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FAX: (202) 371-6279

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

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February 26, 1996

BY HAND DELIVERY

William F. Caton
Acting Secretary
Federal Communications Commission
Room 222
1919 M Street, N.W.
Washington, D.C. 20554

Re: Written Ex Parte Communications in PR Docket No. 92-235

Dear Mr. Caton:

Pursuant to Section 1.1206 of the Commission's Rules, this is to notify you that a copy of the enclosed ex parte presentation submitted on behalf of the Association of American Railroads was hand-delivered today to Michelle Farquhar, Chief, Wireless Telecommunications Bureau.

Any questions concerning this matter should be directed to the undersigned.

Respectfully submitted,

Lawrence R. Sidman

Lawrence R. Sidman

Enclosures

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HOUSTON, TEXAS OFFICE
2600 TEXAS COMMERCE TOWER
600 TRAVIS
HOUSTON, TEXAS 77002
(713) 237-9034
FAX: (713) 237-1216

AUSTIN, TEXAS OFFICE
SAN JACINTO CENTER
98 SAN JACINTO BLVD., SUITE 1440
AUSTIN, TEXAS 78701
(512) 703-6000
FAX: (512) 703-6003

HONOLULU, HAWAII OFFICE
HAWAII TIMES BUILDING
928 NUUANU AVE., SUITE 400
HONOLULU, HAWAII 96817
(808) 566-0999
FAX: (808) 566-0995

McLEAN, VIRGINIA OFFICE
8280 GREENSBORO DRIVE
SUITE 601
McLEAN, VIRGINIA 22102
(703) 749-6000
FAX: (703) 749-6027

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901 - 15TH STREET, N.W.
WASHINGTON, D.C. 20005-2301
(202) 371-6000
FAX: (202) 371-6279

WRITER'S DIRECT DIAL
(202) 371-6206

February 26, 1996

BY HAND DELIVERY

Michelle Farquhar, Chief
Wireless Telecommunications Bureau
Federal Communications Commission
2025 M Street, N.W.
Washington, D.C. 20554

Re: PR Docket No. 92-235: Development of Record by the Federal Railroad Administration and the National Transportation Safety Board Regarding the Need to Preserve the Railroad Radio Service

Dear Ms. Farquhar:

On Thursday, February 16, 1996, you met with Thomas Keller, Edwin Kemp and myself to discuss the impact of the FCC's plan to consolidate the land mobile radio services on the nation's railroads. At that meeting, the question arose as to whether the Federal Railroad Administration (FRA) and the National Transportation Safety Board (NTSB) have compiled a record that documents their opposition to elimination of the Railroad Radio Service. We explained that the position of these two agencies is the result of long experience garnered from their responsibility for railroad safety issues.

To help ensure that the record before the FCC in this docket reflects the detailed bases for the views of these agencies opposing elimination of the Railroad Radio Service, I am enclosing several items. The first item is a 1994 FRA Report to Congress on "Rail Communications and Train Control." The Report outlines the critical safety applications of railroad radio communications and the unique characteristics of rail transportation that cause the railroads to place a premium on extremely reliable channels of communication. Table I-1 on pages 5-6 describes the general categories of railroad radio communications and their safety purposes. The body of the Report goes into great detail regarding the use of radio to prevent and avert accidents, to control train movements and to coordinate emergency

HOUSTON, TEXAS OFFICE
2600 TEXAS COMMERCE TOWER
600 TRAVIS
HOUSTON, TEXAS 77002
(713) 237-9034
FAX: (713) 237-1216

AUSTIN, TEXAS OFFICE
SAN JACINTO CENTER
98 SAN JACINTO BLVD., SUITE 1440
AUSTIN, TEXAS 78701
(512) 703-6000
FAX: (512) 703-6003

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HAWAII TIMES BUILDING
928 NUUANU AVE., SUITE 400
HONOLULU, HAWAII 96817
(808) 566-0999
FAX: (808) 566-0995

McLEAN, VIRGINIA OFFICE
8280 GREENSBORO DRIVE
SUITE 601
McLEAN, VIRGINIA 22102
(703) 749-6000
FAX: (703) 749-6027

assistance. In addition, the Report strongly recommended the further development and use of Positive Train Control (PTC), a radio controlled method of enforcing speed and movement restrictions, to enhance safety along the railroad right-of-way. PTC is also referenced in the enclosed paper published by the NTSB, entitled "The National Transportation Safety Board Most Wanted Transportation Safety Improvements."

Finally, I am enclosing two newspaper articles that highlight the relationship between railroad safety and mobile radio communications. The first is a Washington Post article concerning a derailment in St. Paul. The article points out that the use of radio warnings saved many crewmen from injury and that the FRA is currently looking into the use of end-of-train devices that would allow engineers to apply brakes at the rear of the train via radio control.

The second article, dated February 21, announces several new rules that the FRA has imposed on passenger railroads. One of these new rules would require crew members to communicate via radio concerning signals along the right-of-way. This communication will ensure that the crew is fully aware of signals controlling train movements.

The two agency documents and the newspaper articles vividly illustrate the importance of mobile radio communications as a safety tool. They also document the railroad industry's need for immediate interference-free access to clear channels of communication. If time-critical messages relaying safety information are blocked due to interference, disasters can occur. Because the FCC's plan to allow other radio users to operate on railroad radio channels will result in interference to railroad safety-related communications, consolidation of the Railroad Radio Service is not in the public interest. As the 1994 FRA Report emphasized, "[i]n the contemporary operating environment it is essential that railroads have available effective means of communication..." The best way to ensure the reliability of the nation's railroad radio networks is to preserve the Railroad Radio Service intact.

Once again, thank you for taking the time to meet with us. We greatly appreciate the opportunity to share our concerns with you and your staff.

Sincerely,

Lawrence R. Sidman

Lawrence R. Sidman
Counsel for the Association of
American Railroads

Enclosures

THE NATIONAL TRANSPORTATION SAFETY BOARD

MOST WANTED

Transportation Safety Improvements

"...a program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives."

Recreational Boating Safety
-Strengthen Legislation, Enforcement, and Education Programs to Prevent Boating Accidents
Action Needed by State Legislatures

Administrative Revocation of Driver's License
-Pull Driver's License on the Spot of Anyone Failing or Refusing a Chemical Test for Alcohol
Action Needed by State Legislatures

Airport Runway Incursion
-Provide Safer Control of Aircraft on the Ground
Action Needed by the Federal Aviation Administration (FAA)

Positive Train Separation
-Require a Railroad Collision Avoidance System
Action Needed by the Federal Railroad Administration (FRA) & the Railroad Industry

Mode C Intruder Conflict Alert in Terminal Areas
-Install Collision Avoidance Systems for Airport Terminal Areas
Action Needed by the Federal Aviation Administration (FAA)

Fishing Vessel Safety
-Require Operators' License and Load Line Information for Commercial Fishing Vessels
Action Needed by the United States Coast Guard (USCG)

Youth Highway Crashes
-Strengthen Age 21, Zero BAC, and Licensing Legislation; Improve Enforcement, Licensing, and Education Programs for Persons Under Age 21
Action Needed by State Legislatures

Flight Data Recorder Expanded Parameter Recording
-Require the installation of flight data recorders with larger number of parameters
Action Needed by the Federal Aviation Administration (FAA)

Pipeline Excess Flow Valves
-Require the Installation of Excess Flow Valves in High Pressure Residential Natural Gas Distribution Systems
Action Needed by the Research & Special Programs Administration (RSPA) & the American Gas Association (AGA)

Railroad Hazardous Materials Tank Cars
-Require Improved Protection of Railroad Tank Cars Carrying Hazardous Materials
Action Needed by Federal Railroad Administration (FRA) & the Research & Special Programs Administration (RSPA)

Human Fatigue in Transportation Operations
-Study the Relationship of Fatigue and Work/Rest Cycles in the Transportation Industry and Update Applicable Regulations
Action Needed by the Department of Transportation (DOT)

School Bus Safety
-Safer Transportation for Schoolchildren
Action Needed by the National Highway Traffic Safety Administration (NHTSA)

Commuter Airline Safety
-Require commuter airlines to meet same safety standards as Part 121 operators.
Action Needed by the Federal Aviation Administration (FAA)

Small Passenger Vessel Safety
-Require Lifesaving Equipment, Passenger Briefings, and Crew Emergency Training
Action Needed by the United States Coast Guard (USCG)

Alcohol/Drug Detection
-Require Uniform Collection, Handling, Processing, and Testing for Alcohol and Other Drugs
Action Needed by the Department of Transportation (DOT)

Wake Turbulence
-Require safe separation between large aircraft and following smaller aircraft.
Action Needed by the Federal Aviation Administration (FAA)

Heavy Commercial Truck Safety
-Prevention of Accidents Caused by Fatigue, Alcohol, Drug Use & Medical Problems; and a requirement for Anti-lock Brake Systems
Action Needed by the Federal Highway Administration (FHWA) and the States

May 1995

A3
The Washington Post
Friday, February 16, 1996

Brake Failure Causes Another Train Wreck

Nine Workers Injured; FBI Called Into Probe

By Don Phillips
Washington Post Staff Writer

The Burlington Northern-Santa Fe Railroad yesterday asked the FBI to investigate the wreck of a heavily loaded freight train that lost its brakes on a hill and slammed into a railroad yard in St. Paul, Minn., scattering freight cars and locomotives like giant toys and injuring nine railway workers.

It was the second time in two weeks that a BNSF freight train had had brake problems on a grade, including a Feb. 1 runaway on California's Cajon Pass that killed two crew members and injured the engineer. The FBI also is investigating possible sabotage in that crash.

In both wrecks, according to railroad sources, brake valves found in the wreckage were turned to a position that would have prevented brakes from working properly on portions of the trains. The FBI and investigators for the National Transportation Safety Board are attempting to determine whether the valves were moved by the violence of the crash, as they often are, or were turned deliberately when both trains made short stops just before they began rolling uncontrollably downgrade.

FBI sources said yesterday that so far they do not see any connection between the two crashes, and that the earlier wreck was more likely caused by other problems.

According to railroad and federal officials, the 89-car train involved in yesterday's crash was loaded with 8,528 tons of grain and other nonhazardous freight and pulled by two locomotives when it left Northtown Yard in Minneapolis late Wednesday night. The engineer performed the standard brake tests at that time and found them working properly, officials said.

About five miles from CP Rail's Pig's Eye Yard in St. Paul, the train was told to stop and wait for a train ahead to complete its switching duties. Shortly after being told to resume his journey, the BNSF engineer realized he could not slow the train on the descending grade and began making radio calls.

Running at an estimated 49 miles per hour, the train slammed into six CP Rail locomotives and several standing freight cars. Thirty-eight cars derailed, with some slamming into a two-story yard control tower and office building with 25 people inside. Injuries were held down apparently because radio warnings from the train prompted a number of employees to run.

ASSOCIATED PRESS

Workers sift through debris after 89-car train carrying 8,528 tons of freight lost its brakes on a hill and slammed into switching yard in St. Paul, Minn.

Nine workers were injured, including the two train crew members. None of the injuries was life-threatening, officials said.

Dick Russack, a spokesman for BNSF, said the railroad decided to call in the FBI after officials saw "some tampering with the train." He declined to elaborate.

However, other railroad sources said a brake valve called an "angle cock" was found turned to the off position 24 cars behind the locomotive. If it had been turned during the train's last stop, there would have been no brakes on the rear 65 cars of the train.

Train brakes are controlled by a compressed air line that runs under each car and is connected by flexible hoses between cars. An angle cock at each end of the car either allows air to flow freely through the line or blocks it. An angle cock should be closed only at the end of the train or where cars are being separated during switching.

Federal Railroad Administrator Jolene Molitoris said yesterday in an interview that her agency will expedite an ongoing rule-making process that would require railroads, at a cost of $7,000 per device, to install special "end-of-train devices" that would allow engineers to apply brakes at the rear of the train by radio control.

If the train air line becomes blocked for any reason, limiting braking action to the front part of the train, the engineer can use the device to release air from the line at the rear of the train and apply brakes on all cars from the rear forward to the blockage.

Molitoris said a notice was placed in the Federal Register today setting a March 5 "public regulatory conference" for comments, after which the FRA will issue rules.

The National Transportation Safety Board, railroad unions and members of Congress have called for use of the devices for years.

Staff writer Pierre Thomas contributed to this report.

The Washington Post

WEDNESDAY, FEBRUARY 21, 1996

Rail Agency Tightens Rules After Collision

Signal, Speed Changes May Affect Schedules

By Don Phillips and Justin Gillis
Washington Post Staff Writers

The Federal Railroad Administration ordered passenger railroads yesterday to follow new rules that would have held engineer Richard Orr to half the speed he reached in the seconds before a collision that killed 11 people Friday on his commuter train in Silver Spring.

The emergency rules, which govern departures from certain stations, could affect the schedules of 12 commuter railroads across the nation, including two Maryland Rail Commuter Service lines and one Virginia Railway Express line. Trains on some lines might take longer to deliver commuters, including those on the Brunswick line, where MARC Train 286 exploded in flames after colliding with Amtrak's Capitol Limited.

"There is no question that there will be delays," Transportation Secretary Federico Peña said at a White House briefing to announce the rules, which take effect this morning. "And we believe that they are important for safety reasons."

The rail agency, galvanized by public and political reaction to a diesel fuel fire that claimed the lives of eight of the victims after they survived the collision, also ordered U.S. commuter railroads to inspect every window and door escape mechanism on every car within 60 days.

Orr and the two other members of the MARC train crew were among the dead. The Maryland medical examiner determined that only three of the 11 victims suffered fatal crash injuries. The others died of burns or smoke inhalation, and several people, who arrived at the scene just after the eastbound MARC train rammed into the westbound Capitol Limited, reported seeing passengers pounding on the windows in a vain attempt to escape.

Rail Rules Tightened; Inspection Ordered

CRASH, From A1

The medical examiner also announced that none of the three crew members was using illegal drugs or alcohol.

The rail agency's emergency action represents a tightening of rules prevalent in the railroad industry, targeting conditions present Friday when Train 286 left the Kensington station during a snowstorm.

Just before stopping at Kensington, Orr passed the last trackside signal before reaching the crash site, Georgetown Junction. The Kensington signal should have been yellow, telling him that after leaving Kensington he should travel no faster than medium speed—30 miles an hour—and be prepared to stop at Georgetown Junction.

National Transportation Safety Board investigators report that tests indicate the signal system functioned properly, but they are not ready to declare conclusively that the signal did not give Orr a "false positive," a rare occurrence in which a signal briefly shows green when it should be red or yellow.

Whether there was a signal malfunction or Orr simply had a mental lapse, he accelerated out of Kensington to 63 mph. Almost three miles later, he slammed on the emergency brakes, apparently seeing the red signal, the oncoming headlight of the Capitol Limited or both.

By then, he had only 1,100 feet to stop a train that investigators said would require almost 2,000 feet. He slammed into the Amtrak train at 40 mph, just as it was beginning to switch to another track.

One federal rule issued yesterday would address the problems of a mental lapse and a "false positive" signal. Any train operating on track that lacks a feature known as automatic train control—such as the privately owned tracks used by MARC—may travel no faster than 30 mph after leaving a station until the engineer can see that the next signal is clear.

The same rule would apply if a train was delayed for any other reason or even fell below 10 mph. This allows for the possibility of a change in conditions ahead while the train was delayed. This is almost identical to rules that have affected freight trains for decades.

The rule would not affect lines that have automatic train control, which automatically slows or stops trains whose engineers do not obey restrictive signals. In the Washington area, such systems are in effect on MARC's Penn Line, which uses Amtrak tracks from Washington to Perryville, Md., and on the Virginia Railway Express line from Washington to Fredericksburg. MARC's Brunswick and Camden lines and VRE's Manassas line do not have such systems and would be affected by the rule.

The rule could play havoc with schedules. For instance, the array of signals on the MARC Brunswick line means that trains now have to travel at 30 mph or less from the Garrett Park station through Kensington and Silver Spring to a signal at Takoma Park. Westbound trains would not be affected on that stretch, because signals are located just west of stations.

"I think this 30-mph rule is not well thought out," said Ross Capon, executive director of the National Association of Railroad Passengers. "Everyone will drive. Nobody wants to ride 30 mph on a 70-mph railroad."

Another rule would slightly expand a common railroad practice of "calling out signals." On most railroads, engineers must give their location and the nature of each signal over the radio. This is intended to keep engineers alert and to keep maintenance workers and other trains aware of train locations.

Under yesterday's rule, a crew member on a passenger train must respond to the engineer if the engineer calls a restrictive signal, using a radio if the engineer is alone in the cab.

Peña and Federal Railroad Administrator Jolene Molitoris also ordered passenger railroads to offer within 45 days a system safety plan addressing what they will do to enhance the safety of push-pull trains that operate half the time without a locomotive in front, as was the case with MARC Train 286. This also applies to electric trains that do not use locomotives.

Some union groups and safety officials say putting passengers in a car at the head of a train, without the protection of a locomotive, is dangerous. Others point out that the push-pull concept probably saved hundreds of lives in a 76-mph Boston rear-end crash in 1990, when an Amtrak train's locomotive hit the locomotive of a packed commuter train.

In addition, hundreds of commuter trains have electrically operated passenger cars that do not use a locomotive.

The government also asked for a report on commuter agency plans to implement automatic train control on the lines that do not now have it. That is a potentially expensive prospect not only for MARC and VRE but also for commuter agencies in Miami, San Francisco and Los Angeles that have no automatic train control and even for Chicago, New York and Boston, where some lines do not.

Molitoris indicated that the railroad administration may order installation of automatic systems if the railroads do not plan to do so.

"One of the things the rule says is that once we work with the agencies and review their safety plans, we leave open the possibility of other requirements to enhance safety if the plans themselves do not meet the kinds of safety levels that the department is looking for," Molitoris said.

Twenty-six passengers and three firefighters were treated at hospitals after the collision. Of five admitted to hospitals for treatment, only one remained hospitalized yesterday. Passenger Tyrai Boyer, 17, was listed in fair condition at Suburban Hospital.

Appearing before a state Senate subcommittee yesterday, Maryland Transportation Secretary David L. Winstead expressed confidence in the state's commuter operations but said a fuller description of what happened Friday must await the *outcome* of the federal safety investigation.

Subcommittee members did not ask any pointed questions and appeared content to wait for the outcome of the investigation before passing judgment.

Orr, the engineer, was buried yesterday at Cedar Hill Cemetery in Anne Arundel County after a private funeral.

Staff writers Michael Abramowitz, Eugene L. Meyer and Brian Mooar contributed to this report.

U.S. Department
of Transportation
**Federal Railroad
Administration**

Railroad Communications and Train Control

Report to Congress

Office of Safety

July 1994

US Department
of Transportation

**Federal Railroad
Administration**

Administrator

**400 Seventh St., S.W.
Washington, D.C. 20590**

JUL 8 1994

The Honorable Albert Gore, Jr.
President of the Senate
Washington, D.C. 20510

Dear Mr. President:

Pursuant to the authority delegated to me by the Secretary of Transportation, the Federal Railroad Administration (FRA) submits the enclosed report on "Railroad Communications and Train Control," as required by the Rail Safety Enforcement and Review Act, Public Law 102-365. This report responds to the Congressional mandate to assess safety requirements relating to radio communications, existing advanced train control systems (ATCS), and potential Federal regulations requiring ATCS compatibility and positive train control (PTC) to prevent collisions in the railroad industry.

During the preparation of this report, FRA began discussions with railroads, rail labor, and suppliers, in a cooperative approach to address the real safety challenges confronting the industry. These discussions have already produced positive action on the testing of PTC systems, and I am confident that such cooperative effort will be able to move PTC technology forward towards FRA's high-priority goal of combining private and public sector efforts to foster deployment of contemporary PTC systems on high-risk rail corridors by the year 2000.

On behalf of the FRA, I am pleased with the encouraging vision for the future outlined in this report. I look forward to working with Congress to advance our shared objective of improving safety in the railroad industry.

A copy of this report has also been sent to the Speaker of the House of Representatives.

Sincerely,

Jolene M. Molitoris

Jolene M. Molitoris

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

Administrator

**400 Seventh St., S.W.
Washington, D.C. 20590**

JUN 8 1994

The Honorable Thomas S. Foley
Speaker of the House of Representatives
Washington, D.C. 20515

Dear Mr. Speaker:

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Sincerely,

Jolene M. Molitoris

Jolene M. Molitoris

Enclosure

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2. Institute for Telecommunication Sciences Report

3. Background Note: PTC Criteria and Technological Alternatives

Executive Summary

INTRODUCTION

Recent tragedies in the railroad industry have again focused attention on the prospects for improving railroad safety through enhanced radio communication and implementation of advanced train control systems (ATCS). ATCS has the potential to prevent future accidents such as the collision between multiple-unit commuter trains at Gary, Indiana, on January 18, 1993, in which seven passengers died, and the collision between trains of the Union Pacific and Burlington Northern railroads at Longview (Kelso), Washington, on November 11, 1993, in which five employees lost their lives.

The Clinton Administration is strongly committed to improving safety on all modes of transportation, and this objective is one of the seven core goals of the Department of Transportation's Strategic Plan announced by Secretary Federico Peña in January 1994. In this report, the Federal Railroad Administration (FRA) expands on a Congressional mandate to evaluate ATCS and enhanced radio communications and finds that positive train control (PTC)--which, as a component of ATCS, can enforce speed and movement restrictions--is nearing a point at which it can begin to be used on railroads to eliminate injuries and deaths caused by train-to-train collisions. FRA recommends a series of steps to encourage the implementation of PTC systems on high-risk rail corridors by the year 2000.

Both through the Association of American Railroads (AAR) and through individual companies' efforts, the railroad industry has made great strides towards the development of ATCS over the last twelve years. The AAR has developed technological standards to ensure that equipment from different suppliers will be compatible, and certain railroads have implemented basic ATCS technologies for purposes such as replacement of landline communications. However, ATCS systems are not yet available in off-the-shelf form, nor is much of the research and development necessary to full implementation completed.

In a departure from the past, FRA is working with railroad management, labor, and suppliers in a collaborative effort that does not at this time require a formal regulatory proceeding but still advances FRA's safety agenda. Consultations leading to this report have already fostered concrete action on PTC: in May, the Burlington Northern Railroad and the Union Pacific Railroad announced a joint venture to pilot-test a basic PTC system on their high-density lines in Washington and Oregon, including the site of the Longview, Washington, collision. FRA will monitor and support this effort, and AAR will work with the railroads to ensure that the new system will work with other ATCS-type train control systems.

FRA reviewed the costs and benefits of PTC, using accident prevention estimates developed with the AAR and the Brotherhood of Railroad Signalmen and cost estimates provided by the AAR. That analysis reveals that a requirement of *universal* PTC cannot be justified at the present time based on accident avoidance alone. However, implementing PTC on major corridors is an important safety objective. FRA's near-term goal is to identify corridors--such as those which carry high traffic levels, passenger service, or hazardous materials--on

which PTC is important and justifies the cost. Should the results of this work indicate that application of PTC to certain corridors would be cost beneficial, FRA would propose to require its implementation on those routes.

Development of ATCS and PTC provides an important opportunity to improve railroad safety, increase railroad productivity, and promote the development of new technologies with commercial applications. FRA will continue its collaborative effort to ensure that the safety technology of PTC and ATCS evolves and moves closer to full implementation. FRA is confident that this new partnership will produce real advances towards PTC implementation. In addition, FRA will progress its corridor risk analysis to determine if PTC is warranted on particular categories of rail lines and propose any needed regulatory action to ensure this is accomplished.

THIS STUDY

In September 1992, as part of the Rail Safety Enforcement and Review Act (PL 102-365), Congress required the Secretary of Transportation to conduct an inquiry into the Department's railroad radio standards and procedures. The Act required an investigation into the effectiveness of radios in emergency situations; the effect of interference on safe operation; ways in which technologies such as digital radio can be implemented to enhance safety; and the status of ATCS. Congress also required an assessment of potential regulations mandating that locomotives be equipped with radios allowing crews to communicate with dispatchers and crews on other trains, and that radios be made available at intermediate terminals; and a review of the potential for ATCS to provide positive train separation which would be compatible nationwide.

On behalf of the Secretary, FRA conducted an inquiry which included extensive field surveys, lengthy consultation with railroad management, labor, and suppliers, a review of ATCS by the Institute for Telecommunications Sciences, and opportunity for public comment.

POSITIVE TRAIN CONTROL SYSTEMS

Over the last decade, ATCS has been seen as the ultimate extension of the use of radio in rail operations. Under ATCS, dispatchers would communicate with road crews via digital radio signals to an on-board computer terminal, eliminating the need for voice-communicated orders. The on-board terminal would be continuously updated with information including speed limits, work in progress on the right-of-way, the location of the preceding and following trains, and road and motive power conditions. ATCS would provide capability for positive train control (PTC), through use of an on-board computer and communications links to a control center. Under ATCS, the brakes would be applied automatically if necessary to keep trains apart, enforce a permanent or temporary speed restriction, or stop the train short of a switch not properly lined for that train or other known obstruction (such as on-track maintenance equipment). At some point after much development and implementation, ATCS

could replace existing signal and train control systems and facilitate the more efficient use of existing rail lines.

It is possible to develop PTC technology that provides varying levels of operation, depending on how much or how little of the current signal and control system is to be retained. It is also important to ensure that PTC equipment is interoperable--that different systems installed on different railroads can be used together, due to modern practices in which many locomotives operate over other railroads' lines. A PTC system that is overlaid on existing signal systems and provides enforcement of occupancy and speed restrictions can be referred to as "basic PTC." A PTC system that is "vital" (has failsafe characteristics), and is capable of replacing fixed block signal systems, can be referred to as "enhanced PTC."

Beginning in 1982, the AAR and the Railway Association of Canada (RAC) began investigating ATCS and formulating standards for ATCS throughout the industry. The FRA has found that the AAR is well advanced in its pursuit of standardized ATCS goals and specifications, and that those specifications are at a high state of readiness.

As conceived by the AAR and RAC, "ATCS" is much broader than train control. The ATCS communication platform can be used to replace landlines (pole line elimination), carry work orders for placing and picking up cars at shipper locations, report information on the "health" of an en-route locomotive to a maintenance facility, and perform other nonsafety functions. However, many of these beneficial aspects of ATCS have already been implemented through lower-cost separate systems, none of which has the capability to include positive train control.

The Potential of Communication-Based PTC

Contemporary PTC systems have the potential to improve management of train operations in a variety of ways and at lower cost than conventional automatic train control systems. Depending upon the technology employed, PTC technologies can:

1. **Ensure positive train control.** This capability would override the engineer's controls by braking the train when necessary to enforce speed restrictions, avoid collision with other trains, or ensure that the train will stop short of a known obstruction. In ATCS, an on-board computer would compare the location and speed of the train with a constantly-updated database of train orders, work orders, and speed restrictions, and would apply the brakes to stop or slow the train if the engineer made an error.

2. **Maintain flexible blocks.** With advanced PTC capabilities, railroads will not have to rely on fixed-length blocks and signals to keep trains separated safely. Different trains have different stopping requirements, and routes that carry mixed traffic (heavy commodity traffic; light, fast, intermodal traffic; or high speed passenger trains) currently require all trains to maintain the minimum separation of the trains that take

the longest distance to stop. Trains can be more closely spaced without impairing safety, because each train's braking capacity is taken into account.

3. **Enhance train management.** Under an advanced PTC system, train location is known at all times at the central dispatching center. As a result, train pacing, planning of meets and passes, and dispatching of trains from terminals can be managed with greater precision, improving fuel and crew utilization and gaining valuable time available for roadway work between trains.

4. **Improve accuracy in train communications.** Some forms of advanced PTC would be implemented with on-board computers and digital radio contact. Through this system, train orders and track warrants that are now sent by voice radio--spoken by the dispatcher and copied down by the crew--would be transmitted from the central dispatch computer directly to the displays of the on-board terminal, without the potential for misunderstanding or miscopying.

5. **Maintain constant communication.** Certain forms of PTC technology will require a virtually seamless digital radio contact (current radio contact still has some gaps caused by terrain and other factors), and this capability together with digital transmission of movement authorities will facilitate more efficient operation of trains. An important side benefit is the availability of another means of sending emergency messages, should voice radio communications not be established.

6. **Provide information to the locomotive engineer.** In certain PTC technologies, the on-board computer would give road crews a complete, continuously updated picture of the track ahead, including switch positions, work in progress, and speed limits. Like automatic cab signals, which would also be displayed, this kind of information will assist the engineer in sound train handling.

The Cost/Benefit Analysis of PTC

Working together, the AAR, the Brotherhood of Railroad Signalmen, and FRA developed an estimate of accidents preventable through PTC systems. FRA and AAR then utilized AAR estimates of cost as a basis for cost/benefit analysis of requiring the universal application of PTC. These reviews indicated that the savings from PTC would not cover the costs of installation.

FRA, AAR, and labor representatives identified 116 accidents between 1988 and August 1993 (5.67 years) which could have been prevented by a PTC system. Using the agreed-upon assumptions and the standard values that FRA uses to evaluate avoided fatalities, FRA estimated that the savings from PTC would be approximately $34.5 million per year.

AAR has estimated the cost of universal PTC at $843 million for a system providing only a warning to the crew (without automatic braking) to $1.1 billion for a system replacing current signals altogether. A PTC system providing enforcement of movement limitations using information largely gathered from existing signal systems (where available) was estimated at $859 million.

While a *universal* PTC requirement could not at present be warranted on the basis of cost and safety benefits alone, the benefits of PTC may justify the costs in certain corridors with certain characteristics, including the presence of passenger trains, hazardous materials, or higher levels of congestion. Similarly, further development of PTC technology may result in cost reductions or increases in benefits that may make universal application practical in the future. Thus, FRA will continue to support PTC research, development, and implementation in a number of ways.

Positive Train Control and FRA's Technology Goals

Secretary Peña has made promotion of technological development one of the seven core goals of the Department of Transportation. Assisting and leading the development of PTC technology is a major way in which DOT can make use of technological innovation to improve the Nation's infrastructure and increase American economic competitiveness.

Enhanced PTC technology can advance each of the three primary goals of the FRA's Research and Development program:

1. **Improve railroad safety**. PTC enforcement capability promises virtually to eliminate main line collisions, overspeed derailments, and accidents involving roadway workers and their equipment operating under specific authorities.

2. **Improve railroad productivity**. After decades of downsizing to avoid the costs of excessive track capacity, recent growth in rail traffic has begun to strain the capacity of certain high-traffic rail corridors. Enhanced PTC makes possible more precise scheduling of train movements, effectively increasing capacity. Increased capacity will make possible additional rail commuter service in regions where freight traffic is heavy and excess rail lines are not available for dedicated use, and reduce delays to the host railroad's freight operations, holding down the costs passed on to commuter service funding agencies. Freight railroad companies will also have additional flexibility to accommodate the growth of time-sensitive intermodal freight service.

3. **Facilitate the introduction of high speed ground transportation in the United States**. By continuously maintaining automatic oversight of train movements, increasing track capacity, and allowing dispatchers safely and efficiently to handle trains going at vastly different speeds, PTC will improve the financial feasibility of upgrading existing corridors to handle high speed service safely.

Development of next-generation PTC technologies will also provide opportunities for defense-related industries to team with established rail suppliers and convert defense technology to commercial production. Once demonstrated and accepted, communication-based PTC technology will have a potential market including every railroad in North America and elsewhere in the world, and related technology will have applications for every mode of transportation and the military.

FRA Actions:

This study has determined that the AAR/RAC ATCS specifications provide a sound basis for further development. Although cost/benefit analysis does not presently support requiring the installation of basic or advanced PTC on all railroads, this study has found significant potential benefits of PTC systems and advanced PTC research and has identified the need to take several actions. Specifically, FRA will--

- ***Conduct a risk assessment to determine which conventional rail corridors may warrant application of PTC technologies; and develop proposed safety standards consistent with the findings.***

  FRA will begin a risk assessment study to determine which corridors could benefit most from PTC. For FY 1995, FRA has requested $400,000 for the first year of a two-year effort to develop a model to evaluate PTC safety needs on major rail corridors. While requiring universal application of PTC would not be cost beneficial under present conditions, certain corridors may reap greater benefits from PTC application than the national rail system as a whole. For instance, lines carrying heavy passenger or hazardous materials traffic may experience greater risk with respect to frequency or severity of a preventable accident.

- ***Monitor and provide technical support for implementation of a basic PTC system test bed on heavily used freight and Amtrak lines in the States of Washington and Oregon.***

  FRA will take an active role in monitoring and providing support for the test of basic PTC technology by the Union Pacific Railroad (UP) and Burlington Northern Railroad (BN) on approximately 600 miles of railroad in the States of Washington and Oregon, some of which is jointly operated. This system will use radio communications to integrate PTC into current traffic control systems and automatic block systems. Unlike ATCS, however, it will use the Global Positioning System to determine train location, and both UHF and VHF data radio will be employed.

- ***Support Amtrak's enhancement of its automatic train control system for the Northeast Corridor (NEC); issue performance criteria for operations to 150 miles per hour.***

Beginning with NEC territory from New Haven to Boston, Amtrak is modifying its cab signal/automatic train control system to provide additional cab signal aspects, enforce civil engineering speed restrictions, and enforce positive stop at key control points. The Amtrak system differs from ATCS in three crucial ways: it will be an enhanced cab-signal system, using nine signals to authorize movement, rather than orders transmitted to an on-board computer; it will be based on electronic codes transmitted through the rails, rather than by radio; and the positive train stop and civil engineering speed enforcement features will be based on passive wayside transponders. One of FRA's main interests in this application of PTC technology will be its impact on safety and traffic capacity in a high-speed passenger corridor that also handles large numbers of commuter trains and some freight. FRA is the funding agency for the Northeast Corridor Improvement Project, which will support this signal system enhancement.

FRA is also responsible as a regulator for the safety of signal and train control systems and must specially approve such systems for high speed operations. FRA will commence a proceeding to specify performance criteria for the new NEC signal system incorporating PTC technology.

- ***Promote and develop advanced PTC technology as an element of the Next-Generation High Speed Rail Program.***

Working in partnership with State and private interests, FRA will invest strategically in a demonstration of advanced PTC technology on a specific high speed rail corridor. The demonstration project will apply communications-based technology that is interoperable with PTC systems planned for freight rail corridors to mixed freight and high speed passenger service, verifying safety performance characteristics and refining system features that can enhance corridor capacity and traffic flows.

The first phase of this effort will be the demonstration of communication-based PTC enforcement, and improved on-board information delivery and display, suitable eventually to permit high speed operations, and initially involving parallel operation of an existing signal system with suitable attributes. In later phases of the project, flexible block capabilities may be explored.

- ***Work with other DOT agencies and the Advanced Research Projects Agency (ARPA), Department of Defense, to promote integration of defense technology into PTC systems.***

FRA will aggressively pursue opportunities for partnership among ARPA, DOT agencies, the railroad industry, rail suppliers, and defense industries to explore and help advance innovative technologies that can enhance the capability and affordability of interoperable PTC systems.

- ***Work closely with the AAR to ensure that AAR's open architecture approach for universal compatibility remains effective and that standards meet safety needs.***

  In today's railroad industry, where many locomotives and trains run across company boundaries, the safety benefits of PTC will be lost if incompatible systems are applied by different railroads. FRA will promote the use of flexible industry standards so that all systems will improve safety on all railroads.

  FRA will continue to work with AAR committees and task forces considering further development of ATCS or successor industry standards.

- ***Extend FRA's partnership with the Federal Highway Administration (FHWA) on highway-rail grade crossing safety to work together more closely in planning for interoperability between PTC technology and Intelligent Vehicle Highway Systems (IVHS).***

  PTC technology can and should be made compatible with IVHS technology so that trains and road vehicles can use the same equipment to detect each other at grade crossings as they do to detect other trains and vehicles. The Vehicle Proximity Alerting System (VPAS), being developed as part of IVHS by FHWA, has this potential to interface with ATCS. The VPAS is intended primarily for use by priority vehicles such as school buses and emergency vehicles, at passively equipped grade crossings; it would also provide reinforcement to standard warnings at crossings equipped with active warning devices.

  FRA and FHWA will seek to combine IVHS and ATCS research on this subject. The FRA's Office of Railroad Development and FHWA are working to evaluate proximity alerting technologies, and are planning to use the Transportation Test Center to evaluate invehicle train warning technologies at grade crossings. For FY 1995, the Department's budget request of $12.5 million for technology development in the area of positive train control and grade crossing technologies (under the appropriation for next-generation high speed rail) includes an emphasis on linking IVHS and ATCS for use on high speed rail systems.

- ***Analyze and evaluate developing technology pertinent to PTC to determine its impact on safety.***

  As railroads and suppliers have already begun to develop technology related to ATCS, FRA should evaluate these emerging technologies and analyze their impact on safety. For FY 1995, FRA has requested $250,000 for the analysis of microprocessor-based train control, and $400,000 for the analysis of ATCS technology already in place. A clear focus on software and hardware issues will help lay the foundation for performance standards and support development of PTC technology.

Time Line:

The FRA's goals for PTC research and implementation are as follows:

FY 1994:

- Monitor and support development of BN/UP test bed.

FY 1995:

- Initiate a project to test enhanced PTC technology that is interoperable with industry-standard technology on a high speed rail corridor. Select corridor, determine technical approach, and begin system implementation.

- Begin two-year project to evaluate which conventional rail corridors are prime candidates for implementation of PTC by developing a risk assessment model.

- Initiate and complete a proceeding for an order or rule of particular applicability for NEC system cab/signal automatic train control system with added PTC features.

- Evaluate results of the AAR findings and report on ATCS (expected in December 1994); provide assessment to AAR Board of Directors.

- Complete initial evaluation in conjunction with FHWA of VPAS using the Transportation Test Center to perform evaluation of candidate technologies.

- Study the safety impact of PTC technology and microprocessor-based train control.

- Provide continuing support for AAR standards development to ensure interoperability.

FY 1996:

- Continue development of project to test enhanced PTC technology on a high speed rail corridor, completing basic safety verification of enforcement features linked to existing signal system.

- Complete two-year project to evaluate which conventional rail corridors are prime candidates for implementation of PTC.

- Complete evaluation of BN/UP test bed, report on the lessons of those tests, and work with the AAR to incorporate promising approaches into AAR positive train separation framework (ATCS or successor specifications).

- Continue partnership with FHWA to ensure proper interface of IVHS and PTC technology.

- Continue technical evaluations of PTC technology and systems.

- Provide continuing support for AAR standards development to ensure interoperability.

FY 1997:

- Complete demonstration of an enhanced PTC system on the selected high speed corridor. Implement in revenue service in FY 1998.

- Review conventional rail corridor risk analysis and, as appropriate, commence rulemaking to require PTC on identified categories of rail lines. Include development of generic performance criteria for improved train control systems applicable to high speed and conventional rail service. Complete rulemaking in FY 1998.

- Demonstrate IVHS and PTC interface for highway-rail crossing safety in cooperation with selected railroads and trucking companies.

- Provide continuing technical support for the development and implementation of PTC technologies nationwide, including development of AAR industry standards to ensure interoperability.

By forming partnerships within the Federal Government and with industry, development and demonstration of PTC technology can be achieved. As the technology becomes operational, its value will be recognized. With wide deployment, PTC systems should become more affordable, and barriers to further deployment should fall.

FRA believes that private and public sector efforts can be combined to foster deployment of contemporary PTC systems on high-risk rail corridors by the year 2000. ***FRA will make it a high agency priority to accomplish this objective.***

RADIO COMMUNICATIONS

FRA found that railroad radio communications are generally good and have been improving since FRA's last major review of this issue in 1987. However, compliance with FRA standards and procedures for voice radio communications is poor, and the inflexibility of

FRA regulations may discourage compliance. Further, employee representatives continue to report problems with radio equipment; and railroad companies fail to treat communication systems as an integral part of safety planning and execution, resulting in lower levels of maintenance.

FRA Actions:

As a result of the findings of this study, FRA will--

- ***Revise the Radio Standards and Procedures to make the regulations more flexible and to promote improved compliance.***

- ***Include in the proposed rule requirements that railroads provide suitable communications capabilities between trains and dispatchers, and between locomotive engineers and ground employees, and that back-up systems be established for critical functions.***

- ***Propose as a part of that rulemaking that each lead locomotive be equipped with an operative radio or suitable alternate communication equipment.***

- ***Work with a major railroad and its employees to implement transmission of movement authorities by digital data radio, in lieu of voice radio communications.***

Time Line:

FY 1995:

- Initiate negotiated rulemaking to revise the radio standards and procedures, including requirements for communication plans and compliance with those plans.

- Work with a major railroad and its employees to pilot-test the transmission of movement authorities from the central dispatch computer to the on-board terminal.

FY 1996:

- Complete rulemaking to revise the radio standards and procedures.

- Complete system implementation of data radio to transmit movement authorities on a major railroad.

FY 1997:

- Conduct compliance reviews on major railroads to verify compliance with revised requirements.

- Identify additional opportunities for transmittal of movement authorities by more secure means.

These steps, taken together, will help ensure that radio communications are treated as an integral part of railroad safety planning and execution.