National Rail Safety Action Plan Progress Report 2005-2007

Federal Railroad Administration
United States Department of Transportation
May 2007

Introduction

On May 16, 2005, the U.S. Department of Transportation (DOT) and the Federal Railroad Administration (FRA) launched an aggressive and proactive *National Rail Safety Action Plan* to address important safety issues by:

- Targeting the most frequent, highest-risk causes of train accidents;
- Focusing FRA oversight and inspection resources more precisely; and
- Accelerating research efforts that have the potential to mitigate the largest risks.

The *Action Plan* includes initiatives in several areas: reducing human factor-caused train accidents, addressing the serious problem of fatigue among railroad operating employees, improving track safety; enhancing hazardous materials safety and emergency preparedness, focusing FRA resources (inspections and enforcement) on areas of greatest safety concern and consequence, and further improving highway-rail grade crossing safety.

This report details the substantial progress made by FRA to successfully implement the various elements of the *Action Plan* during the past two years. It also highlights other projects and activities FRA is tackling, which while not specifically elements of the *Action Plan*, nonetheless will contribute to advancing safety on the nation's rail network.

Achievements During the Past Year

Below is a list of achievements in the implementation of the *Action Plan* since the first progress report was issued in June 2006.

August 2006	Public meetings on safety at private highway-rail grade crossings begin
October 2006	Proposed rule on human factor-caused train accidents published
November 2006	Summary report on validation of fatigue measurement model issued
January 2007	Research agreement signed by FRA and railroad and chemical industry leaders to strengthen rail hazmat tank car design standards
February 2007	Data collection for "Close Call" near accident project begins
April 2007	Two new automated track inspection vehicles begin service

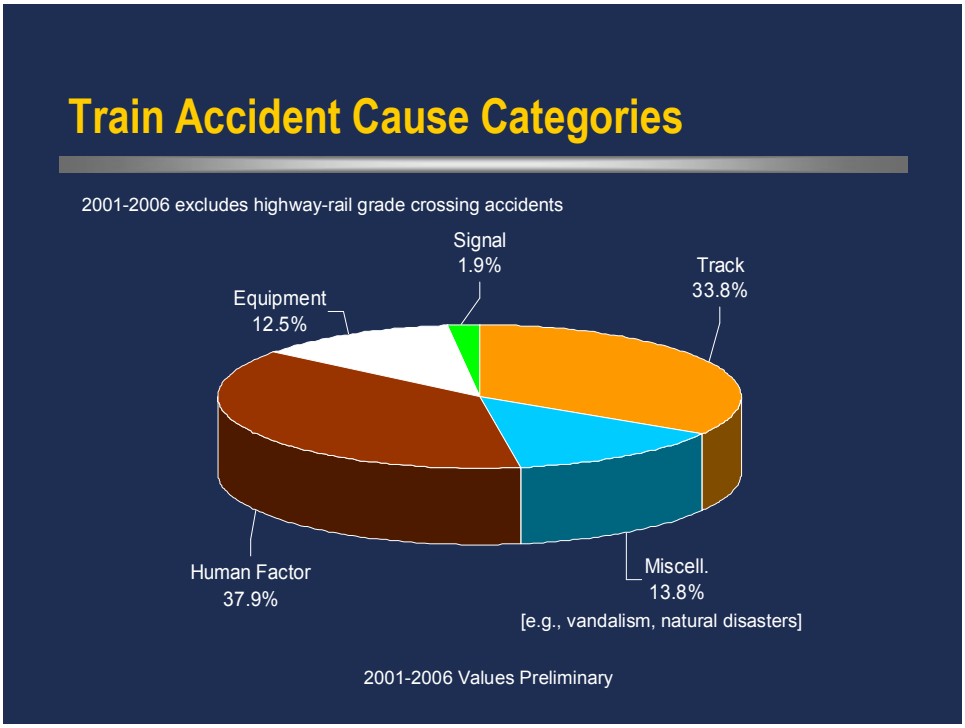
In February 2007, FRA also submitted the "Federal Railroad Safety Accountability and Improvement Act", introduced in Congress as H.R. 1516 and S. 918, to reauthorize the agency for four years and strengthen its safety program.

Anticipated Action Plan Accomplishments in 2007

- Publish final rule to reduce human factor-caused train accidents
- Complete research to strengthen the structural integrity of hazardous materials tank cars
- Issue final report on private highway-rail grade crossing safety with findings and recommendations for further action

Causes of Train Accidents

The causes of train accidents are generally grouped into five categories: human factors, track, equipment, signal and train control, and miscellaneous. Two categories of accidents–those caused by human factors and those caused by defective track–comprise more than 70 percent of all reportable train accidents. Accordingly, both are the primary target areas for improving the overall train accident rate. In recent years, the most serious events involving train collisions or derailments resulting in release of hazardous materials, or harm to rail passengers, have been caused by human factor or track causes.

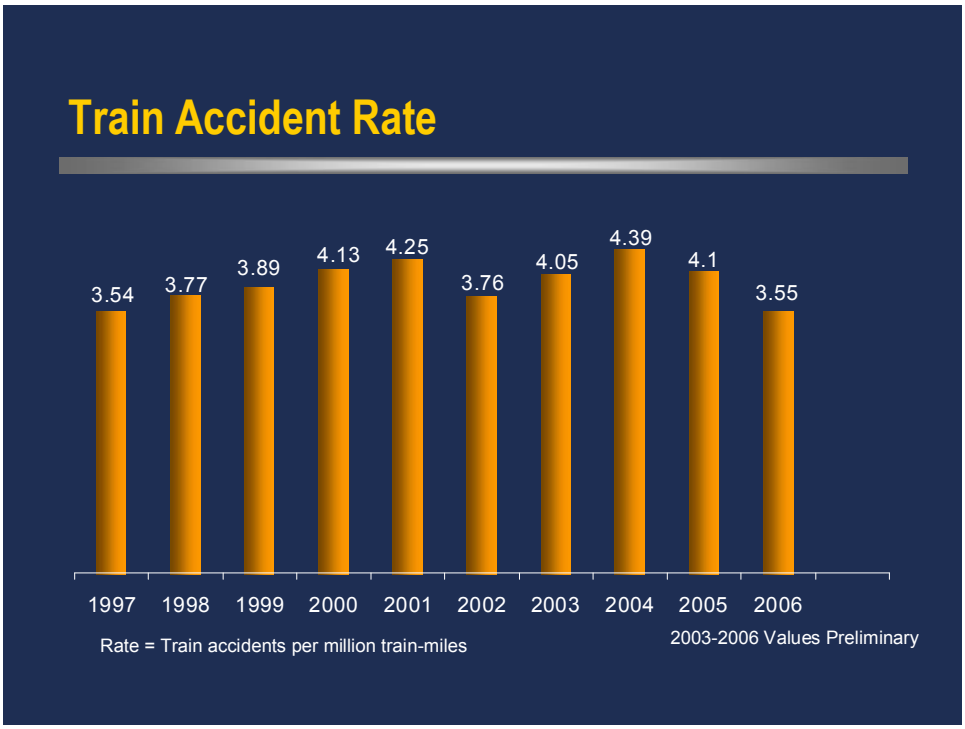


Fewer Train Accidents in 2006

Preliminary statistics (as of February 2006) reveal that in 2006 railroads had 366 fewer train accidents nationwide, or an 11.3 percent reduction from 2005. Specifically, the number of derailments declined 7.3 percent and collisions between trains decreased by 27.1 percent. And, the train accident rate per one million train-miles is near a 10-year low despite significant increases in the volume of train traffic.

The data for 2006 also reveal that train accidents caused by human error—the leading cause of all train accidents--declined 19.0 percent. Train accidents caused by track issues decreased 4.4 percent, and those caused by equipment failure and signal problems fell by 7.6 percent and 27.0 percent, respectively. In addition, last year the number of highway-rail grade crossing collisions fell by 4.7 percent. However, grade crossing fatalities increased by 2.2 percent. And, trespass fatalities, the number one cause of all rail-related deaths, increased by 13.6 percent.


Total Train Accidents
2397
2575
2768
2983
3023
2738
3013
3378
3242
2876
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
*Highway-Rail Grade Crossing Accidents not included
2003-2006 Values Preliminary


Train Accident Rate
3.54
3.77
3.89
4.13
4.25
3.76
4.05
4.39
4.1
3.55
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Rate = Train accidents per million train-miles
2003-2006 Values Preliminary

Reducing Human Factor Accidents

ACTION ITEM: Issue federal rule addressing top causes of human factor train accidents

STATUS: Proposed rule published in October 2006

NEXT STEP: Final rule to be issued in 2007

In October 2006, FRA published a proposed rule intended to reduce the number of human factor-caused train accidents, which have consistently constituted the largest single category of train accidents. FRA believes a federal regulation prohibiting common human errors that lead to train accidents will provide heightened visibility and operational focus to reduce their frequency of occurrence. The final rule will be issued later this year.

Analysis of train accident data has revealed that a small number of particular kinds of human errors account for an inordinate number of human factor-caused accidents. The leading cause is improperly lined track switches. Other top causes include shoving rail cars without a person on the front of the move to monitor conditions ahead, leaving cars in a position that obstructs (fouls) a track, and failure to secure a sufficient number of handbrakes.

At present, few of these kinds of mistakes are prohibited by federal regulations. Instead, most are addressed by each railroad's own operating rules, which subject employees who violate them to discipline, including dismissal. Currently, FRA regulations only require railroads to train their employees on these rules and to test them periodically on their compliance with those rules.

The proposed rule seeks to establish greater accountability on the part of railroad management for the administration of railroad programs of operational tests and inspections, and greater accountability on the part of railroad supervisors and employees for compliance with those operating rules that are responsible for approximately half of the train accidents related to human factors. FRA believes this will contribute positively to railroad safety, by emphasizing the importance of compliance with fundamental operating rules and providing FRA a more direct means of promoting compliance.

The final rule is intended to supersede Emergency Order No. 24, which FRA issued in October 2005, in response to an increasing number of train accidents caused by hand-operated, main track switches in non-signaled territory being left in the wrong position. The Emergency Order requires special handling, instruction and testing of railroad operating rules pertaining to hand-operated main track switches in non-signaled territory, and is expected to remain in place until the final rule is issued and becomes effective.

ACTION ITEM:	Establish "Close Call" pilot project to learn from incidents that could have caused a train accident but did not
STATUS:	Begin pilot project data collection February 2007
NEXT STEP:	Expand pilot project to other railroads in 2007

In February 2007, FRA announced that employees at the nation's largest rail yard in North Platte, Nebraska can now voluntarily and anonymously report "close call" incidents that *could have* resulted in an accident, but did not, without fear of sanction or penalty from their employer or the federal government as part of a new rail safety pilot project.

FRA currently requires railroads to report a wide range of accidents and incidents that actually occur. This "close call" information will be analyzed to determine areas of potential risk and to develop solutions to prevent accidents in the future. The aviation industry has a similar program.

The Confidential Close Call Reporting Pilot Project involves Union Pacific Railroad (UP), the Brotherhood of Locomotive Engineers and Trainmen (BLET) and the United Transportation Union (UTU). Each has ratified an agreement with the FRA to allow railroad employees to anonymously contact the U.S. Department of Transportation's Bureau of Transportation Statistics, to report on such potentially dangerous situations.

Examples of "close calls" could be as minor as employees lifting objects that place them at risk for minor injuries, or more serious events, such as a train operating in non-signaled dark territory proceeding beyond its track authority, or a train crew member's failure to properly test an air brake before leaving a yard, which could lead to a runaway train.

"Close call" reports will be taken for five years to permit researchers enough time to collect a sufficient number of incidents for thorough analysis. Importantly, a review team will evaluate the reports as they are received in order to make safety recommendations for those that require immediate attention.

FRA plans to extend this pilot project to other rail yards, including BNSF Railway in Lincoln, NE and Canadian Pacific in Portage, WI., and is also currently in discussion with commuter railroads to launch another pilot location.

Addressing Fatigue

ACTION ITEM:	Accelerate research on railroad crew work history to validate a fatigue model for possible use to improve crew scheduling
STATUS:	Final report issued October 2006
NEXT STEP:	FRA seeking authority to regulate railroad worker hours of service based on current scientific research February 2007

In November 2006, FRA announced the release of a study which provides a strong scientific rationale for evaluating railroad employee work schedules to address worker fatigue.

Fatigue has long been a fact of life for many railroad operating employees, given their long and often unpredictable work hours and fluctuating schedules. FRA knowledge of the industry's work patterns and the developing science of fatigue mitigation, combined with certain National Transportation Safety Board investigations indicating employee fatigue as a major factor of some train accidents, have persuaded FRA that fatigue plays a role in one out of every four human factor-caused accidents.

The goal of the FRA research was to determine if a fatigue model can accurately and reliably predict an increased risk of human error that could contribute to the occurrence of a train accident. A model for detecting the point at which the risk of fatigue becomes hazardous could become an important part of a railroad's fatigue management plan. FRA expects this information will aid the railroad industry and labor organizations in improving crew scheduling practices in order to reduce that risk. A similar approach is currently utilized by the Department of Defense.

Under the study, researchers analyzed the 30-day work schedule histories of locomotive crews preceding approximately 1,400 train accidents and found a strong statistical correlation between the crew's estimated level of alertness and the likelihood that they would be involved in an accident caused by human factors. In fact, the relationship is so strong that the level of fatigue associated with some work schedules was found to be equivalent to being awake for 21 hours following an 8-hour sleep period the previous night. At this level, train accidents consistent with fatigue, such as failing to stop for red signals, were more likely to occur.

This research provides the basis for an important component of the Administration's rail safety reauthorization proposal submitted to Congress in February 2007 that would grant the FRA statutory authority to regulate railroad worker hours of service based upon the most current scientific knowledge available on fatigue management and mitigation.

Improving Track Safety

ACTION ITEM: Demonstrate vehicle-mounted photo imaging technology to detect cracks in joint bars that can lead to derailments

STATUS: Field testing began in October 2005
Enhanced technology tested in 2006

NEXT STEP: Test additional enhancements to increase operating speeds and make the defect detection technology more robust in 2007

Track has consistently been the second leading cause of train accidents accounting for about one-third of all train accidents from 2001 to 2006. Broken joint bars, for example, are a leading cause, but the kinds of cracks in those bars that foreshadow a derailment-causing break are very hard to spot with the naked eye. Similarly, broken rails account for some of the most serious accidents, but the internal flaws that lead to many of those breaks can be detected only by specialized equipment.

FRA is developing an automated high-resolution video joint bar inspection system that can be deployed on a hi-rail maintenance vehicle that will detect visual cracks in joint bars without having to stop the vehicle. In October 2005, a prototype system that inspects joint bars on both sides of each rail was successfully demonstrated. Testing showed that the high-resolution video system detected visual cracks that were missed by the traditional visual inspections.

The system was then enhanced with new features to improve the reliability of joint bar detection and to add capabilities to include the global positioning system coordinates for each joint to facilitate future inspection and identification. Additionally, software was developed to scan the images automatically, detect the cracked joint bar, and then send a message to the operator with an image of the broken joint bar. The new features were implemented and the system was tested and demonstrated in the summer of 2006.

Additional enhancements were made to the system to further improve joint detection reliability and were tested at participating railroads during the spring of 2007. This year, FRA intends to make additional enhancements to increase the operating speed and implement a more rugged, simple, and robust defect detection system

ACTION ITEM: Deploy two additional automated track geometry inspection vehicles

STATUS: T-19 and T-20 track geometry inspection vehicles in operation April 2007

NEXT STEP: Ongoing Implementation

In late April 2007, FRA began operating its two newest automated track inspection vehicles equipped with state of the art technology to prevent train derailments by detecting subtle track flaws that are difficult to identify by regular means.

The addition of the new equipment increases the FRA fleet of automated inspection vehicles to five, and when fully integrated into the federal inspection program, will allow this agency to inspect nearly 100,000 track-miles each year, tripling the current capacity. In particular, FRA will be better able to focus its automated track inspection activities on high-volume rail lines that carry hazardous materials and passenger trains as well as improve its ability to follow up more quickly on routes where safety performance by a railroad is substandard.

The new vehicles, known as the T-19 and the T-20, use a variety of technology to measure track geometry flaws such as whether two rails are level, if the width between the rails is acceptable, and if the shape of each rail meets federal standards so to avoid derailments. The measurements are recorded in real-time and at operating speed. Problem areas are identified by global positioning system location and shared immediately with the railroad so appropriate corrective actions can be taken in a timely manner.

In May 2005, FRA added the T-18 to its fleet of automated track inspection vehicles that measures for weaknesses in the track structure such as bad crossties or poor connections between the rail and crosstie that could cause the rails to dangerously widen.

New FRA T-19 Track Geometry Inspection Vehicle

Improving Hazardous Materials Safety and Emergency Response Capability

ACTION ITEM:	Identify technology to improve safety in dark (non-signaled) track territory
STATUS:	Switch Point Monitoring System pilot project November 2005
NEXT STEP:	Use success of pilot project to encourage other railroads to install switch position monitoring technology in other dark track territory

In November 2005, FRA partnered with BNSF Railway in a $1 million Switch Point Monitoring System pilot project. The main objective of the project was to develop a low-cost system that electronically monitors, detects, and reports a misaligned switch on the mainline track located in dark, or non-signaled, track territory.

The project involved the installation of wireless communication devices at 49 switches along a 174-mile section of non-signaled BNSF track between Tulsa and Avard, Oklahoma. Train dispatchers at an operations center in Fort Worth, Texas, monitor the devices to identify when the hand-operated switches are set in the wrong position. If a switch is misaligned, the dispatcher directs a train to stop until railroad crews in the field check the switch and confirm it is safe to proceed. No unsafe failures of the system have been reported to date.

As a result of the successful pilot project, BNSF has now developed technology so dispatchers can remotely control the operation of the switch in addition to simply monitoring it. And, the railroad has installed the switch monitoring technology on at least one other of its dark territory lines and has plans to expand it use elsewhere on its rail network.

ACTION ITEM:	Ensure emergency responders have access to key information about hazardous materials transported by rail
STATUS:	Rail hazmat lists available to first responders March 2005 Rail hazmat accident pilot project with major railroad July 2005
NEXT STEP:	Monitor new rail hazmat pilot project with short line and regional railroads December 2006

Emergency responders have access to a wide variety of information regarding hazardous materials transport by rail. The Association of American Railroads (AAR) offers hazardous materials incident response training and the American Chemistry Council has a program that familiarizes local emergency responders with railroad equipment and product characteristics. In addition, the U.S. DOT Pipeline and Hazardous Materials Safety Administration publishes the *Emergency Response Guidebook* and distributes federal grants to States to train emergency personnel.

In March 2005, with FRA encouragement, the AAR amended its Recommended Operating Practices for Transportation of Hazardous Materials (Circular No. OT-55-G) to expressly provide that local emergency responders, upon written request, will be provided with a ranked listing of the top 25 hazardous materials transported by rail through their community. This is an important step to allow emergency responders to plan, and better focus their training, for the type of rail-related hazardous materials incident that they would be more likely to encounter.

In July 2005, again with FRA encouragement, CSX Transportation and CHEMTREC (the chemical industry's 24-hour resource center for emergency responders) entered into an agreement to conduct a pilot project designed so that if an actual hazardous materials rail accident or incident occurs, CHEMTREC will have immediate access to CSX computer files regarding that specific train, including the type of hazardous materials being carried and their exact position within the train. During the six-month pilot project there was minimal opportunity to effectively test the program so all parties agreed to continue the arrangement for an additional 18-month period.

In December 2006, another pilot project began to evaluate the use of Railinc Corporation's Freightscope, a program that provides equipment search capabilities for hazmat shipments. The system was installed at CHEMTREC, and it has the potential to more rapidly provide information about hazmat shipments on short line and regional railroads to CHEMTREC to improve information availability and reduce delays in emergency response.

ACTION ITEM: Accelerate research into hazardous materials rail tank car structural integrity

STATUS: Funding added to complete research in 2007 rather than 2008
Tank car research agreement with rail and chemical industry January 2007

NEXT STEP: Research to be completed in Fall 2007

In January 2007, FRA executed a formal Memorandum of Cooperation (MOC) with rail and chemical industry leaders to share research data and resources to aid in developing new federal design standards for stronger and safer hazardous materials tank cars in 2008. The goal is to move beyond incremental design changes and apply the latest research and advanced technology to provide increased safety for rail shipments posing the greatest potential safety risk.

The MOC with Dow Chemical Company, Union Pacific Railroad and the Union Tank Car manufacturing company provides for extensive information sharing and cooperation between ongoing FRA and industry research programs to improve the safety of rail shipments of hazardous commodities such as toxic inhalation hazards and high-risk gases and liquids.

The focus of FRA is to strengthen the structural integrity of the tank car including evaluating the type of material and thickness of the outer shell and the type and design of the insulation material located between the outer shell and the inner tank that contains the hazardous material. This is intended to reduce the probability that a collision, such as a side impact, will result in release of the hazardous commodity.

In addition, FRA is closely evaluating technology such as pushback couplers, energy absorbers, and anti-climbing devices designed to prevent a derailment of the tank car by keeping it upright and on the tracks after an accident.

Also, in collaboration with the railroad industry through the Association of American Railroads Tank Car Committee, FRA is conducting research involving three major activities: (1) modeling of dynamic forces acting on hazmat tank cars in accidents and assessing the subsequent damage, (2) material testing to determine fracture behavior of tank car steels, and (3) risk ranking to prioritize the tank cars that are perceived to be most vulnerable to catastrophic failure. Originally scheduled to be finished in 2008, FRA has provided an additional $400,000 to move the target completion date for this research forward to August 2007.

The first project, modeling of dynamic forces in train accidents, is ongoing and will assess items including train makeup, train speed, configuration of rail car pileup, the effect of having different types of impacting objects (i.e., couplers and wheels) strike different parts of various tank car models, and the effect of various levels of pressurization, among other elements. It is expected to be completed August 2007.

The second project, material testing for dynamic fracture toughness, is testing the amount of stress required to propagate an existing flaw on the tank car steel and evaluating the ability of the steel to resist fracture. Researchers at the Southwest Research Institute laboratories in San Antonio, Texas are testing 34 steel samples from tank cars segregated by decades of manufacture (e.g., 1960s, 1970s, and 1980s). This work is expected to be completed in July 2007.

The third project, ranking the vulnerability of hazardous materials tank cars to catastrophic failure, represents the end purpose of this research. Risk is a complex concept, and therefore the methods used to rank the factors that affect risk vary in complexity. Preliminary low-level analyses are ongoing. Higher-level analysis can be conducted after the research on dynamic forces and testing for fracture toughness has been completed. The final hazardous materials tank car risk analysis is to be completed by September 2007.

And, since May 2006, FRA has held three public meetings in cooperation with the Pipeline and Hazardous Materials Safety Administration (PHMSA) to comprehensively review design and operational factors that affect hazmat rail tank car safety. The two agencies will utilize a risk management approach to identify ways to enhance the safe transportation of hazardous materials including, tank car design, manufacture, and re-qualifications to keep a tank car in service; operational issues such as human factors, track conditions and maintenance, wayside hazard detectors, and signals and train control systems; and emergency response.

In addition, in December 2006, PHMSA issued a proposed rule that would require railroads to perform a safety and security risk analysis to determine the most appropriate route for shipping certain high-risk hazardous materials. Under the proposed rule, rail carriers would be required to compile annual data clearly identifying the total number and type of hazardous materials shipments transported over each route and use the information to select the route that provides the highest possible degree of safety and security. The proposed rule would require shippers to develop consistent plans for safely and securely storing hazardous materials while en route, and ensure that within a specified time period a rail carrier informs the final recipient that it has delivered a hazardous materials rail car.

Further, in September 2006, FRA began a project to test sample tank car panels with various coatings to determine their ability to prevent penetration from small arms fire, as well as their ability to self-seal and, thereby, mitigate the severity of any incident. FRA developed the project in coordination with the AAR and the U.S. Department of Homeland Security, which came up with the idea of applying to tank cars a protective coating like that used to enhance the armor protection of military vehicles in Iraq.

Strengthening the FRA Compliance Program

ACTION ITEM: Make better use of data to direct FRA safety inspectors and other resources to where problems are likely to arise

STATUS: New National Inspection Plan fully implemented March 2006
Proposal to increase civil penalty guideline amounts December 2006

NEXT STEP: Ongoing implementation and refinement of NIP process

The National Inspection Plan (NIP) is a strategic inspection resource allocation program that uses predictive indicators to assist FRA in conducting inspection and enforcement activities within a given geography or on a particular railroad. In essence, it makes use of existing inspection and accident data in such a way to identify potential safety "hot spots" so they can be corrected before a serious accident occurs.

In April 2005, the FRA safety disciplines of Operating Practices (i.e., Human Factors), Track, and the Motive Power & Equipment began operating under the NIP since combined, these factors account for over 80 percent of all train accidents. The two other safety disciplines of Signal & Train Control and Hazardous Materials started in March 2006. A reduction in both the number of accidents and the accident rate is expected once the NIP has had time to take its full effect and FRA refines its application to real-world experience.

The first year under the NIP was a time of learning by FRA regional offices and field inspectors on how to understand and use the information. During the second year, there has been a noticeable increase in sophistication and initiative by the regions and they are making adjustments to the NIP where needed and managing resources in a proactive manner to meet the targets in the plan. There is an increased willingness to break with past inspections patterns and to focus more effort on railroads with the most safety problems. And, FRA has improved the planning phase of the NIP by implementing a mid-year review process.

Regarding enforcement efforts, FRA announced in December 2006 that the civil penalty guideline amounts assessed against railroads for violating federal rail safety regulations would at least double for most violations. FRA evaluated each of the more than 2,000 regulations using a five-point severity scale. The measure takes into consideration the likelihood that a rail accident or graver consequences will occur as a result of failing to comply with a particular section of the regulations. The more severe the potential outcome of violating a rule, the higher the fine. The agency's new civil penalty guidelines are to become effective later this year.

Fostering Further Improvements in Highway-Rail Grade Crossing Safety

ACTION ITEM:	Build partnerships with state/local agencies and emphasize railroad responsibilities concerning safety at highway-rail grade crossings
STATUS:	Safety advisory issued May 2005 Public meetings on private grade crossings safety begin August 2006
NEXT STEP:	Final public meeting on private grade crossing safety July 2007

Deaths in highway-rail grade crossing accidents are the second-leading category of fatalities associated with railroading (trespasser fatalities are the leading category). The number of grade crossing deaths has declined substantially and steadily over time. However, the growth in rail and motor vehicle traffic continues to present challenges.

In August 2006, FRA held the first in a series of public meetings across the country (MN, NC, LA, and CA) to foster a national discussion on improving safety at the nation's largely unregulated private highway-rail grade crossings. Each year, about 400 accidents, and from 30 to 40 fatalities, occur at the over 94,000 private crossings used by both freight and passenger trains.

Private crossings are owned by private property owners primarily to allow roadway access over railroad tracks to residential, commercial, or agricultural areas not meant for general public use. The FRA is seeking comments on topics such as determining when a private crossing has a public purpose and whether the State or Federal government should assume a greater role in setting safety standards.

Establishing responsibility for safety at private crossings is one of the primary goals of the U.S. Secretary of Transportation's *Highway-Rail Grade Crossing Safety and Trespass Prevention Action Plan* issued in 2004. A final public meeting is scheduled for July 2007 in New York.

In May 2005, FRA issued Safety Advisory 2005-03 describing the roles of the Federal and state governments and of the railroads in grade crossing safety. It also specifically reminds railroads of their responsibilities to properly: report any accident involving grade crossing signal failure; maintain records relating to credible reports of grade crossing warning system malfunctions; preserve the data from all locomotive mounted recording devices following grade crossing collisions; and cooperate fully with local law enforcement authorities during their investigations of such accidents. FRA also offers assistance to local law enforcement authorities in the investigation of highway-rail grade crossing collisions where information or expertise within FRA control is required to complete the investigation.

ACTION ITEM:	Assist Louisiana create Highway-Rail Grade Crossing Safety Action Plan
STATUS:	Louisiana approved action plan April 2006
NEXT STEP:	Work with other States to develop grade crossing safety action plans

In March 2005, FRA began working with the state of Louisiana in developing its own action plan for highway-rail crossing safety. Louisiana has the distinction of consistently being among the top five states in the nation with the highest number of grade crossing collisions and fatalities. The action plan focuses on reducing vehicle-train collisions at grade crossings where multiple collisions have occurred. Louisiana approved its action plan in April 2006.

In June 2006, in part as a result of efforts to create this action plan, the Louisiana Department of Transportation and Development announced an agreement with Kansas City Southern Railway to make safety improvements at 300 public grade crossings. Over a five-year period, more than $16 million will be invested to upgrade warning devices, replace cross buck signage, and close redundant crossings.

FRA is now working with Texas to develop a similar, State-specific action plan, and encourages other States with high numbers of grade crossing accidents and fatalities to do the same.

Other FRA Initiatives to Improve Rail Safety

During the past year, FRA has undertaken several initiatives to improve rail safety above and beyond the specific elements of the *Action Plan*. These other activities include advancing the development and deployment of safety technology such as Positive Train Control (PTC) and Electronically Controlled Pneumatic (ECP) brake systems, enhancing passenger rail safety, and submitting to Congress a comprehensive bill that seeks to reauthorize FRA for four years and strengthen the federal rail safety program.

Positive Train Control (PTC)

In January 2007, FRA announced approval of the first PTC system intended for general use by the freight railroads capable of automatically controlling train speed and movements to prevent certain accidents, including train collisions. This is a major achievement that marks the beginning of a new era of rail safety.

FRA approved the BNSF Railway's Product Safety Plan for its Electronic Train Management System (ETMS), an overlay technology that augments and supplements existing train control methods. ETMS employs both digital communications and a global positioning system to monitor train location and speed within track authority limits. The ETMS system includes an in-cab electronic display screen that will first warn of a problem and then automatically engage the train's brake system if a locomotive engineer fails to act in accordance with operating instructions.

The FRA action allows BNSF to implement ETMS on 35 specific freight lines in 17 states, and requires appropriate employee training before it can be initiated. It is expected that the rail industry will increasingly embrace and adopt PTC technology as other railroads— among them, Union Pacific, Norfolk Southern, and CSX Transportation—are each making significant strides to develop PTC systems.

In addition to its safety benefits, PTC also can support rail operations by increasing the capacity of high-density rail lines, improving overall efficiency.

In 2005, FRA revised federal signal and train control regulations to facilitate and enable development and deployment of PTC technology.

Electronically Controlled Pneumatic (ECP) Brakes

In August 2006, FRA released a report on the business benefits of Eelectronically Controlled Pneumatic (ECP) brake systems that have the capability to significantly improve train control, reduce derailments, and shorten stopping distances. ECP brakes are to trains what anti-lock brakes are to automobiles—they provide better control.

ECP brakes apply uniformly and virtually instantaneously on every rail car throughout a train and not sequentially from one car to the next as is done with conventional air brake systems.

The full train brake application, and an ability to gradually apply and release the brakes, provides for vastly improved train control and enhances safety. FRA believes ECP brake systems are the most significant development in railroad brake technology since the 1870s.

ECP brake technology can help avert train derailments caused by sudden emergency brake applications, prevent runaway trains caused by loss of brake air pressure, and shorten train stopping distances up to 60 percent under certain circumstances. ECP brake systems also are capable of performing continual electronic self-diagnostic 'health checks' of the brakes to identify maintenance needs.

At the time the benefit report was issued, FRA announced its intention to propose revisions to the federal rail safety regulations in 2007 to facilitate use of ECP brakes. As FRA continues to draft the proposed rule changes, the agency has encouraged railroads to submit their own plans to install ECP brakes on a limited basis. In March 2007, FRA approved a joint request by BNSF Railway and Norfolk Southern Railway to install ECP brakes on trains to demonstrate the safety and efficacy of the technology in revenue service. With the approval, trains equipped with ECP brakes will be able to safely travel up to 3,500 miles without stopping to undergo certain routine brake inspections, more than double the distance currently allowed by federal regulations. It is expected that the railroads will use ECP brakes on container-only trains from West Coast ports to Chicago and on trains carrying coal from the Powder River Basin fields in Wyoming to southern and eastern power plants.

FRA placed several conditions on the approval, including requirements that the railroads clearly define a process for handling brake problems discovered en route; ensure that ECP brake inspections be performed by qualified individuals; and provide appropriate training to crew members. Proper safeguards will be in place and will permit FRA to gather extensive data that could be used in developing its proposed rulemaking.

In addition, ECP brakes support the U.S. Department of Transportation's *National Strategy to Reduce Congestion on America's Transportation Network*. Better brakes mean longer trains can move more freight faster and safer to help reduce congestion on America's rail system.

Passenger Rail Safety Initiatives

While the *Action Plan* focuses on improving the safety of freight railroad operations, FRA has also been making important progress on passenger rail safety during the past two years.

In August 2006 FRA published proposed new passenger rail safety standards to improve evacuation of passengers from trains, provide additional ways for rescuers to access the passenger car in case of an emergency, and enhance onboard emergency communication systems. FRA is preparing the final rule, which is expected to be published in 2007.

In addition, FRA is currently developing a proposed rule focusing on passenger car emergency signage, low-location exit path marking, and emergency lighting. FRA is also preparing a proposed rule to enhance structural strength requirements for the front of cab cars and multiple

unit locomotives. These enhancements would include the addition of "energy deformation" requirements specified in revised APTA standards for front-end collision posts and corner posts for this equipment.

In February 2007, FRA held the first meeting of its Railroad Safety Advisory Committee Task Force to review passenger safety at stations with high-level platforms where there are gaps between passenger car doorways and the platform. FRA has made this issue a priority. The Task Force will also address safety concerns associated with other matters directly affecting passenger safety on or around station platforms, such as express trains through stations, and make any necessary recommendations to FRA for regulatory action.

In May 2006, FRA unveiled the Passenger Rail Vehicle Emergency Evacuation Simulator, or "Rollover Rig," which can rotate a full-sized commuter rail car up to 180 degrees to simulate passenger train derailment scenarios. It provides researchers the ability to test new passenger rail evacuation strategies and safety components such as emergency lighting, doors, and windows and gives first responders a unique training tool.

And, in March 2006, FRA successfully conducted the final in a series of full-scale passenger train collisions at its testing facility in Pueblo, Colorado, to test new Crash Energy Management technology. The passenger train was equipped with crush zones which absorb the force of a crash to better protect passenger seating areas and operators' spaces. The crush zones have stronger end frames that act as bumpers to distribute crash forces throughout an entire train so passengers feel less of the impact. Other devices tested include newly designed couplers, which join two cars together and are built to retract and absorb energy to keep trains upright on the tracks during a crash. New passenger seats and chairs designed with special padding and crushable edges also were tested.

Proposed FRA Rail Safety Legislation

In February 2007, FRA submitted to Congress the "Federal Rail Safety Accountability and Improvement Act" (H.R. 1516 and S. 918) to reauthorize the agency for four years and to strengthen its safety program. The proposed bill's major provisions include: giving FRA authority to regulate railroad worker hours of service; providing greater emphasis by FRA and railroads to establish risk reduction programs; and improving highway-rail grade crossing safety.

A major challenge is to ensure that train crewmembers have adequate opportunity to rest, are free of disorders that can disrupt sleep, and are fully engaged in maintaining alertness. The current statutory provisions—first enacted in 1907-- that govern the hours of service of railroad train crews, dispatchers, and signal maintainers are antiquated and inadequate to address present realities. The FRA proposal would replace railroad hours of service laws with comprehensive,

scientifically based regulations and make use of a century worth of learning on sleep-wake cycles and fatigue-induced performance.

Under the proposal, the maximum on-duty or minimum off-duty hours would be established by FRA, much like hours of service standards are set for airline pilots by the Federal Aviation Administration and for truck drivers by the Federal Motor Carrier Safety Administration. If given the authority, the FRA Railroad Safety Advisory Committee, made up of railroad management, labor representatives and other key stakeholders, will review the issue and develop recommendations on new hours of service limits based on current, sound science before any changes are made.

To achieve additional safety improvements, the FRA proposal also will supplement traditional safety efforts with the establishment of risk reduction programs. FRA will place increased emphasis on developing methods to systematically evaluate safety risks in order to hold railroads more accountable for improving the safety of their own operations, including risk management strategies and implementing plans to eliminate or minimize the opportunity for workers to make errors which can result in accidents.

Other provisions in the FRA proposal include requiring states and railroads to update the National Highway-Rail Grade Crossing Inventory on a regular basis to ensure current information is available for hazard analysis in determining where federal highway safety improvement funding is directed. In addition, the bill seeks to encourage the creation and deployment of new, cost-effective technology at the Nation's approximately 80,000 public highway-rail grade crossings that still lack active warning devices.

Furthermore, the proposed legislation would expand the authority of the FRA to disqualify any individual as unfit for safety-sensitive service for violation of federal regulations related to transporting hazardous materials, among other items.

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