreting Section 110(a) of the Hazardous Materials Transportation Act (49 U.S.C. § 1809(a)), Southern contends that FRA must prove either actual knowledge of the acts constituting a violation of the regulations or a reckless failure to use available means to discover that such acts had been committed. FRA insists that mere negligence, rather than willful negligence, is sufficient to establish a violation. FRA also asserts that under either standard of liability, there is substantial evidence in the record to support its finding that Southern "knowingly" violated the regulations. Cross motions for summary judgment were filed on April 15, 1985.

Brotherhood of Locomotive Engineers v. Dole (D. Nev.): November 1984 suit by the Brotherhood of Locomotive Engineers and one individual railroad employee alleging that the Southern Pacific Transportation Company's sleeping quarters at Carlin, NE, are located within one-half mile of the switching of hazardous materials, in violation of 45 U.S.C. § 62(a)(4), and that the quarters are excessively noisy and not clean, safe, and sanitary, in violation of 45 U.S.C. § 62(a)(3). Shortly after the commencement of the suit, the Southern Pacific intervened. Responding to the plaintiffs' motion for a preliminary injunction, FRA filed its opposition on December 18, 1984. FRA's investigation confirmed that some switching of hazardous materials had occurred within one-half mile of the quarters; the railroad responded by providing FRA with assurances that such switching would cease and would be effectively prohibited by the railroad. FRA's investigation also revealed that the quarters were clean, safe, and sanitary, with noise levels in compliance with FRA guidelines. A hearing on the plaintiffs' motion for a preliminary injunction was held on March 4, 1985. In April 1985, the plaintiffs sought permission unsuccessfully to file an affidavit alleging an incident in March of hazardous materials' switching within a half-mile of the quarters. FRA had investigated the incident in question and intends to cite the railroad for violating 45 U.S.C. § 62(a)(4). On May 7, 1985, relying on assertions by one of the plaintiffs' witnesses during the hearing that an incident of hazardous materials switching had occurred in February within the half-mile zone, the court entered a preliminary injunction against the Southern Pacific, prohibiting the railroad from switching hazardous materials within one-half mile of the sleeping quarters. Both FRA and the railroad intend to file a motion with the trial court to reconsider. FRA is also considering filing a dipositive motion.

## SECTION VIII

## INFORMATION DISSEMINATION

During 1984, the Federal Railroad Administration (FRA) published the:

Rail-Highway Crossing Accident/Incident and Inventory Bulletin No. 6, Calendar Year 1983

Accident/Incident Bulletin No. 152, Calendar Year 1983

Summary of Accidents Investigated by the Federal Railroad Administration, Calendary Year 1982

Railroad Employee Fatalities Investigated by the Federal Railroad Administration, 1982

Appendix C lists the technical reports on railroad safety research studies published by FRA during 1984.

## SECTION IX

## STATE PARTICIPATION PROGRAM

Under the State Participation Program, authorized by Section 206 of the Federal Railroad Safety Act of 1970, the Federal Railroad Administration (FRA) provides financial assistance to States participating in the enforcement of Federal rail safety requirements.

During 1984, the 32 States in the program employed 103 State inspectors. Fifty-nine State inspectors participated in the track discipline; 35, in motive power and equipment; 8, in operating practices; and 1, in signal and train control.

FRA continued to provide 100 percent of the funding for State inspector training at the Department of Transportation's Transportation Safety Institute (TSI) in Oklahoma City, OK. TSI offers State and Federal inspectors orientation, guidance, and training in a classroom atmosphere.

In 1984, three FRA Regional Rail Safety Conferences, with State inspector participation, were held to review rail safety standards and program activities.

Table 3 lists the States participating in the program at the end of 1984.

TABLE 3

STATE PARTICIPATION PROGRAM
(Calendar Year 1984)

State Safety Inspectors

| State | Track | Motive Power & Equipment | Operating Practices | Signal & Train Control |
|---|---|---|---|---|
| Alabama | 2 | 2 | | |
| Arizona | 1 | 1 | 1 | |
| California | 2 | 1 | | |
| Connecticut | 1 | | | |
| Florida | 3 | 2 | 1 | |
| Illinois | 3 | | | |
| Iowa | 3 | | | |
| Kansas | 1 | | | |
| Louisiana | 1 | | | |
| Maryland | 1 | 2 | 1 | |
| Michigan | 3 | | | |
| Minnesota | 2 | | | |
| Missouri | 3 | | | |
| Montana | 1 | | | |
| Nebraska | 1 | 1 | | |
| Nevada | 1 | | | |
| New Hampshire | 1 | | | |
| New Jersey | 1 | | | |
| New Mexico | | 1 | | |
| New York | 3 | 3 | | |
| North Carolina | 2 | 1 | | |
| Ohio | 3 | 4 | | |
| Oklahoma | 2 | | | |
| Oregon | 2 | 2 | | |
| Pennsylvania | 4 | 3 | 1 | |
| South Carolina | | 1 | | |
| Tennessee | 2 | 2 | 1 | |
| Texas | 3 | 3 | 2 | |
| Utah | 1 | 1 | | |
| Virginia | 2 | | | |
| Washington | 2 | 2 | 1 | 1 |
| West Virginia | 2 | 3 | | |
| Total | 59 | 35 | 8 | 1 |

*Trainee.

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Table A-1 Summary of Casualties by Type of Accident/Incident for 1983 and 1984

| Type Accident/Person | % Of Total 1983 | % Of Total 1984 | Total Cases 1983 | Total Cases 1984 | Killed 1983 | Killed 1984 | Injured 1983 | Injured 1984 | Illness 1983 | Illness 1984 |
|---|---|---|---|---|---|---|---|---|---|---|
| **TRAIN ACCIDENTS - RAIL EQUIPMENT ACCIDENT/INCIDENT CASUALTIES** | | | | | | | | | | |
| EMPLOYEE ON DUTY..... | .86 | .83 | 310 | 330 | 15 | 19 | 293 | 302 | 2 | 9 |
| EMPLOYEE NOT ON DUTY. | .00 | .01 | 1 | 2 | --- | --- | 1 | 2 | --- | --- |
| PASSENGER ON TRAIN... | .13 | .95 | 48 | 380 | 4 | 4 | 44 | 376 | --- | --- |
| NONTRESPASSER..... | .04 | .01 | 15 | 3 | --- | --- | 15 | 3 | --- | --- |
| TRESPASSER..... | --- | .03 | --- | 10 | --- | 4 | --- | 6 | --- | --- |
| CONTRACTOR EMPLOYEE.. | --- | .01 | --- | 2 | --- | --- | --- | 2 | --- | --- |
| TOTAL..... | 1.04 | 1.83 | 374 | 727 | 19 | 27 | 353 | 691 | 2 | 9 |
| **TRAIN INCIDENT CASUALTIES** | | | | | | | | | | |
| EMPLOYEE ON DUTY..... | 13.00 | 12.41 | 4,665 | 4,942 | 24 | 23 | 4,576 | 4,836 | 65 | 83 |
| EMPLOYEE NOT ON DUTY. | .03 | .04 | 10 | 16 | 1 | 2 | 9 | 14 | --- | --- |
| PASSENGER ON TRAIN... | .35 | .41 | 125 | 162 | --- | 7 | 125 | 155 | --- | --- |
| NONTRESPASSER..... | .19 | .17 | 68 | 69 | 22 | 15 | 46 | 54 | --- | --- |
| TRESPASSER..... | 2.24 | 2.33 | 804 | 929 | 383 | 466 | 421 | 463 | --- | --- |
| CONTRACTOR EMPLOYEE.. | .02 | .02 | 7 | 9 | 2 | 2 | 5 | 7 | --- | --- |
| TOTAL..... | 15.82 | 15.39 | 5,679 | 6,127 | 432 | 515 | 5,182 | 5,529 | 65 | 83 |
| **NONTRAIN INCIDENT CASUALTIES** | | | | | | | | | | |
| EMPLOYEE ON DUTY..... | 70.71 | 70.26 | 25,379 | 27,975 | 21 | 14 | 24,770 | 27,501 | 588 | 460 |
| EMPLOYEE NOT ON DUTY. | 1.07 | 1.07 | 384 | 427 | 2 | 1 | 379 | 423 | 3 | 3 |
| PASSENGER ON TRAIN... | .80 | 1.09 | 288 | 435 | --- | 1 | 288 | 434 | --- | --- |
| NONTRESPASSER..... | 1.13 | .90 | 404 | 357 | 3 | 6 | 401 | 351 | --- | --- |
| TRESPASSER..... | .26 | .27 | 92 | 106 | 17 | 29 | 75 | 77 | --- | --- |
| CONTRACTOR EMPLOYEE.. | .26 | .26 | 94 | 104 | 4 | 5 | 89 | 96 | 1 | 3 |
| TOTAL..... | 74.23 | 73.85 | 26,641 | 29,404 | 47 | 56 | 26,002 | 28,882 | 592 | 466 |
| **RAIL-HIGHWAY GRADE CROSSING ACCIDENT/INCIDENT CASUALTIES (EXCLUDED FROM ABOVE CATEGORIES)** | | | | | | | | | | |
| EMPLOYEE ON DUTY..... | .34 | .44 | 123 | 176 | 1 | 3 | 122 | 173 | --- | --- |
| EMPLOYEE NOT ON DUTY. | .01 | .01 | 3 | 4 | --- | 2 | 3 | 2 | --- | --- |
| PASSENGER ON TRAIN... | .13 | .09 | 45 | 35 | --- | --- | 45 | 35 | --- | --- |
| NONTRESPASSER..... | 7.71 | 7.60 | 2,768 | 3,028 | 502 | 555 | 2,266 | 2,473 | --- | --- |
| TRESPASSER..... | .72 | .79 | 259 | 316 | 72 | 89 | 187 | 227 | --- | --- |
| CONTRACTOR EMPLOYEE.. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TOTAL..... | 8.91 | 8.94 | 3,198 | 3,559 | 575 | 649 | 2,623 | 2,910 | --- | --- |
| **GRAND TOTALS BY TYPE OF PERSON** | | | | | | | | | | |
| EMPLOYEE ON DUTY..... | 84.91 | 83.94 | 30,477 | 33,423 | 61 | 59 | 29,761 | 32,812 | 655 | 552 |
| EMPLOYEE NOT ON DUTY. | 1.11 | 1.13 | 398 | 449 | 3 | 5 | 392 | 441 | 3 | 3 |
| PASSENGER ON TRAIN... | 1.41 | 2.54 | 506 | 1,012 | 4 | 12 | 502 | 1,000 | --- | --- |
| NONTRESPASSER..... | 9.07 | 8.68 | 3,255 | 3,457 | 527 | 576 | 2,728 | 2,881 | --- | --- |
| TRESPASSER..... | 3.22 | 3.42 | 1,155 | 1,361 | 472 | 588 | 683 | 773 | --- | --- |
| CONTRACTOR EMPLOYEE.. | .28 | .29 | 101 | 115 | 6 | 7 | 94 | 105 | 1 | 3 |
| TOTAL..... | 100.00 | 100.00 | 35,892 | 39,817 | 1,073 | 1,247 | 34,160 | 38,012 | 659 | 558 |

NOTE: Rail-highway crossing casualties include those occurring at both public and private crossings



SOURCE: Data for the Accident/Incident Bulletin for 1984

Table A-2

Total Number of Train Accidents by Cause for 1983 and 1984

| CAUSES | NBR OF ACCS 1983 | NBR OF ACCS 1984 | $DAMAGE 1983 | $DAMAGE 1984 | KILLED 1983 | KILLED 1984 | INJURED 1983 | INJURED 1984 | HAZMAT RELEASE 1983 | HAZMAT RELEASE 1984 |
|---|---|---|---|---|---|---|---|---|---|---|
| **TRACK, ROADBED AND STRUCTURES** | | | | | | | | | | |
| Roadbed defects | 94 | 80 | 5,970,740 | 14,975,538 | 0 | 5 | 20 | 60 | 0 | 3 |
| Track geometry defects | 717 | 662 | 28,376,758 | 29,227,153 | 0 | 0 | 17 | 26 | 17 | 6 |
| Rail and joint bar defects | 369 | 362 | 33,673,171 | 29,301,656 | 6 | 0 | 51 | 10 | 5 | 10 |
| Frogs, switches and track appliances | 370 | 350 | 12,139,887 | 9,147,431 | 0 | 0 | 11 | 14 | 2 | 4 |
| Other way and structure | 19 | 17 | 1,235,804 | 1,337,597 | 0 | 0 | 1 | 2 | 0 | 0 |
| Signal and communication failures | 12 | 10 | 1,943,664 | 225,638 | 0 | 0 | 3 | 0 | 0 | 0 |
| | 1,581 | 1,481 | 83,340,024 | 84,215,013 | 6 | 5 | 103 | 112 | 24 | 23 |
| **MECHANICAL AND EQUIPMENT FAILURES** | | | | | | | | | | |
| Brakes | 69 | 62 | 3,801,817 | 4,413,751 | 0 | 0 | 2 | 2 | 0 | 0 |
| Trailer or container on flat car | 10 | 7 | 520,588 | 142,600 | 0 | 0 | 1 | 0 | 0 | 0 |
| Body | 66 | 52 | 3,844,716 | 3,109,928 | 0 | 0 | 5 | 2 | 1 | 2 |
| Coupler and draft system | 78 | 86 | 4,029,355 | 4,090,746 | 0 | 0 | 2 | 5 | 2 | 1 |
| Truck components | 128 | 126 | 7,797,237 | 6,923,206 | 0 | 0 | 19 | 7 | 3 | 3 |
| Axles and journal bearings | 92 | 126 | 15,217,785 | 20,725,065 | 0 | 2 | 5 | 7 | 2 | 2 |
| Wheels | 127 | 128 | 10,902,277 | 11,940,464 | 0 | 0 | 3 | 6 | 1 | 3 |
| Locomotives | 48 | 56 | 3,210,126 | 4,250,311 | 0 | 0 | 10 | 27 | 0 | 0 |
| Doors | 10 | 7 | 725,418 | 192,807 | 0 | 0 | 0 | 0 | 1 | 0 |
| Other mechanical and electrical failures | 8 | 11 | 213,265 | 348,949 | 0 | 0 | 6 | 0 | 0 | 0 |
| | 636 | 661 | 50,262,584 | 56,137,827 | 0 | 2 | 53 | 56 | 10 | 11 |
| **TRAIN OPERATION - HUMAN FACTORS** | | | | | | | | | | |
| Brakes, use of | 167 | 174 | 6,562,798 | 7,041,983 | 1 | 0 | 10 | 37 | 0 | 2 |
| Employee physical condition | 5 | 4 | 197,884 | 6,039,737 | 0 | 7 | 2 | 2 | 0 | 0 |
| Flagging, fixed, hand and radio signals | 43 | 38 | 6,633,170 | 2,824,535 | 6 | 0 | 29 | 23 | 1 | 1 |
| Other rules and instructions | 286 | 305 | 6,965,182 | 12,886,241 | 1 | 6 | 51 | 355 | 1 | 0 |
| Speed | 93 | 73 | 5,377,590 | 8,228,735 | 0 | 1 | 13 | 12 | 1 | 0 |
| Switches, use of | 173 | 169 | 10,847,507 | 6,175,620 | 1 | 1 | 15 | 17 | 1 | 1 |
| Miscellaneous human factors | 334 | 335 | 11,775,484 | 11,625,431 | 0 | 0 | 7 | 14 | 4 | 10 |
| | 1,101 | 1,098 | 48,359,615 | 54,822,282 | 9 | 15 | 127 | 460 | 8 | 14 |
| **MISCELLANEOUS** | | | | | | | | | | |
| Collision with hwy user at grade crossing | 130 | 188 | 5,606,614 | 11,076,297 | 37 | 36 | 147 | 193 | 2 | 2 |
| Vandalism | 81 | 75 | 2,296,110 | 3,819,125 | 0 | 0 | 9 | 8 | 0 | 0 |
| Load shifted | 25 | 28 | 1,242,335 | 1,740,716 | 0 | 0 | 0 | 1 | 1 | 2 |
| Interaction of lateral/vertical forces | 111 | 102 | 5,582,902 | 4,094,051 | 0 | 0 | 7 | 4 | 1 | 0 |
| Miscellaneous causes not otherwise listed | 241 | 267 | 11,660,272 | 24,557,203 | 4 | 5 | 56 | 59 | 6 | 2 |
| | 588 | 660 | 26,388,233 | 45,287,392 | 41 | 41 | 219 | 265 | 10 | 6 |
| **TOTAL** | 3,906 | 3,900 | 208,350,456 | 240,462,514 | 56 | 63 | 502 | 893 | 52 | 54 |

SOURCE: Data for the Accident/Incident Bulletin for 1984

## APPENDIX B

The Federal regulations that have been issued under the Federal Railroad Safety Act of 1970 and were in effect during 1984 are shown below.

Signal Systems Reporting Requirements
(49 CFR Part 233) January 26, 1984.

Instructions Governing Applications for Approval of a Discontinuance or Material Modification of a Signal System or Relief from the Requirements of Part 236
(49 CFR Part 234) January 26, 1984.

Rules, Standards, and Instructions Governing the Installation, Inspection, Maintenance, and Repair of Signal and Train Control Systems, Devices, and Applicances
(49 CFR Part 236) January 26, 1984.

State Safety Participation Regulations
(49 CFR Part 212) September 16, 1982.

Track Safety Standards
(49 CFR Part 213) September 7, 1982.

Railroad Freight Car Safety Standards
(49 CFR Part 215) December 31, 1979.

Safety Glazing Standards - Locomotives, Passenger Cars, and Cabooses (49 CFR Part 223) December 31, 1979.

Railroad Operating Rules
(49 CFR Part 218) January 10, 1979.

Radio Standards and Procedures
(49 CFR Part 220) January 27, 1977.

Rear-End Marking Device - Passenger, Commuter, and Freight Trains
(49 CFR Part 221) January 11, 1977.

Railroad Operating Rules
(49 CFR Part 217) November 25, 1974

## APPENDIX C

### Technical Reports*

Vehicle/Track Interaction Assessment Techniques, Three Volumes
Vol. I, Part I, Determination of Vehicle Performance Issues, Report No. FRA/ORD-84/01, PB 84 225739/AS
Vols. II & III, Part II, Detailed Procedures in Vechicle/Track Interaction Assessment Techniques, Vol. II Report No. FRA/ORD-84/10.II, PB 84 233717, Vol. III Report No. FRA/ORD-84/10.III, PB 84 225747

Correlation of Concrete Tie Track Performance in Revenue Service and at the Facility for Accelerated Service Testing, Two Volumes
Vol. I, A Detailed Summary, Report No. FRA/ORD-84/02.I, PB 85 159291/AS
Vol. II, Predictions and Evaluations of Track Settlement, Report No. FRA/ORD-84/02.II, PB 85 159309/AS

Roll Dynamics Unit Dynamometer Evaluation Test Using a GP 40-2 Locomotive, Report No. FRA/ORD-84/03, PB 85 112001/AS

Tank Car Damage Assessment Procedure Study, Report No. FRA/ORD-84/04, PB 85 175586/AS

Wheel Climb Derailment Processes and Derailment Criteria, Report No. FRA/ORD-84/05, PB 85 149367/AS

Analysis of Rail Defect Data on the Burlington Northern and Atchison, Topeka, and Santa Fe Railroads, Report No. FRA/ORD-84/06, PB 85 149516/AS

Physical Response of Flat Steel Plates to Drop Hammer Tests, Report No. FRA/ORD-84/07

Temperature, Pressures, and Liquid Levels of Tank Cars Engulfed in Fires, Two Volumes
Vol. I, Results of Parametric Analyses, Report No. FRA/ORD-84/08.I, PB 85 156859/AS

Vol. II, Description of Analytical Procedure, Report No. FRA/ORD-84/08.II, PB 85 156867/AS

*Report numbers are prefixed AD or PB and are available from the National Technical Information Service (NTIS) at 5828 Port Royal Road, Springfield, VA 22161.

Validation of Track Geometry Input to the Vibration Test Unit (VTU) and Endurance Capability of the VTU, Report No. FRA/ORD-84/09, PB 85 111995/AS

Assessment of Radial Truck Safety Performance Data, Report No. FRA/ORD-84/10, PB 85 173706/AS

Survey of Nondestructive Methods for Evaluation of Derailed Tank Cars, Report No. FRA/ORD-84-11, AD-A150-249/1/WTS

Experimental Investigation of Gage Widening and Rail Restraint Characteristics, Report No. FRA/ORD-84/12, PB 85 162428/AS

Safety Margin Testing of a 70-ton Boxcar with Shifted Plywood Lading, Two Volumes

Vol. I, Summary Results, Report No. FRA/ORD-84/15.I, PB 85 155950/AS

Vol. II, Test Results Data, Report No. FRA/ORD-84/15.II, PB 85 155968

Freight Train Brake System Safety Study, Report No. FRA/ORD-84/16

Track Degradation at FAST (Facility for Accelerated Service Testing), Report No. FRA/ORD-84/17

Ballast Testing at FAST, 1976-1982, Report No. FRA/ORD-84/18