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| Description of document: | Federal Railroad Administration (FRA) agency records/reports produced for Congress after November 10, 2006 not posted on a Department of Transportation (DOT) public internet website, 2011 |
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| Source of document: | FOIA Request<br>Freedom of Information Act Coordinator<br>Office of Chief Counsel<br>Federal Railroad Administration<br>1200 New Jersey Avenue, Stop 10<br>Washington, DC 20590<br>Fax (202) 493-6068<br>Email: FRAFOIA@dot.gov |

From: <kathryn.hurd@dot.gov>
Date: Thu, 29 Sep 2011 17:16:14 -0400
Subject: FRA FOIA File No. 10-237

This email is in response to your Freedom of Information Act (FOIA) request to the Federal Railroad Administration (FRA) for agency records or reports produced for Congress after November 10, 2006 that are not posted on a Department of Transportation public internet website.

In accordance with the FOIA, I am attaching the following related documents:

- December 2009 Railroad Safety Strategy
- September 2010 Railroad Carrier Employee Exposure to Radiation
- February 2011 letters to Congress regarding deadlines, and enclosures
- March 2011 FY2011 Interim Monitoring Plan for the High Speed Intercity Passenger Rail Program
- April 2011 Congressional Scorecard

Please note, due to the size of the files, No fee has been assessed in light of the minimal cost incurred in processing your request. Since the FRA has no other records in its possession that are responsive to your request, I am closing your file in our office. If you have any questions about the processing of your request, please contact FRA's FOIA Officer, Denise Kollehlon.

Sincerely,

Kathryn Hurd
Attorney-Advisor
Federal Railroad Administration

# Railroad Safety Strategy

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

December 2009

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# Contents

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# Railroad Safety Strategy

## Introduction

Section 102 of the Rail Safety Improvement Act of 2008 (RSIA) directed the Federal Railroad Administration (FRA) to develop a Railroad Safety Strategy and submit it at the same time as the President's budget. FRA has incorporated this requirement with the fiscal year (FY) 2011 budget request to ensure consistency between this strategy and funding requests to achieve our safety goals. This report's organization mirrors the legislation language structure.

Section 102 of the RSIA reads as follows:

*Railroad Safety Strategy*

a) *Safety Goals – In conjunction with existing federally required and voluntary strategic planning efforts ongoing at the Department and the Federal Railroad Administration as of the date of enactment of this Act, the Secretary shall develop a long-term strategy for improving railroad safety to cover a period of not less than 5 years. The Strategy shall include an annual plan and schedule for achieving at a minimum, the following goals:*
   1) *Reducing the number and rates of accidents, incidents, injuries, and fatalities involving railroads including train collisions, derailments, and human factors.*
   2) *Improving the consistency and effectiveness of enforcement and compliance programs.*
   3) *Improving the identification of high-risk highway-rail grade crossings and strengthening enforcement and other methods to increase grade crossing safety.*
   4) *Improving research efforts to enhance and promote railroad safety and performance.*
   5) *Preventing railroad trespasser accidents, incidents injuries and fatalities.*
   6) *Improving the safety of railroad bridges, tunnels, and related infrastructure to prevent accidents, incidents, injuries and fatalities caused by catastrophic failures and other bridge and tunnel failures.*

b) *Resource Needs. – The strategy and annual plan shall include estimates of the funds and staff resources needed to accomplish the goals established by subsection (a). Such estimates shall also include the staff skills and training required for timely and effective accomplishment of each such goals.*

c ) *SUBMISSION WITH THE PRESIDENT'S BUDGET. – The Secretary shall submit the strategy and annual plan to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Transportation and Infrastructure at the same time as the President's budget submission.*

*d) ACHIEVEMENT OF GOALS. –*

1) *PROGRESS ASSESSMENT. – No less frequently than annually, the Secretary shall assess the progress of the Department toward achieving the strategic goals described in subsection (a). The Secretary shall identify any deficiencies in achieving the goals within the strategy and develop and institute measures to remediate such deficiencies. The Secretary and the Administrator shall covey their assessment to the employees of the Federal Railroad Administration and shall identify any deficiencies that should be remediated before the next progress assessment.*
2) *REPORT TO CONGRESS. – Beginning in 2009 not later than November 1 each year, the Secretary shall transmit a report to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Transportation and Infrastructure on the performance of the Federal Railroad Administration containing the progress assessment required by paragraph (1) toward achieving the goals of the railroad safety Strategy and annual plans under subsection (a).*

This report is our initial strategy as requested by Congress. FRA will provide an evaluation of our performance a year from this budget submission.

## Background

FRA promotes and regulates safety throughout the Nation's railroad industry. Most of its regulatory authority is codified under Title 49 Code of Federal Regulations (CFR) Parts 200-299. FRA has numerous enforcement tools under its authority, including defect and deficiency warnings, civil penalties, compliance and emergency orders, special notices, and directives.

FRA executes its regulatory and inspection responsibilities through a diverse staff of railroad safety experts who share their experience with the industry. The staff includes more than 400 inspectors and other safety professionals across the Nation who are assigned to eight regional offices. FRA safety inspectors specialize in five safety disciplines consisting of Track and Structures, Signal and Train Control (S&TC), Motive Power and Equipment (MP&E), Operating Practices (OP), and Hazardous Materials (HM). In addition, FRA's field complement includes program managers for highway-rail grade crossing safety and trespass prevention, bridge structure specialists, and industrial hygienists.

The railroad industry experienced a significant improvement in safety from calendar year (CY) 2000 to 2008, with the total number of all reportable rail-related accidents and incidents declining 26 percent. During this period, train accidents also fell by 18 percent, casualties (deaths and injuries) dropped 24 percent, and highway-rail grade crossing incidents decreased 32 percent. These actual-number results are all the more impressive because they occurred during an era where train miles increased 6 percent.

As remarkable as these numbers are, several major freight and passenger train accidents in 2004 and 2005 raised concerns about railroad safety. In addition to several key national rail safety initiatives that FRA has championed since 2005, the agency has also devoted four of its six safety performance measures to evaluate train accidents under the Government Performance and Results Act of 1993 (GPRA).

## Long-Term Strategy Measures

FRA believes that the long-term strategy achievements expected from the RSIA in Sec. 102 and other FRA safety efforts are best evaluated using GPRA results. FRA has been using these goals to measure regional performance and FRA's overall safety performance since GPRA was officially implemented at the agency.

FRA's GPRA goals for FY 2012 through FY 2015 at this time only assumes FRA inspector staffing increases of 5FTE/10 positions for FY 2011. When additional field inspectors are hired, the impact on safety improvements is not immediate. Our experience shows to expect at least a 1-year lag in safety improvement from new inspectors. This time is used to train them on performing safety enforcement duties.[1]

Increases in headquarters positions focus on ways to achieve safety improvements through rulemakings, enforcement oversight, and alternative methods such as the Risk Reduction Program (RRP). RRP looks for ways to improve safety by identifying areas through industry collaboration that achieve safety results in ways not previously identified. FRA's GPRA goals are listed in the tables below.

**FRA GPRA Goal #1: Grade Crossing Incidents (per million train miles)**

| | **2011** | **2012** | **2013** | **2014** | **2015** |
|---|---|---|---|---|---|
| **GPRA Goal** | 3.500 | 3.350 | 3.200 | 3.050 | 2.900 |

**FRA GPRA Goal #2: Human Factors-Caused Train Accidents (per million train miles)**

| | **2011** | **2012** | **2013** | **2014** | **2015** |
|---|---|---|---|---|---|
| **GPRA Goal** | 1.250 | 1.245 | 1.232 | 1.232 | 1.232 |

**FRA GPRA Goal #3: Track-Caused Train Accidents (per million train miles)**

| | **2011** | **2012** | **2013** | **2014** | **2015** |
|---|---|---|---|---|---|
| **GPRA Goal** | 1.12 | 1.120 | 1.120 | 1.120 | 0.120 |

**FRA GPRA Goal #4: Equipment-Caused Train Accidents (per million train miles)**

| | **2011** | **2012** | **2013** | **2014** | **2015** |
|---|---|---|---|---|---|
| **GPRA Goal** | 0.450 | 0.450 | 0.450 | 0.450 | 0.450 |

[1] Note: FRA revises its GPRA goals on an annual basis.

**FRA GPRA Goal #5: Signal/Misc. Train Accidents (per million train miles)**

| | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|
| **GPRA Goal** | 0.590 | 0.585 | 0.580 | 0.575 | 0.570 |

**FRA GPRA Goal #6: Non-Accident Hazmat Releases**

| | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|
| **GPRA Goal** | 0.780 | 0.760 | 0.740 | 0.720 | 0.700 |

FRA also has an overall performance measure that reports on accidents/incidents per million train miles as part of the U.S. Department of Transportation (DOT) Safety Performance Goals. These goals, like other safety goals, are based on available data for analysis. Programs such as the National Safety Program Plan (NSPP), the National Inspection Plan (NIP), rulemakings, RRP, and inspections contribute to achieving these safety goals.

**DOT Safety Performance Goals: Rail Accidents/Incidents per Million Train Miles***

| | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|
| **DOT Goal** | 16.40 | 16.25 | 16.05 | 15.80 | 15.50 |

*This projection assumes that all five of the Automatic Track Inspection Program (ATIP) cars will be in service (including T17, T19, and T20) and that the Track Integrity Group will be fullly staffed by 2010.

## RSIA Safety Goals

### Goal #1: Reducing the number and rates of accidents, incidents, injuries, and fatalities involving railroads, including train collisions, derailments, and human factors.

National Safety Program Plan (NSPP)

The NSPP is the FRA Office of Railroad Safety's annual (fiscal year) document designed to ensure the sound implementation of the National Safety Program, including identification of recurring and nonrecurring special-emphasis activities for the year. The NSPP provides a mechanism for planning recurring activities (e.g., dispatch-center assessments performed triennially on a rotating basis). At the national level, it identifies emphasis areas based on data analyses, including interregional initiatives directed at particular system-level issues of concern for major railroads operating in multiple regions. The NSPP for FY 2010 integrates safety planning for all elements of the Office of Railroad Safety into a single document.

National Inspection Plan (NIP)

In December 2004, the Office of Inspector General (OIG) recommended that FRA submit to the Secretary of the Department of Transportation a comprehensive rail safety plan for implementing a program that, among other things, makes meaningful use of available data on which to focus inspection activities. In 2005, FRA issued the National Rail Safety Action

Plan, which contains the development and implementation of a new NIP. Under this approach, FRA inspectors focus their efforts on locations that, according to data-driven models, are likely to have safety problems.

The purpose of the NIP is to optimize FRA's ability to reduce the rates of various types of train accidents, releases of hazardous materials, and casualties from human factor (HF) errors. The plan provides guidance to each regional office on how its inspectors, who each specialize in one of the five inspection disciplines, should divide their work by railroad company and State.

The NIP is a process that involves three steps. In the first step, FRA headquarters produces an initial baseline plan for each of the agency's eight regions. In the second step, the regional administrators may adjust the goals for their respective regions based on local knowledge and emerging issues. In the third step, once the fiscal year starts, FRA monitors how the regions are meeting their inspection goals. The NIP is implemented through a Web-based interface that allows FRA headquarters and the regions to monitor progress in field inspections during a fiscal year.

Dashboard

In 2008, FRA deployed a Dashboard tool on its secure Web site to provide its leadership, regional management, and inspection workforce multiple views of the agency's current and historical enforcement efforts. Inspection data from the field is compiled in near-real time fashion and a nightly process creates the data stores to display detail and aggregated data graphically (bar graphs and gauges). The Dashboard is also used as an effective performance management tool. It maintains over 15 different metrics (e.g., inspection days, defect ratios, violations) at the inspector, discipline, and regional levels. Finally, the Dashboard serves as a central launch pad for several complex query and report programs that have been integrated into the output displays and allows users to "drill down" when additional detail is required. It is a useful decision support tool in managing limited inspection resources when scheduling enforcement activities such as focused inspections and audits. It also allows FRA headquarters managers to monitor inspection activities in the regions to ensure that enforcement and compliance policy is applied uniformly.

Staff directors of the various disciplines at FRA headquarters conduct regularly occurring Web meetings with regional specialists in their respective disciplines to go over the data that is compiled in the Dashboard. Using the Dashboard "cube," an online analytical processing data-mining tool, headquarters staffers are able to view inspections summarized by activity category (Top 10 categories) and correlate this with information on what types of accidents and incidents are occurring in the region. This allows headquarters and the regions to jointly address where the safety hazards are being identified and plan inspection activities accordingly. The regional managers also use the compiled data to ensure that each discipline and each inspector is maintaining the goals and to address outliers in the data.

Rulemakings

*Railroad Safety Advisory Committee (RSAC)*

Through its RSAC, FRA works collaboratively with Government entities, railroads, unions, trade associations, suppliers, and other stakeholders to fashion mutually satisfactory solutions on safety regulatory issues. Recent RSAC efforts include rules regarding passenger train emergency systems, accident/incident reporting, and railroad operating rules. Its schedule for 2009 included additional protection for roadway workers, passenger equipment crashworthiness, medical standards for safety-critical personnel, hours of service recordkeeping, bridge safety standards, and advanced signal and train control technology (i.e., positive train control).

FRA has worked to implement several other new regulations through the traditional rulemaking process. These recent rulemakings include: electronically controlled pneumatic brakes, poison inhalation hazard (PIH) tank car crashworthiness (with the Pipeline and Hazardous Materials Safety Administration (PHMSA)), and rail-routing rule for hazardous materials (also with PHMSA).

FRA has also begun a rulemaking that establishes minimum training standards for each class or craft of safety-related employee and equivalent railroad contractor and subcontractor employee, as specified in Section 401 of the RSIA.

*Rail Route Analysis Requirements for Security Sensitive Materials*

The Implementing Recommendations of the 9/11 Commission Act of 2007 required DOT to issue a final rule that would require rail carriers of security-sensitive hazardous materials to "select the safest and most secure route to be used in transporting" those materials, based on the rail carrier's analysis of the safety and security risks on primary and alternate transportation routes. On November 25, 2008, PHMSA, in close consultation with FRA, published a final rule implementing these requirements. FRA administers the PHMSA rule and may force a carrier to use routes other than those selected if it finds that: (1) the carrier failed to conduct an adequate analysis; or (2) the carrier failed to select the safest and most secure route. This action would only be taken after consulting with PHMSA, the Transportation Security Administration, and the Surface Transportation Board.

PHMSA's rail routing rule requires rail carriers of security-sensitive hazardous materials to annually compile traffic data on shipments of these materials. The Department of Homeland Security (DHS) and DOT have determined that security-sensitive materials are bulk shipments of PIH materials; certain explosive materials that pose a hazard of mass explosion, fragment projectile, or a fire hazard; and certain high-level radioactive material shipments. Railroads are required to annually analyze and assess the safety and security of the routes used to transport these security-sensitive materials and all available practicable alternative routes over which they have authority to operate, and to solicit input from State, local and tribal officials regarding security risks to high-consequence targets along or in proximity to the routes. The route assessment must consider a minimum of 27 risk factors, including rail infrastructure characteristics along the route, proximity to iconic targets, environmentally

sensitive or significant areas, population densities, and emergency response capabilities. After considering mitigation measures to reduce safety and security risks, the railroads are to select the practicable routes that pose the least overall safety and security risks. Railroads can elect to make their initial routing decisions by September 1, 2009, based on analysis of 6-month data (from July to December 2008), or make their decisions by March 31, 2010 (based on calendar year 2008 data).

Using funding from DHS, the Railroad Research Foundation developed a risk management tool that will assist rail carriers in performing the safety and security analyses mandated by the RSIA. The Rail Corridor Risk Management System (RCRMS), a Web-based interactive tool, will enable rail carriers to identify route characteristics using the 27 factors and to weigh safety and security impacts. The RCRMS thus provides a standardized, consistent approach to the process of selecting the rail routes posing the least overall safety and security risks for security-sensitive hazardous materials.

*Railroad Operating Rules (ROR)*

The ROR final rule is already making a significant impact in the improvement of railroad transportation safety at the national, State, and local levels, while dramatically enhancing the safety of all railroad employees. The new rule directly addresses 49 percent of the HF accident causes and enhances transportation safety for railroad employees and the public by bringing responsibility and accountability for compliance with critical railroad operating rules to the industry.

The final rule covers both railroad operational testing programs and railroad operating practices related to the handling of equipment, switches, and fixed derails. The rule establishes greater accountability for implementation of sound operating rules necessary for safety. The theme of the final rule is accountability. It embodies a broad strategy intended to promote better administration of railroad programs, on the one hand, and a highly targeted strategy designed to improve compliance with railroad operating rules addressing three critical subject matters, on the other. Within this framework, FRA is taking responsibility to set out certain requirements heretofore left to private action and will be monitoring compliance with those requirements through appropriate inspections and audits. Railroad management is held accountable for putting in place appropriate rules, instructions, and programs of operational tests. Railroad supervisors are held accountable for doing their part to administer operational tests and establish appropriate expectations with respect to rules compliance. Railroad employees are held accountable for complying with specified operating rules and will have a right to challenge if they are instructed to take actions that, in good faith, they believe would violate the rules. This framework of accountability is intended to promote good discipline, prevent train accidents, and reduce serious injuries to railroad employees.

In CY 2004, 32 people were injured as a result of 646 accidents, but by 2007, the number of injuries was reduced to 5. For 2004, the industry suffered $30,458,185 in damages as a result of HF-caused accidents, but through 2007, the total cost to the industry was $18,801,398. The 2008 figures through April (117 HF-caused accidents, 0 injuries or deaths, and

$4,888,372 in damages) bode well for continued improvement. Furthermore, the reduction of HF-caused accidents and employee injuries was a key objective of FRA and DOT's National Safety Plan, and the team's activities over the last 3.5 years have accelerated the drive to accomplish this primary objective.

*Electronically Controlled Pneumatic (ECP) Brakes*

In CY 2005, 14 percent of train accidents on mainline track caused by human error involved the improper handling or misuse of the automatic braking system. Today's air-brake systems are built on 19th century pneumatic technology that has been progressively refined to support current railroad operations. Broad agreement exists among railroads, suppliers, and users of these systems that they have serious limitations that cannot be remedied with further incremental changes.

In 2006, FRA released the final report, "ECP Brake System for Freight Service." The study addresses the issues surrounding this technology, presents alternative plans for ECP brake implementation, and offers a recommended approach.

On October 16, 2008, FRA issued revisions to regulations governing freight power brakes to provide for and encourage the safe implementation and use of ECP brake systems. This rule allows railroads to take advantage of productivity-enhancing technologies to achieve very significant long-term cost savings. This technology has the potential to alleviate congestion on many rail corridors and, thus, increase rail capacity and economic growth for the Nation. The economic analysis and information collection package were key to obtaining Office of Management and Budget clearance for issuance of this rule. The MP&E Division had processed this rulemaking on an expedited basis starting in FY 2007. The new rule has encouraged the safe implementation and use of new ECP brake systems by providing specific requirements relating to the design, interoperability, training, inspection, testing, handling defective equipment and periodic maintenance related to ECP brake systems. Since the issuance of the new rule, FRA has continued to meet with the railroads and provide safety oversight for new ECP brake-equipped train starts. To date, BNSF Railway has successfully deployed two ECP brake-equipped standalone "pilot" coal trains (Alabama to Wyoming), Norfolk Southern Railway has two such trains (in Pennsylvania and West Virginia) and Union Pacific Railroad has one intermodal ECP brake-equipped train (Long Beach, CA to Dallas, TX). These ECP brake-equipped trains provide for significantly enhanced safety which includes shorter stopping distances (up to 30 percent reduction), reduced train slack action, reduced brake shoe/rigging wear, and better train handling as well as enhanced energy conservation/fuel savings.

*Positive Train Control (PTC)*

FRA is continuing to support national deployments of advanced signal and train control technology to improve the safety, security, and efficiency of freight, intercity passenger, and commuter rail service through regulatory reform, project safety oversight, technology development, and financial assistance. "Positive Train Control" refers to technology that is capable of preventing train-to-train collisions, overspeed derailments, and casualties or

injuries to roadway workers (e.g., maintenance-of-way workers, bridge workers, signal maintainers) operating within their limits of authority. PTC systems vary widely in complexity and sophistication based on the level of automation and functionality they implement, the system architecture utilized, and the degree of train control they are capable of assuming. Current PTC system designs either act as a safety overlay for existing methods of rail operations or provide the functionality necessary to implement new methods of rail operations. PTC technology also has the potential capability to limit adverse consequences of events such as hijackings and runaways that are of special concern in an era of heightened security. Because of the requirements of the RSIA, FRA has tasked the RSAC with a new Federal regulation requiring each Class I railroad and any entity that provides regular scheduled intercity or commuter rail passenger transportation to submit a plan for implementing a PTC system.

Risk Reduction Program (RRP)

The RRP is an FRA-led, industrywide initiative to reduce accidents and injuries, and build strong safety cultures by developing innovative methods, processes, and technologies to identify and correct individual and systemic contributing factors using "upstream" predictive data. RRP will incorporate developing knowledge of precursors to actual accidents, confidential reporting, effective problem analysis, and corrective actions. The adoption of new non-regulatory approaches creates the opportunity for accelerated improvement but does not supersede current regulatory approaches. Since FRA initiated this program on its own, the RSIA has mandated it and made it mandatory by October 2012.

FRA envisions a wide variety of projects that could fit under the RRP umbrella. Some examples include the close-call reporting systems, peer observation programs, management development systems, and the Collision Hazard Analysis currently in place on some commuter railroads. In addition, use of the Track Quality Index or innovative use of wayside equipment monitors and sensors for predictive maintenance or capital investment might qualify as RRP programs. In fact, any innovative use of predictive data could be seen as a potential pilot.

In addition to the voluntary programs, by October 2012, FRA will implement a regulation requiring certain railroads to develop and implement risk reduction programs, and to file RRP plans with the FRA. Once the regulation is in effect, FRA will approve the plans and will monitor railroads' compliance with the plans to ensure that railroads proactively identify and address risks. Given that this program is in its infancy and will not be an industrywide requirement for several years, the ability to estimate or predict the impacts on future improvements on safety are difficult to accomplish. Also, given that this program will not be required industrywide, it might take several years for the benefits to materialize.

Passenger Rail Division

In 2009, FRA formally established the Passenger Rail Division (PRD) to support the RSIA initiative for the development of passenger rail programs throughout the United States by October 16, 2012, and the American Recovery and Reinvestment Act of 2009 (ARRA) to

support high-speed rail (HSR) and commuter/passenger rail development. The PRD is coordinating and maintaining FRA safety policies, regulations, and guidance for all matters related to HSR, intercity rail, commuter rail, and shared-use rail operations.

The primary focus of the PRD will be to develop new Federal standards for rail passenger equipment, training, and operations. The program will also help to evaluate proposed rail operations to determine if they are safe and whether the proposed equipment meets Federal standards.

More specifically, this division will concentrate on the many issues associated with the selection, implementation, and evaluation of passenger rail projects pertaining to System Safety and Emergency Response Plans, and the PRD will also address the many issues associated with the selection, implementation, and evaluation of "new start" railroads and the associated planning and determination of compliance with existing Federal regulations. The division's responsibilities would also include a focus on pilot projects that involve application of new technologies to improve safety.

Some of the most important work administered by the PRD is passenger rail system safety. The PRD directs an outreach program to provide passenger railroads training and information on system safety techniques. PRD staff also collaborates with the American Public Transportation Association (APTA) to conduct system safety audits on passenger rail operations. System safety for passenger rail operations is currently a voluntary program. PRD staff, however, is working with an RSAC group to develop a System Safety Regulation that will require all passenger railroads to develop and implement System Safety Programs (SSP) that satisfy the RSIA requirements for a risk reduction program.

System safety uses innovative hazard management techniques to proactively identify and address safety issues before accidents occur. Use of system safety supports the FRA Railroad Safety Strategy in that the hazard management techniques can reduce the number, frequency, and severity of all passenger rail related accidents, injuries, and fatalities, including those related to trespassing and highway-rail grade crossings.

The PRD goals include completion of the RSAC portion of the System Safety Regulation by February 2010 and issuing a notice of proposed rulemaking (NPRM) for the System Safety Regulation by September 2010.

The division will continue to provide training and information on system safety and FRA requirements to all passenger rail new starts. The PRD goal is for all passenger rail new starts to have adequate training and information to establish its own SSP.

Another important initiative for the PRD is to provide program management for the development of HSR standards, regulations, and rules of particular applicability, and to address HSR mandates contained in RSIA and ARRA for HSR corridors. FRA regulations for HSR currently support maximum train speeds of 150 mph. The HSR vision contained in the RSIA and ARRA contemplates train speeds of up to 220 mph.

The PRD is currently working with two potential HSR operators, DesertXpress and California HSR, to identify appropriate safety requirements for those applications. The PRD goal is to have requirements fully defined for DesertXpress and California HSR by 2011. However, identification and funding of additional projects in the coming year may require the PRD to both broaden and focus its efforts to address the variety of projects that may eventually be funded.

**Goal #2: Improving the consistency and effectiveness of enforcement and compliance programs.**

Industrial Hygiene

The Industrial Hygiene Division has a dual role within FRA. The division is responsible for performing activities in support of Administration enforcement in the railroad industry as well as for implementing internal Occupational Safety and Health Administration compliance programs in safety and health for the benefit of our coworkers.

In regulatory enforcement, the Division has primary responsibility for ensuring compliance with the regulations governing occupational noise exposures in locomotive cabs and exposures to contaminants in the cabs of maintenance-of-way equipment. As the Occupational Noise Exposure regulation for the locomotive cab occupants gets fully implemented, more enforcement efforts are expected to take place there. The Division supports the MP&E, Track, OP, HM, and Signal disciplines in the areas of the use of fall protection for railroad bridge work, diesel exhaust in locomotive cabs, and non-occupational noise rules; as well as Environmental Protection Agency noise rules from 40 CFR Part 201 under 49 CFR Part 210, and 49 CFR Section 229.129, *Audible warning device*. In the future, the Division will also play a role in the enforcement of a future regulation on fitness-of-duty (medical standards) of railroad safety employees.

The Division also has primary responsibility for FRA internal safety and health compliance programs including bloodborne pathogens, confined space entry, hearing conservation, radiation protection, and injury and illness reporting. The Division develops the structure of the programs, develops and provides the training associated with them, provides guidance for compliance, and maintains all necessary records.

Discipline-Specific Technical Training

The Safety Improvement and Development Team (SIDT) is staffed with discipline-specific trainers that train inspectors throughout the year on FRA safety regulations. The primary mission of the SIDT is to manage the Office of Railroad Safety's Technical Training Program for the 600 Federal and participating State railroad safety inspectors and specialists of the five technical disciplines. To accomplish this mission, the team designs, develops, and delivers specialized internal courses, and administers contract training from external sources as necessary. A test is given before and after each class to confirm that inspectors are learning skills to effectively enforce safety regulations. Classroom training using established training modules includes enforcement directives from newly issued technical bulletins,

enforcement manuals, and rule modifications. This focus improves uniformity of enforcement nationwide and is a way of determining that FRA inspectors meet agency qualification requirements.

Technical training is based on organizational needs and is therefore considered mandatory. Various types of analyses are performed to determine the organizational needs, including feedback from headquarters, the regions, and the inspectors. On average, the team manages approximately 45 classes in 22 different courses of study each year. SIDT also develops and delivers general training to all Federal and State employees who may be assigned to perform accident investigations or write specialized reports, and to meet special agency needs such as steam locomotive inspections, using radar to monitor train speeds, and fatigue-related assessments for safety-related railroad employees. On average, new inspectors attend 7 weeks of classroom training during their first 2 years of employment, and all inspectors and regional specialists attend at least 1 week of classroom training per year.

The SIDT also develops and administers on-the-job training standards for new railroad safety inspectors and inspector trainees. These standards, based on a model used by the Department of Defense, are specific to FRA inspection tasks. They are designed to ensure that the tasks are fully described, that conditions for learning transfer are present, and that standards of proficiency are met before an inspector is deemed qualified.

FRA held discipline-specific training conferences focused on uniformity of enforcement for all five disciplines in FY 2009. The guidance provided reduces variations among inspectors in their enforcement of Federal safety regulations.

Technical Bulletins

Technical bulletins are internal documents (usually memoranda) issued to FRA's regional personnel by FRA's Director for Safety Assurance and Compliance. The bulletins provide interpretive guidance and they help clarify specific issues under the rail safety regulations and other safety issues. Technical bulletins improve the awareness of inspectors and industry persons in terms of what is expected from them when enforcing or complying with existing safety regulations. The intermediate outcome is more uniform compliance, which improves the quality of compliance and data used to measure achievement of safety goals. Newly produced bulletins are immediately distributed to inspectors by e-mail, added to REG-Trieve disks every quarter (which are distributed to inspectors for easy access to these documents on their laptop computers), and incorporated into training classes.

Compliance Manuals

The Office of Railroad Safety uses six manuals to establish and clarify organizational expectations for railroad safety inspectors, safety specialists, and regional managers. All of the manuals are primary source documents for both classroom and on-the-job training.

The General Manual describes the organization of DOT, of FRA generally, and of the Office of Railroad Safety specifically. This manual includes step-by-step instructions that regions

and inspectors must use when performing accident investigations, clarifies general expectations for use of enforcement and other compliance tools, explains in general terms other safety mechanisms and investigations the Office of Railroad Safety uses to ensure a higher level of safety in the United States, and provides interviewing guidance.

The Office of Railroad Safety also publishes compliance manuals for the five railroad safety inspection disciplines. These manuals establish organizational expectations for inspection tasks, establish specialized investigation requirements, and explain application of FRA safety regulations.

Performance Evaluations

Performance evaluations for regional administrators include GPRA safety goals. Quarterly progress reports are provided to regions showing their progress toward their share of annual national goals. The intermediate outcome provides a means for evaluating what the region is doing to improve safety and a way to check on what their region is doing to succeed at making a difference in safety.

Rail Integrity

The Rail Integrity Group within the Track and Structures Division was established to provide FRA oversight on railway non-destructive inspection programs and other rail-related maintenance programs. The Rail Integrity Group maintains FRA safety policies and provides guidance for all rail-related issues as determined by 49 CFR Part 213, Track Safety Standards. The group is the primary representative for the Office of Railroad Safety and other FRA divisions concerning rail-related incidents that impact railway safety.

The purpose of the Rail Integrity Group is to provide expert advice and assistance to headquarters, regional safety staff and regional administrators on safety issues relating to management, inspection, and maintenance of railroad rail; railroad safety issues related to rail and components; and issues concerning rail defect development, rail failure, and rail-caused train accidents.

The Rail Integrity Group analyzes the current non-destructive rail inspection programs and processes, rail maintenance programs, and make recommendations on those analyses. They perform onsite inspections, investigations, and/or evaluations to determine the effectiveness of railroad safety programs which address the inspection, maintenance, and replacement of rail. They also provide oversight into the capabilities of the various non-destructive detection systems, the training and experience of the flaw detector car operators, and the accuracy of the defect verification process utilized by the test car operator.

Automated Track Inspection Program (ATIP)

In the field of technology, FRA oversees a fleet of track geometry rail cars under its ATIP. These advanced, specially designed cars provide accurate track geometry data to assess compliance with our Federal Track Safety Standards. Currently, the fleet inspects roughly

30,000 miles a year out of approximately 220,000 miles of track, with major priorities given to passenger, hazardous materials, and defense-related routes. With the full production of the new geometry cars, ATIP intends to increase survey miles to approximately 100,000 miles per year. The track data collected under ATIP is used by FRA's railroad inspectors and by railroads to ensure track safety and to assess track safety trends within the industry. The railroads often use ATIP data as a way of checking quality assurance on their inspection and maintenance. To facilitate use of the collected data, ATIP intends to originate and distribute quarterly survey reports to agency and railroad managers to promote consistent application. ATIP will place additional emphasis on Amtrak and commuter routes to promote passenger safety. To support this goal, ATIP intends to identify track segment locations based on quality index for additional attention by ATIP, regions and railroads.

**Goal #3: Improving the identification of high-risk highway-rail grade crossings and strengthening enforcement and other methods to increase grade crossing safety.**

During the past 6 calendar years for which complete data is available, grade crossing incidents have decreased 20 percent, from 2,977 in 2003 to 2,373 in 2008. Casualties have likewise declined, with fatalities and injuries down 14 percent and 12 percent, respectively. While these are encouraging trends, the number of accidents and casualties remains a concern for FRA.

FRA will promote and enhance public safety over the next 5 years by reducing rail-related deaths and injuries due to collisions at highway-rail grade crossings. This will be achieved by using additional public outreach and educational programs, and increasing law enforcement partnerships.

During the 5-year period, FRA will partner with national organizations (e.g., Operation Lifesaver, Inc. (OLI)), the Federal Motor Carrier Safety Administration (FMCSA), the Federal Highway Administration (FHWA) and the National Highway Traffic Safety Administration (NHTSA), and non-Federal law enforcement agencies, to increase awareness and enforcement of highway-rail grade crossing violations. The following is a brief description of some of the organizations and how FRA will work with them:

| | |
|---|---|
| **OLI** | A nonprofit, international, continuing public education program first established in 1972 to end collisions, deaths, and injuries at places where roadways cross train tracks, and on railroad rights-of-way. FRA will provide funding and assistance in program development. |
| **FMCSA** | Focuses on reducing crashes, injuries, and fatalities involving large trucks and buses. FRA will join forces with FMCSA outreach efforts and activities to prevent collisions at highway-rail grade crossings. |

| | |
|---|---|
| **Law Enforcement** | Increases partnerships between FRA and law enforcement through FRA's Law Enforcement Liaison Program. In addition, works with the National Sheriffs' Association and the International Chiefs of Police Association to foster a better relationship with law enforcement. |
| **FHWA, NHTSA** | FRA will continue to work with these agencies and FMCSA to encourage Departmental advocacy for improving crossing safety. |

Prior to FY 2011, FRA will have:

- Updated the *Compilation of State Laws and Regulations Affecting Highway-Rail Grade Crossings*.
- Issued a direct final rule of particular applicability that identifies the 10 States with the most collisions over the past 3 years and required them to develop State action plans with specific solutions for improving safety at highway-rail grade crossings.
- Worked with FRA's Office of Chief Counsel to update model legislation for highway-rail grade crossing violations.
- Issued a rule that requires each railroad carrier to establish and maintain a toll-free telephone service for rights-of-way over which it dispatches trains for the reporting of emergencies or other problems.
- Provided two grant programs (assuming funding is provided as authorized) for States to improve crossing safety.

One grant is for enhanced public education and enforcement programs to reduce crossing collisions and reduce trespassing. The other grant is to provide priority funding for crossing safety improvements (e.g., signals, gates, four-quadrant gates, medians, traffic signals, lighting, signs, and crossing surfaces). These programs will continue through 2013.

During FY 2011, FRA will:

1. Study the effectiveness of various highway-rail grade crossing treatments on designated high speed-rail corridors (e.g., Northeast Corridor, North Carolina, and Michigan) and evaluate the economic benefits of the treatments. The purpose of this study is to demonstrate the benefits of making improvements at crossings where passenger and commuter train speeds are being increased.

In FY 2012, FRA will:

1. Revise the DOT Crossing Inventory Form FRA F 6180.71 to include new fields that will enhance the ability of States, railroads, FRA, and others to evaluate safety at crossings. We anticipate that a rulemaking will be necessary for the new form and accompanying guides.
2. Explore issuing a rulemaking mandating the periodic updating of the Inventory by both railroads and States, per the RSIA.
3. Issue rules or establish policy and guidance on responsibility for safety at private crossings. This is an action identified in the 2004 Secretary's Action Plan and a continuation of efforts began in 2006.

4. Update the *Compilation of State Laws and Regulations Affecting Highway-Rail Grade Crossings.* This publication compiles the existing State laws concerning highway-rail grade crossings and will be made available to the public.

In FY 2013, FRA will:

1. Research the risk reduction associated with commonly used Alternative Safety Measures in quiet zones (e.g., escape medians) to determine appropriate standard effectiveness rates. This study will potentially expand the approved Supplementary Safety Measures while eliminating the cumbersome review process of Alternative Safety Measures.
2. Work with FRA's Office of Chief Counsel to update model legislation for highway-rail grade crossing violations.

In FY 2014, FRA will:

1. Conduct a study determining the effectiveness of the new Manual on Uniform Traffic Control Devices requirement for all passive crossing to be equipped with either stop or yield signs.

**Goal #4: Improving research efforts to enhance and promote railroad safety and performance.**

FRA Research and Development

The primary goal of the FRA Research and Development (R&D) program is to enhance railroad safety for conventional and HSR operations. The R&D program is managed by the FRA Office of Research and Development (OR&D) within the Office of Railroad Development. In order to improve the effectiveness of the FRA R&D program, a rigorous process for selecting and evaluating R&D projects has been established and an annual review of the entire research program is conducted by the independent Transportation Research Board (TRB). Priorities for project selection include areas which present significant safety risks or unacceptable safety trends, where technology is most likely to have a positive impact to both safety and performance, and where there is a clear path to real-world implementation.

The R&D project evaluation and selection process has been used to identify those projects that have the potential for *significant safety impact, a positive impact on performance and appropriate technology available.* For those projects, selected emphasis is placed on producing the maximum possible real-world impact at the earliest possible time. To accomplish this, OR&D seeks to establish the partnerships with appropriate stakeholders including railroads, rail labor, suppliers and technology providers early in the life of the project. This minimizes the time between a successful research and development "proof of concept" and the application in the field. Close collaboration with Office of Railroad Safety assures early identification and remediation of potential regulatory barriers to innovation.

FRA OR&D has expanded the use of targeted grants and cooperative agreements, involving both railroads and technology providers, to provide a fast start to establish stakeholder buy-in and demonstrated real-world impact at the earliest possible time.

High-Speed Rail

Fostering the development of HSR in the United States has been an important part of FRA's work since its creation in 1967. During the 1980s and 1990s, FRA played a central role in managing or facilitating the growth of high-speed service on the Northeast Corridor. Acting in response to the Intermodal Surface Transportation Efficiency Act of 1991, FRA began the formal process of designating HSR corridors for future development and providing limited funding for corridor improvements primarily directed at safety. With the passage of the ARRA, which provides $8 billion in capital assistance for HSR corridors and intercity passenger rail service, and following President Obama's announcement of a Strategic Plan for High-Speed Rail ("*Vision for High-Speed Rail in America*"), FRA now takes on the important work of helping to make HSR a reality in markets across the Nation.

On June 17, 2009, FRA's Administrator issued a notice of funding availability and interim program guidance for the HSR Passenger Rail Program. The guidance identified transportation safety and safety planning as evaluation criteria for merit consideration of proposed projects and programs. This strategy describes how FRA will provide specificity and additional safety guidance for development of HSR systems.

The hallmark of world-class, high-speed rail is safety. FRA believes that railroads conducting HSR operations in the United States can provide service as safe as, or safer than, any HSR operation being conducted elsewhere. In anticipation of such service, and to promote public safety, FRA has developed a *High-Speed Passenger Rail Safety Strategy*. The final version of the Safety Strategy was issued in November 2009 and is now available on the FRA Web site. The Strategy includes: (1) establishing safety standards and program guidance for HSR, (2) applying a system safety approach to address safety concerns on specific rail lines, and (3) ensuring that railroads involved in passenger train operations can effectively and efficiently manage train emergencies. This strategy endeavors to achieve uniformly safe rail passenger service, regardless of speed. Since the severity of collisions and derailments increases with speed, safety performance targets for preventive measures are tiered to become more stringent as speed increases.

The strategy divides the safety issues into four categories: prevention, mitigation, emergency management, and SSPs. Each category includes FRA initiatives to address the corresponding safety issues. Some initiatives are fully developed with specific goals in place to address issues. For example:

- Vehicle Track Interaction (VTI) and key safety issues related to track and structures will be addressed through a VTI final rule scheduled to be published in the first quarter of CY 2010.
- Standards for PTC systems that define increased functionalities for higher speeds will be identified during 2010.
- Structural standards for Tier I trainsets (up to 125 mph) are under review in the RSAC Engineering Task Force. Initial guidance will be issued during the first quarter of CY 2010.

- Structural standards for Tier II and above will commence in CY 2010 after Tier I guidelines are completed.

System safety is also identified as a Safety Strategy component. HSR systems and other new passenger rail service require development and evaluation of SSPs. SSPs seek to integrate the process of identifying safety needs and managing them over time. One key to success is effective hazard identification, which focuses attention on opportunities for risk reduction in the particular circumstances of the specific passenger railroad. The purpose of an SSP is to improve railroad safety through a structured, proactive program developed and implemented by passenger railroad operators. The SSP can also support development of a strong safety culture and requires processes and procedures to identify and manage hazards inherent to the passenger railroad.

Requirements for SSPs on HSR systems will be included in HSR Rules of Particular Applicability and will be formalized for all passenger operations in ongoing rulemaking activity. The goals for System Safety include completion of the RSAC portion of the System Safety Regulation by February 2010 and issuing an NPRM for the System Safety Regulation by September 2010.

Longer-term initiatives that address specific issues related to the Safety Strategy will be developed throughout 2010. Work on these initiatives will commence as other projects are completed and technical resources become available.

**Goal #5: Preventing railroad trespasser accidents, incidents, injuries and fatalities.**

Deaths among trespassers on railroad rights-of-way (2,496 in the 5-year period 2000-2004, or approximately 500 annually) are the leading cause of fatalities attributable to railroad operations in the United States. From a study completed in May 2008, FRA learned that trespassers who die are an average of 38 years old and are most often Caucasian males. Approximately two-thirds were under the influence of alcohol and/or drugs.
Coroners described the activity of more than 43 percent of the decedents as walking, standing, sleeping, lying, reclining, lounging, or sitting on the track or in the gauge, i.e., between the rails. Seven percent were walking or running across the track. Other activities included riding a recreational vehicle (all-terrain vehicle, dirt bike, snowmobile, etc.), standing outside the gauge but obviously too close, riding or getting on or off a train, driving a highway vehicle, or being on a bridge or trestle. Tunnels were not mentioned.

<u>Future Trespassing Strategies</u>

FRA's future trespassing strategies include the following:

- Promote and enhance public safety by reducing rail-related deaths and injuries due to trespassing on railroad rights-of-way and other property, using increased public outreach and education programs. (Ongoing throughout the 5 years.)
- Partner with national organizations to increase awareness and enforcement of railroad trespassing, including OLI. In addition, FRA will partner with Drug Abuse

Resistance Education (D.A.R.E.) America to develop graffiti prevention programs with special focus on railroad trespassing.

Prior to FY 2011, FRA staff will have reviewed and evaluated existing local, State, and Federal laws that address rail trespassing, vandalism, and violations at highway-rail grade crossing signal warning devices. In addition, FRA will have developed and made available to States model prevention and enforcement strategies. By 2011, FRA will have developed a Web site for educators and law enforcement officials that outlines specific facts, lesson plans, and State laws designed for them.

In FY 2011, FRA will:

1. Host a Right-of-Way Trespass Reduction workshop that will take an indepth look at the issues surrounding one of the more significant risk areas facing the rail community: trespassing and fatalities on the railroad rights-of-way. The goal of the workshop will be to identify and share existing industry-leading practices and explore new strategies that the rail industry could pursue to reduce the number of right-of-way and trespasser incidents and fatalities.
2. Conduct a demographic study of profiles collected by the rail industry to provide information regarding the at-risk audience to be target for additional education and outreach activities.
3. Seek additional funding to provide two additional grade crossing managers to assist with the growing needs of trespassing-related issues.
4. Review and update trespass and vandalism prevention strategies.

In FY 2012, FRA will continue to promote and enhance public safety by reducing rail-related deaths and injuries due to trespassing on railroad rights-of-way and other property, using increased public outreach and education programs by:

1. Using data collected by the railroads and working with the Geographic Information System to plot each trespassing incident and fatality. This information will be useful to direct additional outreach, educational resources, and law enforcement activities to areas in need.
2. Updating the *Compilation of State Laws and Regulations Affecting Highway-Rail Grade Crossing*.

In FY 2013, FRA will:

1. Review and update model trespass legislation and vandalism model legislation.

In FY 2014, FRA will:

1. Review and update trespass and vandalism prevention strategies.

In FY 2015, FRA will:

1. Host a Right-of-Way Trespass Reduction workshop (as in 2011).
2. Conduct a demographic study of profiles (as in 2011).

**Goal #6: Improving the safety of railroad bridges, tunnels, and related infrastructure to prevent accidents, incidents, injuries, and fatalities caused by catastrophic failures and other bridge and tunnel failures.**

FRA Bridge Safety Program

FRA has been conducting evaluations of railroad bridge management programs since the 1980s, before the Bridge Safety Policy was issued as an interim statement in 1995 and in final form in August 2000. This Policy issues guidelines by which railroads should implement bridge safety management programs, and by which FRA evaluates those programs. FRA issued a revised bridge policy statement in January 2009 to add recommendations developed by the Railroad Bridge Working Group of the RSAC in 2008.

In September 2007, FRA also issued Safety Advisory 2007-03 to further explain and amplify important aspects of the agency's bridge safety policy and to re-emphasize the need for railroads to adopt and implement safe maintenance practices to prevent bridge failures.

Following enactment of the RSIA, FRA's RSAC undertook the task of developing a recommended text for a Federal railroad bridge safety regulation which would govern railroads' bridge management programs. The RSAC Working Group completed that task in April 2009. In August 2009, FRA published an NPRM based on the RSAC recommendation.

Meanwhile, FRA continues to evaluate bridge management practices on a representative sampling of the Nation's railroads, including Class I, II, and III freight railroads, and passenger carriers. The evaluations generally compare a railroad's program with the guidelines in the FRA Bridge Safety Policy, and include observations of individual bridges to determine their general condition, as well as the accuracy of the railroad's inspection reports. Most large railroads generally conform to the FRA guidelines, but FRA has discovered instances where management had not adequately evaluated or addressed critical items delineated in railroad bridge inspection reports before they developed into critical failures or near-failures. Many of the smaller railroads evaluated also conformed generally to the guidelines, but a considerable number either fell short by a large degree or showed no evidence of bridge inspection, management, or maintenance.

FRA has examined reports from January 1, 1982, through December 31, 2006, of 51 train accidents caused by the catastrophic structural failure[2] of railroad bridges, an average of two per year. During that 25-year period, two people were injured and no fatalities were attributed to structural bridge failure. Since that period, four instances have been reported to FRA in which lack of adherence to the guidelines in the Bridge Safety Policy resulted in trains operating over structural deficiencies in steel bridges that could very easily have resulted in serious train accidents.

[2] It should be noted that FRA uses the term "catastrophic failure" to describe an incident in which a bridge collapses or directly causes a train accident. A "bridge failure" is a situation in which a bridge is no longer capable of safely performing its intended function.

In CY 2007, five train accidents occurred due to catastrophic structural failure of bridges, all of which were timber trestles. The most severe of those accidents occurred on the M&B Railroad near Myrtlewood, AL, where a train of solid fuel rocket motors derailed when a timber trestle railroad bridge collapsed under the train. Several cars, including one car carrying a rocket motor, rolled onto their sides and six people were injured. FRA also recently evaluated the bridge management practices of several small railroads and found that some had no bridge management or inspection programs whatsoever.

In CY 2008, FRA had reports of two train accidents due to catastrophic structural failure of bridges, both of which were timber trestles. One railroad employee was injured from this cause.

Besides the development of regulations and the evaluation of railroad bridge management programs, FRA is cooperating with the American Short Line and Regional Railroad Association and all of the large railroads in the development of model programs that can be adopted by small railroads to enable the safe, effective, and efficient management of their bridges.

## Resources Needed

The resources needed to meet the safety programs and goals in this strategy plan for FY 2011 are found in other sections of FRA's budget request for FY 2011.

## Progress Assessment

A historic review of FRA's safety program using information from GPRA measures over a 5-year period are provided for this initial strategy. FRA is providing these results to show the progress made leading up to the RSIA requirements.

**FRA Safety Performance Measures**

**1. Grade Crossing Incidents per Million Train-Miles**

| Year | Incidents | Train-Miles (000) | Actual Rate | GPRA Goal |
|---|---|---|---|---|
| **2004** | 3,076 | 764,846 | 4.02 | NA |
| **2005** | 2,978 | 785,882 | 3.79 | 3.90 |
| **2006** | 3,069 | 805,008 | 3.81 | 3.85 |
| **2007** | 2,804 | 793,631 | 3.53 | 3.75 |
| **2008** | 2,524 | 781,449 | 3.23 | 3.75 |
| **2009 *** | 1,860 | 629,667 | 2.95 | 3.65 |

**2. Human Factors-Caused Train Accidents per Million Train-Miles**

| Year | Accidents | Train-Miles (000) | Actual Rate | GPRA Goal |
|---|---|---|---|---|
| **2004** | 1,315 | 764,846 | 1.72 | NA |
| **2005** | 1,295 | 785,882 | 1.65 | 1.66 |
| **2006** | 1,112 | 805,008 | 1.38 | 1.66 |
| **2007** | 1,034 | 793,631 | 1.30 | 1.66 |
| **2008** | 952 | 781,449 | 1.22 | 1.66 |
| **2009 *** | 621 | 629,667 | 0.99 | 1.35 |

**3. Track-Caused Train Accidents per Million Train-Miles**

| Year | Accidents | Train-Miles (000) | Actual Rate | GPRA Goal |
|---|---|---|---|---|
| **2004** | 1,004 | 764,846 | 1.31 | NA |
| **2005** | 1,099 | 785,882 | 1.40 | 1.27 |
| **2006** | 1,065 | 805,008 | 1.32 | 1.27 |
| **2007** | 1,001 | 793,631 | 1.26 | 1.15 |
| **2008** | 854 | 781,449 | 1.09 | 1.15 |
| **2009 *** | 615 | 629,667 | 0.98 | 1.15 |

**4. Equipment-Caused Train Accidents per Million Train-Miles**

| Year | Accidents | Train-Miles (000) | Actual Rate | GPRA Goal |
|---|---|---|---|---|
| **2004** | 418 | 764,846 | 0.547 | NA |
| **2005** | 392 | 785,882 | 0.499 | 0.521 |
| **2006** | 348 | 805,008 | 0.432 | 0.521 |
| **2007** | 333 | 793,631 | 0.420 | 0.521 |
| **2008** | 338 | 781,449 | 0.433 | 0.521 |
| **2009 *** | 223 | 629,667 | 0.354 | 0.450 |

**5. Other (Signal & Misc.) Train Accidents per Million Train-Miles**

| Year | Accidents | Train-Miles (000) | Actual Rate | GPRA Goal |
|---|---|---|---|---|
| **2004** | 527 | 764,846 | 0.689 | NA |
| **2005** | 557 | 785,882 | 0.709 | 0.647 |
| **2006** | 517 | 805,008 | 0.642 | 0.647 |
| **2007** | 401 | 793,631 | 0.505 | 0.647 |
| **2008** | 395 | 781,449 | 0.505 | 0.647 |
| **2009 *** | 313 | 629,667 | 0.497 | 0.647 |

**6. Non-Accident Rail Hazmat Releases per Million Train-Miles**

| Year | Releases | Train-Miles (000) | Actual Rate | GPRA Goal |
|---|---|---|---|---|
| **2004** | 669 | 764,846 | 0.875 | NA |
| **2005** | 684 | 785,882 | 0.870 | 0.965 |
| **2006** | 639 | 805,008 | 0.794 | 0.940 |
| **2007** | 700 | 793,631 | 0.882 | 0.915 |
| **2008** | 690 | 781,449 | 0.883 | 0.900 |
| **2009 *** | 547 | 629,667 | 0.869 | 0.800 |

*** FY 2009 data for 11 months**

## Conclusion

FRA's Railroad Safety Strategy includes a variety of approaches to achieve industry safety improvements. The NSPP is focused on critical safety projects that are designed to advance safety improvements. The NIP focuses Federal inspector inspection efforts toward areas on railroads needing the most attention and monitors progress made achieving inspection goals. Rulemakings are improving industry actions by providing improved methods to achieve safety advancements. The RRP is a process that brings industry and FRA together to build a strong safety culture. Highway-rail grade crossing and trespass prevention programs promote enhancing public safety through public outreach, educational programs, and increased law enforcement partnerships. FRA's research and development has potential for significant safety impact, a positive impact on performance, and identifying promising available technology. Emphasis is placed on producing the maximum possible real-world impact at the earliest possible time.

# Railroad Carrier Employee Exposure to Radiation

## Report to Congress
## September 2010


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

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# Contents

## The Mandate

Section 411 of the Federal Railroad Safety Improvement Act of 2008 (Pub. L. No. 110-432) reads as follows:

> (a) STUDY. The Secretary of Transportation shall, in consultation with the Secretary of Energy, the Secretary of Labor, the Administrator of the Environmental Protection Agency, and the Chairman of the Nuclear Regulatory Commission, as appropriate, conduct a study of the potential hazards to which employees of railroad carriers and railroad contractors or subcontractors are exposed during the transportation of high-level radioactive waste and spent nuclear fuel (as defined in section 5101(a) of title 49, United States Code), supplementing the report submitted under section 5101(b) of that title, which may include—
> (1) an analysis of the potential application of "as low as reasonably achievable" principles for exposure to radiation to such employees with an emphasis on the need for special protection from radiation exposure for such employees during the first trimester of pregnancy or who are undergoing or have recently undergone radiation therapy;
> (2) the feasibility of requiring real-time dosimetry monitoring for such employees;
> (3) the feasibility of requiring routine radiation exposure monitoring in fixed railroad locations, such as yards and repair facilities; and
> (4) a review of the effectiveness of the Department's packaging requirements for radioactive materials.
> (b) REPORT. Not later than 18 months after the date of enactment of this Act, the Secretary of Transportation shall transmit a report on the results of the study required by subsection (a) and any recommendations to further protect employees of a railroad carrier or of a contractor or subcontractor to a railroad carrier from unsafe exposure to radiation during the transportation of high-level radioactive waste and spent nuclear fuel to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Transportation and Infrastructure.
> (c) REGULATORY AUTHORITY. The Secretary of Transportation may issue regulations that the Secretary determines appropriate, pursuant to the report required by subsection (b), to protect railroad employees from unsafe exposure to radiation during the transportation of radioactive materials.

## Executive Summary

This report was prepared by the Federal Railroad Administration (FRA) following the specific mandate of Congress to investigate occupational exposures to ionizing radiation of specific groups of employees during railroad transportation of high-level radioactive waste (HLRW) and spent nuclear fuel (SNF). Commercial shipments of these types of materials are very rare since transportation to the Yucca Mountain Repository[1] is not being conducted at this time.

In an effort to establish the known levels of exposure to the materials in question, FRA obtained exposure information from one of the Class I railroads that has been conducting exposure monitoring during shipments of SNF materials. In addition, FRA reviewed reports of exposure assessments conducted in foreign locations where transportation by rail is occurring more frequently.

Both of these sources indicate that the different classes of workers identified in the mandate were found to have levels of exposure significantly lower than those expected, and also significantly lower than the radiation exposure dose limits established by the Occupational Safety and Health Administration (OSHA) in Title 29 Code of Federal Regulations (CFR) Section 1910.1096.

The data presented in this report include theoretical predictions of potential exposure to radiation, as well as real-world exposure assessments in the United States and two European countries. Both the theoretical findings and the real-world experience indicate that potential and actual exposures are well below the currently established permissible levels. All of the current regulatory permissible levels have been established recognizing the importance of the "as low as reasonably achievable" principles in minimizing exposures.

The real-world exposures in the three studies cited all found exposures well below regulatory limits. These facts would indicate that female employees exposed during the first trimester of pregnancy would not likely face a risk of adverse health effects to themselves or the fetus.

The medical and health implications of someone undergoing radiation therapy and the interaction with on-the-job exposures cannot be presumed, given the complexity of the medical procedures and types of therapy available in today's practice of medicine.

In response to the question of the feasibility of requiring routine radiation exposure monitoring in fixed railroad locations, such as yards and repair facilities, the study found that the use of dedicated trains results in minimal dwell time in such locations, and the already significant monitoring of the packages of HLRW and SNF required by regulation, along with the known shielding properties of the packages, would make monitoring of these types of sites redundant and unnecessarily costly, and would serve no practical purpose.

[1] The Yucca Mountain Repository is the United States' designated geological repository storage facility for spent nuclear reactor fuel and other radioactive waste. It is located between the Mohave and the Great Basin Deserts in Nevada.

The real-world levels measured by Norfolk Southern Railway (NS) during actual shipments indicate that the packaging far exceeds the minimum requirements for shielding, thereby providing an extra margin of safety for employees and the general public.

The U.S. Department of Transportation (DOT) does not believe that any regulatory action is necessary at this time to further protect railroad employees from unsafe exposure to radiation during the transportation of radioactive materials.

In preparing this report, FRA coordinated closely with the DOT Pipeline and Hazardous Materials Safety Administration (PHMSA), which also issues regulations governing the transportation of hazardous materials in all modes,[2] and with DOT's Office of the Secretary. In addition, FRA consulted with the U.S. Department of Energy (DOE), the Environmental Protection Agency, the Nuclear Regulatory Commission (NRC), and OSHA.

The transportation of SNF/HLRW is thoroughly regulated, and several Government agencies play active, highly coordinated roles to ensure its safety. Over the past 45 years, approximately 600 train movements of these materials have occurred by rail without any incidents affecting the integrity of the shipping packages. At the discretion of the shipper or carrier parties involved, a majority of these shipments were made using "special" or dedicated trains.[3] The responsible agencies work continually to verify the safety of packaging, rolling stock, and procedures, and oversee the training of personnel involved in transportation.

The railroad industry also issued its own standard for movement of these commodities, that seeks to establish performance guidelines for a cask/car/train system transporting high-level radioactive material. These guidelines are designed to ensure safe transportation, minimize time in transit, and incorporate the best available technology to minimize the potential for rail accidents.

During previous work involving these materials, specifically the report to Congress titled "Use of Dedicated Trains for Transportation of High-Level Radioactive Waste and Spent Nuclear Fuel" (March 2005), also called the Dedicated Train Study (DTS) conducted under a prior mandate,[4] the safety and integrity of the packaging and shipments was reported. This report will reference the DTS to the extent that it contains information contributing to the understanding of occupational exposures, which are the subject of this mandate.

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[2] FRA and PHMSA develop hazardous materials regulations specifically applicable to the rail mode for issuance by PHMSA. FRA enforces hazardous materials regulations applicable to transportation by rail. Both agencies act by delegation from the Secretary of Transportation.

[3] As used in this report, a "special" or "dedicated" train is a train that consists only of equipment and lading associated with the transportation of SNF/HLRW. That is, the train consists only of necessary motive power, buffer cars, and cask car or cars, together with a car for escort personnel. Such a train does not transport other rail rolling stock, other revenue freight, or other company freight.

[4] Section 15 of the Hazardous Materials Transportation Uniform Safety Act of 1990 (Pub. L. No. 101-615), amended Section 116 of the Hazardous Materials Transportation Act (49 U.S.C. App. 1813).

## Background

### Definitions and Discussion of Technical Terms and Concepts

A number of technical terms are used to describe the measurement of and exposure to radiation. Since these terms are used throughout the report, it will be helpful to begin with definitions and a brief discussion of these terms and concepts.

**Radiation** is energy that is emitted or transmitted in the form of rays, waves, or particles. Radio waves, light, and heat are forms of radiation. These are low-energy forms of radiation, and are considered non-ionizing radiation.

**Ionizing radiation** is radiation that has enough energy to remove electrons from atoms or molecules (groups of atoms) when it passes through or collides with another material. In the process called ionization, an atom or molecule loses an electron, which results in the formation of a charged atom (or molecule) that is called an ion. The amount of ionization depends on the level of energy of the impinging individual particles or waves, not their number. A large number of particles or waves with low energy will not cause ionization.

Note: It is assumed that the term "radiation," as used in the congressional mandate, means ionizing radiation. Therefore, in this report, the use of the word "radiation" means ionizing radiation. Many types and sources of both ionizing and non-ionizing radiation are present in the railroad environment when shipments of HLRW and SNF are moved.

Ionizing radiation can take the form of subatomic particles or electromagnetic waves. The two primary types of ionizing particles are alpha particles and beta particles.

> **Alpha particles** consist of two protons and two neutrons. They are relatively heavy, high-energy particles, with a positive charge of +2 from its two protons. Because of their large mass and electric charge, alpha particles travel relatively slowly in air and rapidly lose energy. They are easily stopped by a piece of paper or by coming in contact with human skin.
>
> **Beta particles** are free electrons. They have a very low mass, about 1/2000 of the mass of a proton or neutron. Due to the small mass, the amount of ionization that beta particles can cause depends on the energy level imparted to them when they are created by the decay of radioactive materials such as tritium, carbon-14, and other similar substances. Beta particles can travel several feet in open air. They are easily stopped by solid materials such as sheets of aluminum, glass, or plexiglass.

There are two types of photon-ionizing (pure energy) radiation: gamma rays and x-rays.

> **Gamma radiation** is very high-energy ionizing radiation that has about 10,000 times as much energy as the photons in the visible range of the electromagnetic spectrum (visible light). Gamma photons are pure electromagnetic energy, thus, they have no mass and no electrical charge.

**X-radiation** is also very high-energy ionizing radiation, similar to gamma radiation, but generally has lower wave lengths and energy levels—although the ranges of energy and wavelength overlap for both types of radiation. The primary difference between the two types is where in the atom the energy waves originate; for gamma rays it is the nucleus, for x-rays it is the electrons. X-ray photons are also pure electromagnetic energy, therefore, they have no mass and no electrical charge. Since these types possess such high energy levels, the materials used to shield against them must be very dense, such as steel or lead.

Since the focus of this report is "the potential hazards to which employees are exposed during the transportation of high-level radioactive waste and spent nuclear fuel," the terms are defined below.

**SNF** is fuel that has been withdrawn from a nuclear reactor following irradiation and has undergone at least 1 year's decay since being used as a source of energy in a power reactor. Further, reprocessing has not separated the constituent elements of the SNF. This fuel includes:

1) Intact, non-defective fuel assemblies
2) Failed fuel assemblies in canisters
3) Fuel assemblies in canisters
4) Consolidated fuel rods in canisters
5) Non-fuel components inserted in pressurized water reactor fuel assemblies
6) Fuel channels attached to boiling water reactor fuel assemblies
7) Non-fuel components and structural parts of assemblies in canisters [42 U.S.C. 10101(23), 40 CFR 191.02, and DOE Order 5820.2A]

**HLRW** results from the reprocessing of SNF in a commercial or defense facility. It includes liquid waste produced directly in reprocessing, and any solid waste derived from the liquid that contains a combination of transuranic waste and fission products in concentrations requiring permanent isolation [42 U.S.C. § 10101(12), 10 CFR Part 72.3, and DOE Order 5820.2A]. HLRW meeting this definition is shipped by modes other than rail.

SNF and HLRW are required to be transported in casks constructed to NRC requirements. The casks are secured to specially constructed rail cars capable of transporting the heavy load.[5] A cask consist includes the cask car(s) surrounded by two buffer cars and accompanied by an escort car. A dedicated train is comprised of the cask consist and multiple locomotives. A regular or key train will include the cask consist, locomotive(s), and any number of additional cars potentially containing other regulated hazardous materials, various other general cargo,

[5] A typical cask assembly weighs about 250,000 pounds, and a loaded cask car weighs about 394,500 pounds. A typical rail load weighs about 286,000 pounds. Like other cars constructed to carry heavy loads, cask cars will most likely use additional axles and span bolsters to distribute the weight over a larger portion of the track structure. Other special loads transported on the railroad include large transformers and specialized industrial equipment.

and/or empty rail cars. In 2005, DOE issued a policy statement indicating "[DOE] will use dedicated train service (DTS) for its usual rail transport of spent nuclear fuel and high-level radioactive waste to the Yucca Mountain Repository site in Nevada when the repository is operational."

Although SNF/HLRW casks are required to be well shielded by design, some forms of radiation are very difficult to stop; therefore, the casks continuously emit very low levels of radiation throughout all phases of transportation. As a result, some unavoidable radiation exposure to crew, handlers, yard personnel, and the wayside population can occur whenever a shipment takes place. The emissions are limited to acceptable, permissible levels (a maximum of 10 millirems per hour (mrem/hr) at 3.3 feet (1 meter) from the surface of the package).[6] All individuals exposed to the radiation being emitted from the cask during transport, handling, loading, and unloading will receive very low doses of radiation.

Rail cars placarded as radioactive cannot be placed next to a locomotive or an occupied caboose.[7] A buffer car loaded with non-radioactive material must be placed between a car carrying radioactive materials and a locomotive or caboose.[8]

**Measuring Radiation**

When discussing radiation, we measure several different phenomena. The terms "activity," "exposure," and "dose" are some of the names that are used to describe radiation and to express the interaction of radiation in the environment and with humans. Since this report is concerned with radiation exposure to railroad employees, the units of exposure and dose most relevant to the discussion and are defined here.

**Exposure** to ionizing radiation is usually expressed in units of roentgen (R). The R unit defines the amount of ionization present in the air from gamma rays or x-rays. One R equals the electric charge of 258 microcoulombs per kilogram of air. One roentgen of gamma- or x-ray exposure produces approximately 1 radiation-absorbed tissue dose.

**Dose** measures the effect of radiation on substances that absorb it. It measures what radiation does to substances, not anything specific about the radiation itself. This permits the measurement of different types of radiation (particles or waves) by measuring the effect they have on the materials.

**Rad** is the acronym for *radiation-absorbed dose* in traditional English units. It defines the amount of energy from any type of ionizing radiation (e.g., alpha rays, beta rays, gamma rays, neutrons, etc.) deposited in any medium (e.g., water, human tissue, air). A dose of 1 rad is equivalent to the absorption of 100 ergs (a small but measurable amount of energy) per gram of absorbing medium.

[6] 49 CFR § 173.441
[7] 49 CFR § 174.85(b)
[8] 49 CFR § 174.85(d)

**Gray** (Gy) is the international system (SI)[9] unit of radiation dose expressed in terms of absorbed energy per unit mass of tissue.

- 1 Gy = 1 Joule/kilogram.
- 1 Gy = 100 rad.

**Relative Biological Effectiveness** (RBE) is used to define a term known as the **Quality Factor** (Q factor). Different Q factors are assigned to different types of radiation since some types are more dangerous to biological tissue than others, even if their "energy deposition" levels are the same. The value of the quality factor for each type of radiation depends on the distribution of the absorbed energy in a mass of tissue.

- The Q factor is 1 for x-rays, gamma rays, and electrons.
- The Q factor is 10 for protons and neutrons.
- The Q factor is 20 for alpha particles. (Alpha radiation is considerably more potent than x-rays, beta rays, or gamma rays in causing cancer since the alpha particles that do the damage usually are inhaled or ingested and then incorporated in body tissue where they continue to emit energy.)

The Q factor defines the relationship between rads and rems (defined below). To calculate rems from rads, or sieverts (defined below) from Gys, multiply by Q. The Q factor approximates what otherwise would be very involved computations. For example:

- Gamma rays with the energy of 10 rad and a Q factor of 1 will produce a dose of 10 rem.
- Alpha particles with the energy of 10 rad and a Q factor of 20 will produce a dose of 200 rem.

**Rem** is the acronym for "roentgen equivalent man." It is the English unit of measurement of exposure that describes the effects of radiation specifically on human tissue.

**Sievert** (Sv) is the corresponding SI unit.

- 1 Sv = 100 rem
- 1 millisievert (mSv) = 100 mrem

Occupational exposures are characterized as doses, with limits based on the rate of exposure (generally mrem/hr, as well as overall accumulated exposure for a specified period). For example, 1250 mrem (12.5 mSv) is the maximum permissible dose for whole-body exposure per calendar quarter (in accordance with OSHA guidelines).

[9] "SI" stands for Système International

## Human Exposure to Radiation

Radiation has been naturally present in the environment since the birth of this planet. As a result, life has evolved in an environment with significant levels of ionizing radiation. The radiation comes from outer space (cosmic rays), the minerals in the ground, and within our own bodies since it is present in the air we breathe, the food we eat, and the water we drink. Certain foods grown in areas with naturally high levels of radiation in the soil contain higher levels of radiation than other foods. Rice and tapioca from the State of Kerala, India, and Brazil nuts, squash, kale, beans, cassava, and oranges are examples.

Radiation is also found in the minerals used for or incorporated in the construction materials used to build our homes and other structures. Brick and stone homes have higher natural radiation levels than homes made of other building materials such as wood. Our Nation's Capitol, which is largely constructed of granite, contains higher levels of natural radiation than most homes.

The average radiation dose from exposure to natural and manmade background radiation in the United States is approximately 360 mrem per year. As a rule of thumb, this exposure level nearly doubles for each mile of elevation above sea level. Therefore, living in Denver, CO; Flagstaff, AZ; or other cities at high elevations increases the average background dose to approximately 1000 mrem per year. The increase is due to higher contributions from cosmic radiation at higher altitudes and terrestrial radiation sources such as radon gas.

**Radiation Exposure from Various Sources**

| Source | Exposure Level |
|---|---|
| External Background Radiation | 60 mrem/yr, U.S. average |
| Natural Potassium–40 Radioactivity in Body | 40 mrem/yr |
| Air Travel–1 Roundtrip (NY–LA) | 5 mrem |
| Chest X-Ray–Effective Dose | 10 mrem per film |
| Radon in the Home | ~200 mrem/yr (variable) |
| Manmade (medical x-rays, etc.) | ~60 mrem/yr (average) |

### Risks Associated with Radiation Exposure

The most significant risk associated with occupational exposure to ionizing radiation is the increased risk of cancer. The amount of that increased risk depends on three factors: the total dose of radiation received, the length of time over which that dose was received, and the specific body part or parts exposed. Genetic differences, age, and other individual personal factors are also thought to affect risk.

Our understanding of the risks of radiation exposure is primarily the result of studies of Japanese atomic bomb survivors, the Chernobyl reactor accident survivors, radium dial painters, and medical patients who are exposed through selected diagnostic or therapeutic medical procedures.

From these populations we know that acute (i.e., short in duration), very high radiation doses can increase the occurrence of certain kinds of diseases (e.g., cancer) and possibly have adverse genetic effects. The types of cancer associated with high-dose exposures (greater than 50,000 mrem) include leukemia and multiple myeloma as well as breast, bladder, colon, liver, lung, esophagus, ovarian, and stomach cancers. The U.S. Department of Health and Human Services (DHHS) literature also suggests a possible association between ionizing radiation exposure and prostate, nasal cavity/sinuses, pharyngeal, laryngeal, and pancreatic cancers.[10]

Since the human body has a number of mechanisms that can repair damage caused by radiation and chemical carcinogens, the effects of radiation on living cells can result in different outcomes, including:

- Injured or damaged cells that repair themselves with no lasting damage;
- Injured or damaged cells that die and are replaced through normal tissue replacement processes (millions of cells in the body do this normally every day); or
- Cells that incorrectly repair themselves (due to damage to the genetic code that directs the cell repair mechanism), resulting in a biological change.

Although it is assumed that exposure to low levels of radiation will lead to an increased risk of cancer, medical studies have not yet seen these adverse health effects in people who have been exposed to low-level, long-term radiation doses; for example, up to 10,000 mrem above background for more than 2 years.[11] When compared to the overall cancer rate in today's society, the increased risk of cancer from normal levels of *occupational* radiation exposure is small. In the United States, the current lifetime risk of dying from all types of cancer is approximately 23 percent in males and 20 percent in females.[12]

A very simple illustration of the *theoretical* increase in risk of dying from cancer due to occupational radiation exposure would be a person who receives a lifetime radiation dose of 10 rem (10,000 mrem) to the entire body. This person would have a risk of dying from cancer of about 20%, without otherwise being exposed to radiation other than that normally present in the environment. With the added exposure stated above, the person's risk of dying from cancer would increase to 20.4%.[13]

**Latency and Other Sources of Damage**

The period of time between exposure to a carcinogen and the detection of cancer can be many years. This period is known as the "latent period." Those cancers that may develop as a result of radiation exposure cannot be distinguished from cancers that have a natural origin or are a result

[10] U.S. NRC Fact Sheet–"Biological Effects of Radiation" 2009.
[11] The National Research Council Committee on the Biological Effects of Ionizing Radiation, Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V, Washington, DC, 1990.
[12] American Cancer Society, http://www.cancer.org/docroot/CRI/content/CRI_2_6x_Lifetime_Probability_of_Developing_or_Dying_From_Cancer.asp, April 2010.
[13] U.S. Nuclear Regulatory Commission, Instruction Concerning Risks from Occupational Radiation Exposure, Regulatory Guide 8.29, Rev. 1, NRC, Washington, DC, February 1996.

of exposure to chemical carcinogens. In addition, some cancer research literature indicates that other chemical and physical hazards and lifestyle factors (e.g., smoking, alcohol consumption, and diet) significantly contribute to the incidence and severity of these same cancers.

Although radiation may cause cancer at high doses and high-dose rates, currently there is no data that unambiguously establishes the occurrence of cancer following whole-body exposure to low doses (below about 10,000 mrem (100 mSv)) and low-dose rates. For example, people living in areas such as Denver, CO, where the levels of background radiation are higher than those typical in lower-altitude cities (near or above 1,000 mrem (10 mSv) per year)[14] have not shown any evidence of an increase in radiation-induced cancer rates when compared to rates in other States and in the United States, overall.

[14] U.S. NRC Fact Sheet–"Biological Effects of Radiation," 2009.

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## Radiation Safety Practice

Radiation safety, as it is currently practiced, assumes adverse effects are possible with low-level, long-term exposure to radiation (i.e., less than 10,000 mrem). Radiation safety policies and standards have been established by international and national radiation protection organizations, such as the International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP), to limit potentially harmful radiation effects and protect the public, radiation workers, and the environment. Many of these policies and standards are reflected in the limits of exposure established by regulatory agencies such as the NRC and OSHA. All recognize the application of the "as low as reasonably achievable" principles in keeping exposure dose to a minimum.

"As low as reasonably achievable," or ALARA, is a basic radiation protection philosophy based on the assumption that there is no safe level of exposure to radiation. This assumption requires the belief that the probability for harmful biological effects increases with increased radiation doses, no matter how small. This assumption is under debate in the scientific community, reflecting the facts we know about everyday natural and manmade exposures to radiation and the current lack of evidence of increased risk. Much of our knowledge about health effects is derived from studies of populations exposed to very high doses of ionizing radiation, not from exposures at normal everyday levels. Application of ALARA principles means making every reasonable effort to maintain exposures to ionizing radiation as far below the established dose limits as practical, taking into account the state of technology, the economics of exposure reductions in relation to state of technology, the economics of exposure reductions in relation to the benefits to the public health and safety, etc.

The risks associated with low-level medical, occupational, and environmental radiation exposure are formulated to be proportional to those observed with high-level exposure. Regulatory limits for the allowable exposure dose for both the public and workers are set by Federal agencies. The Environmental Protection Agency (EPA), OSHA, NRC, DOE and State agencies have all established standards to limit cancer risk. In addition, radiation dose limits have been established to limit other potential biological impacts on worker populations such as effects on the skin and lens of the eye.

**Annual Radiation Dose Limits**

| Dose | Agency | Population covered |
|---|---|---|
| 5,000 mrem | NRC | Radiation Worker–NRC Licensee workers |
| 5,000 mrem | OSHA | Radiation Worker–non-NRC Licensee workers |
| 100 mrem | NRC | General Public–from NRC Licensee sources |
| 10 mrem | EPA | General Public–air pathway |
| 4 mrem | EPA | General Public–drinking-water pathway |

All of these regulatory limits recognize that there are many sources of radiation exposure. As noted above, the presence of natural "background" radiation is included in the considerations for the safety factors built into these limits.

**Protection from Exposure to Radiation**

Time, distance, and shielding are used to reduce dose due to exposure to known sources of ionizing radiation.

**Time.** Since the dose of exposure is cumulative, the amount of time spent in proximity to a radiation source of a given intensity will increase the accumulated dose. If someone is exposed each workday to 15 mrem, their exposure will be just below the OSHA quarterly dose limit of 1,250 mrem for whole-body exposure.[15] The exposure dose of 15 mrem may be incurred throughout the day at about 2 mrem per hour or it may occur over a shorter period of higher exposure with offsetting periods of lower or no exposure.

**Distance.** Distance is another important concept, but a little more involved. Since radiation is a physical phenomenon, the intensity of radiation energy decreases at a known rate as the distance from the source increases. The rate of this decrease follows what is known as the "inverse square rule."

The inverse square rule describes how physical phenomena spread influence equally in all directions without a limit to range—a geometrically spherical spread. The intensity of the phenomenon at any given radius (r) is the source strength divided by the area of the sphere.

This means that you can predict the intensity of the energy contained in the particles or rays of radiation at a different location if you have determined the amount of radiation at a particular distance from the source. If you measure the intensity at 1 meter and it is 200 mrem, then it will be one fourth as much at 2 meters or 50 mrem, following the inverse square rule.

**Shielding.** Shielding is a barrier of some kind between the source of radiation and its surroundings. Alpha and beta particle radiation is easily stopped by materials with low thicknesses and densities. As an example, a sheet of ordinary paper will stop almost all alpha radiation and a thin sheet of plastic or metal will stop beta particles. More energetic photon-type radiation—gamma rays and x-rays—require thicker, more dense shielding.

The effectiveness of a shielding material, in general, increases with its electron density. High-mass density materials like lead have high electron densities. A sheet of lead is more effective than a sheet of steel of the same thickness, since lead has a higher electron density than steel.

Another important property of shielding is that it exponentially reduces the intensity of radiation depending on its thickness.

- A lead shield that is 1 cm (0.4 in) thick reduces the level of gamma radiation by 50% (for example, from 200 mrem to 100 mrem).
- To get the same level of shielding from steel, the sheet would have to be 2.5 times as thick.

[15] OSHA has three different permissible limits for ionizing radiation based on the body part exposed. See the reproduction of the OSHA Table G-18 in the discussion of OSHA on page 18.

Both of the examples above are the half-value layer thicknesses of lead and steel, respectively. Half-value layer thickness means that each time you add another layer of a particular material of the same thickness, the level of radiation getting through is reduced by half of the incident level at the other side of the shielding. That means:

- A lead shield that is 5 cm (2 in) would reduce the level from 200 mrem to 6.25 mrem (5 half-value layers of lead).
- It would take 5 inches of steel to provide the same level of shielding (5 half-value layers of steel).

It is also true that shielding of the same material will provide the same level of protection for a given type of radiation regardless of the source of the radiation. Therefore, x-rays, whether they are from an x-ray machine or from a radioactive material that emits x-rays during radioactive decay, can be well-shielded by lead. Lead and other high-mass density materials are also good shielding materials for gamma radiation. Gamma radiation is the same type of radiation as x-rays (electromagnetic radiation), but it may differ significantly in energy from some x-rays.

One type of radiation that is not sufficiently shielded by typical high-mass density materials is neutron radiation. Neutrons are electrically neutral particles with significant energy and can pass fairly easily through many materials since they have no charge and do not interact with the electrons of materials through which they pass. In fact, low-mass materials are better for neutron shielding since interaction with the nucleus of their atoms are more likely to result in the transfer of the neutron energy to the nucleus. Hydrogen is the lowest-mass atom, so materials with high hydrogen content, such as water and plastics or other organic materials with high hydrogen content, make good neutron shielding. Concrete is another material frequently used for neutron shielding since the chemistry of concrete incorporates water into the finished material.

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## Regulatory Regimes and Exposure Limits

There are several sets of regulations that are pertinent with respect to occupational exposures to radiation that may be encountered by railroad employees. While a number of the regulations have been mentioned already, this section provides an overview.

- DOE regulates exposure to ionizing radiation for employees at DOE facilities, including both Federal and contractor employees. This includes the regulation of all aspects of DOE shipments exclusive of the regulation of cask certificates, which are regulated by NRC.
- The Department of Defense (DOD) is responsible for worker exposures to ionizing radiation in DOD facilities and operations.
- NRC regulates worker and public exposure to ionizing radiation from specific materials for which NRC issues licenses. This includes transportation of those materials in the packages that they regulate.
- OSHA regulates worker exposure to ionizing radiation in many workplaces. OSHA standards cover worker exposures from all radiation sources except those identified above. These sources include x-ray equipment, accelerators, accelerator-produced materials, electron microscopes, and naturally occurring radioactive materials (NORM).
- DOT, through enforcement of limits on package emissions[16] and, for rail transportation, placement within trains,[17] limits worker and public exposures to ionizing radiation during transportation.

Of these regulations, the ones that are most relevant to this report and the exposures discussed here are those of NRC (in conjunction with DOT) and OSHA.

### Nuclear Regulatory Commission Standards and Limits

As mentioned in the discussion of SNF/HLRW, the NRC establishes permitted levels of emissions from the casks used for transporting these materials. The NRC's regulations for transporting radioactive materials are found in 10 CFR Part 71. These limits are codified for enforcement by DOT under 49 CFR § 173.441. Section 71.47 defines external radiation standards for all packages:

> § 71.47 External radiation standards for all packages.
> (a) Except as provided in paragraph (b) of this section, each package of radioactive materials offered for transportation must be designed and prepared for shipment so that under conditions normally incident to transportation the radiation level does not exceed 2 mSv/h (200 mrem/h) at any point on the external surface of the package, and the transport index does not exceed 10.
> (b) A package that exceeds the radiation level limits specified in paragraph (a) of this section must be transported by exclusive use shipment only, and the radiation levels for such shipment must not exceed the following during transportation:

[16] 49 CFR § 173.441
[17] 49 CFR § 174.85

(1) 2 mSv/h (200 mrem/h) on the external surface of the package, unless the following conditions are met, in which case the limit is 10 mSv/h (1000 mrem/h):
(i) The shipment is made in a closed transport vehicle;
(ii) The package is secured within the vehicle so that its position remains fixed during transportation; and
(iii) There are no loading or unloading operations between the beginning and end of the transportation;
(2) 2 mSv/h (200 mrem/h) at any point on the outer surface of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load or enclosure, if used, and on the lower external surface of the vehicle; and
(3) 0.1 mSv/h (10 mrem/h) at any point 2 meters (80 in) from the outer lateral surfaces of the vehicle (excluding the top and underside of the vehicle); or in the case of a flat-bed style vehicle, at any point 2 meters (6.6 feet) from the vertical planes projected by the outer edges of the vehicle (excluding the top and underside of the vehicle); and
(4) 0.02 mSv/h (2 mrem/h) in any normally occupied space, except that this provision does not apply to private carriers, if exposed personnel under their control wear radiation dosimetry devices in conformance with 10 CFR 20.1502.
(c) For shipments made under the provisions of paragraph (b) of this section, the shipper shall provide specific written instructions to the carrier for maintenance of the exclusive use shipment controls. The instructions must be included with the shipping paper information.
(d) The written instructions required for exclusive use shipments must be sufficient so that, when followed, they will cause the carrier to avoid actions that will unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public.

**Occupational Safety and Health Administration Standards and Limits**

OSHA regulates worker exposure to ionizing radiation under the authority granted by the Occupational Safety and Health Act of 1970 (the Act) (29 U.S.C. 651, et seq.). OSHA standards cover worker exposures from all other radiation sources not identified in the regulations of DOD, DOE, or NRC; including x-ray equipment, accelerators, accelerator-produced materials, electron microscopes, and NORM. OSHA continues to work with NRC, DOE, DOD, and the EPA on advances in the research and data collection dealing with worker exposure and Federal policies addressing this important issue. OSHA also continues its involvement with the Interagency Steering Committee on Radiation Standards in an effort to coordinate any future activity.

OSHA has published its standards in 29 CFR § 1910.1096 under the title, “Ionizing Radiation.” The standard was originally issued and subsequently amended as described in the following caption: [39 FR 23502, June 27, 1974, as amended at 43 FR 49746, Oct. 24, 1978; 43 FR 51759, Nov. 7, 1978; 49 FR 18295, Apr. 30, 1984; 58 FR 35309, June 30, 1993; 61 FR 5507, Feb. 13, 1996; 61 FR 31427, June 20, 1996].

Under the OSHA standard, some of the definitions previously discussed for dose and the units used to describe exposure are refined as follows:

> 1910.1096(a)(5) - Dose means the quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body. When the provisions in this section specify a dose during a period of time, the dose is the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time. Several different units of dose are in current use. Definitions of units used in this section are set forth in paragraphs (a)(6) and (7) of this section.
>
> 1910.1096(a)(6) - Rad means a measure of the dose of any ionizing radiation to body tissues in terms of the energy absorbed per unit of mass of the tissue. One rad is the dose corresponding to the absorption of 100 ergs per gram of tissue (1 millirad (mrad)=0.001 rad).
>
> 1910.1096(a)(7) - Rem means a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose of 1 roentgen (r) of X-rays (1 millirem (mrem)=0.001 rem). The relation of the rem to other dose units depends upon the biological effect under consideration and upon the conditions for irradiation. Each of the following is considered to be equivalent to a dose of 1 rem:
>
> 1910.1096(a)(7)(i) - A dose of 1 roentgen due to X- or gamma radiation.
>
> 1910.1096(a)(7)(ii) - A dose of 1 rad due to X-, gamma, or beta radiation.
>
> 1910.1096(a)(7)(iii) - A dose of 0.1 rad due to neutrons or high energy protons.
>
> 1910.1096(a)(7)(iv) - A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye.

In Section (b) of the OSHA standard, the exposure limits are established as follows:

> (b) Exposure of individuals to radiation in restricted areas.
> (1) Except as provided in paragraph (b)(2) of this section, no employer shall possess, use, or transfer sources of ionizing radiation in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter from sources in the employer's possession or control a dose in excess of the limits specified in Table G-18:

**TABLE G-18 Rems per calendar quarter**

| | |
|---|---|
| Whole body: Head and trunk; active blood-forming organs; lens of eyes; or gonads | 1-1/4 (1,250 mrem) |
| Hands and forearms; feet and ankles | 18-3/4 (18,750 mrem) |
| Skin of whole body | 7-1/2 (7,500 mrem) |

(2) An employer may permit an individual in a restricted area to receive doses to the whole body greater than those permitted under subparagraph (1) of this paragraph, so long as:
(i) During any calendar quarter the dose to the whole body shall not exceed 3 rems; and
(ii) The dose to the whole body, when added to the accumulated occupational dose to the whole body, shall not exceed 5 (N-18) rems, where "N" equals the individual's age in years at his last birthday; and
(iii) The employer maintains adequate past and current exposure records which show that the addition of such a dose will not cause the individual to exceed the amount authorized in this subparagraph. As used in this subparagraph Dose to the whole body shall be deemed to include any dose to the whole body, gonad, active blood forming organs, head and trunk, or lens of the eye.
(3) No employer shall permit any employee who is under 18 years of age to receive in any period of one calendar quarter a dose in excess of 10 percent of the limits specified in Table G-18.

## Previous Research and Predicted Levels of Exposure

As mentioned earlier, the Dedicated Train Study, or DTS, conducted under a prior congressional mandate,[18] examined the safety and integrity of the packaging and shipment of SNF/HLRW. Contributing to the information upon which the DTS was based, the John A. Volpe National Transportation Systems Center (Volpe), Accident Prevention Division (DTS-73) (Cambridge, MA), provided a technical analysis and report comparing the relative safety of regular trains versus dedicated trains used for shipping these materials.[19]

Part of the analysis contained in the DTS was an estimate of the potential radiation exposures to various populations including different groups of railroad employees involved in these shipments. Several sets of assumptions were made in estimating exposures, and those most relevant to this report are quoted below. Please note that the term "incident free" is used in the Volpe report and DTS to distinguish the risks and levels of exposure arising simply from activities associated with transportation of the materials, rather than those associated with accidents that might occur. The "incident-free" exposure estimates are relevant to this report's focus.

For those unfamiliar with a dedicated train, Figure 1, below, illustrates a typical consist.

**Source Strength**

The Volpe report estimated the intensity of the radiation emitted from the packages by using the

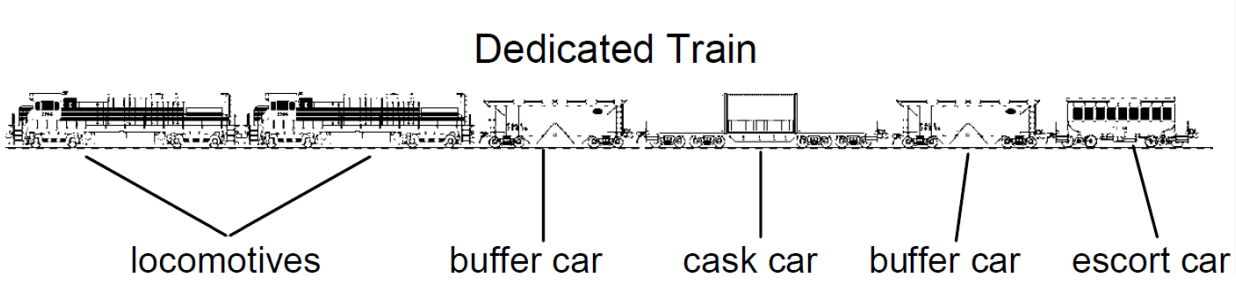


**Figure 1: Dedicated Train Consist**

maximum allowable limits established by the NRC. On page 20, the report states:

> Packaging, transport and disposal of radioactive materials by all modes of transportation is regulated in the United States by the NRC and the DOT. Regulations promulgated by the NRC are contained in Title 10 of the Code of Federal Regulations (10 CFR 71-73); regulations promulgated by the DOT are primarily contained in Title 49 (49 CFR 171-178). These regulations establish maximum permissible package dose rates and maximum permissible dose rates to vehicle crew members. Characteristics of radioactive material that affect incident-

[18] Section 15 of the Hazardous Materials Transportation Uniform Safety Act of 1990 (Pub. L. No. 101-615)—amended Section 116 of the Hazardous Materials Transportation Act (49 U.S.C. App. 1813)

[19] "Comparative Safety of the Transport of High-Level Radioactive Materials on Dedicated, Key and Regular Trains" Volpe Report Number DOT-VNTSC-FRA-05-06; FRA Report Number FRA/ORD-05/03.

free transportation are the package dose rate and the fractions of gamma and neutron radiation. The package dose rate is expressed as a transportation index (TI) for certain package types. TI is defined as the highest radiation dose rate in millirem per hour (mrem/hr) from all penetrating radiation at 3.3 feet (1 meter (m)) from any accessible external surface of the package, rounded to the highest tenth (49 CFR 173.403). *For the purposes of this analysis, it was conservatively assumed that the dose rate is the regulatory limit of 10 mrem/hr at 3.3 feet (1 meter).* The estimated dose rate for the MPC cask selected for this analysis is below this regulatory limit. (*Emphasis added.*)

The next relevant section was the identification and characterization of the populations that would be exposed to radiation during the transportation SNF and HLRW by rail. On page 24, the groups of railroad employees that were identified included:

- **Train Crews:** Train crews are estimated at two per train for the dedicated, regular, and key trains.
- **Shipment Escorts:** Four escorts per train are assumed for dedicated, regular, and key trains.
- **Inspectors/Classification Yard Workers:** Railroad employees that classify or inspect the rail casks cars during stops are likely to receive close proximity exposures. Functions performed at stops include marshalling of cars, arrival and departure train inspections, and repair of damaged railcars. A determination of exact numbers of close-in rail yard workers was not established. Instead, doses for this population were estimated based on the total person-hour/meter estimate used by RADTRAN [DOE, 1986].
- **Other Rail Yard Workers:** An average of 125 workers within a 0.2 $mi^2$ (0.5 $km^2$) area at each yard is assumed based on estimates provided by consulted railroads. This gives a yard worker population density of 625 workers per $mi^2$ (250 workers per $km^2$).

Another key issue discussed was the proximity of the various groups to the radioactive sources—recognizing one of the key means of reducing exposure—distance. Beginning on page 24, the report says:

> **2.1.5 Distances from the Source**
> The distance from the source is a determining factor in the amount of radiation dose members of a population group receive. Distance is important because the radiation level varies with the inverse square of the distance from the cask. The various impacted populations are at different distances from the source.
>
> **Train Crew.** Train crew distances from the cask vary depending on the shipment service selected. The cask car(s) were assumed to be buffered front and rear. A 49.2 ft (15-m) car length and 6.6 ft (2 m) between cars was assumed. For regular and key train service, it was assumed that the cask car was car number 35 in a 70 car train. For dedicated service, it was assumed that the train consisted of two locomotives (with crew in first unit), buffer car, cask car, buffer car, and escort

car (see Figure 6). Crew distances were thus 2,140 ft (652.3 m) and 300 ft (91.3 m) for regular/key and dedicated service, respectively.

**Shipment Escorts** For all service cases it was assumed that the escort distance from the cask was 96 ft (29.3 m). The cask was assumed to be buffered front and rear, with escorts in a car following the rear buffer car. Although the position of the escort railcar could differ for regular and key train service, placement used for this analysis results in the most conservative estimate.

The issue of time of exposure relative to the railroad employees was discussed. The assumptions made begin on page 26 with this statement.

> Exposure time is a determining factor in the amount of radiation members of a population group receive. In determining the total exposure durations of populations, time spent near both moving and standing trains is considered. Train operational restrictions such as train speed and run through operations impact exposure time both during stops and when en-route.

On page 27, operating crew and escort exposures are described.

> **For Moving Train.** Exposure time for moving trains is dependent on the train speed and route length ... Speeds of both 35 mph (56.3 km/hr) and 50 mph (80.4 km/hr) were used for this analysis. *For crews and escorts, transit time was calculated for each route by multiplying the average speed by the route length.* (*Emphasis added.*)
> **For Standing Trains.** Two types of stops were assumed for each route: yard stops (classification, switching, and inspection) and non-yard or siding stops (interchange and crew change). Each type has a different stop duration. Stop times for regular and dedicated trains differ since handling, inspections, routes, crew changes, and many other variables affect the time. … In general, regular and key trains stop in every yard; dedicated trains stop for crew changes (driven by hours-of-service limits) and when entering territory of a different railroad and changing locomotives (about every 350 miles (563 km)). Trains also could be stopped for inspections (the assumption for this analysis is that these inspections are done at the nearest siding/yard stop).

On page 28, crew and escort exposures are discussed further:

> Crew and escort in-transit exposure was calculated as a stop with a duration equal to the total travel time for the trip. Actual stop time for the crew is equal to the total travel time, plus two hours for each yard stop, excluding origin and destination (O-D), plus non-classification [sic] stop time. Escort stop time is equal to the total travel time, plus the full yard entry times including O-D (it is assumed escorts never leave the shipment), plus non-classification [sic] (interchange, crew change, refueling, inspection) stop times. Note that the number of non-classification stops for regular and key trains are fewer than for dedicated trains because some crew changes are assumed to occur in conjunction with classification stops.

The final element of the three protective measures that reduce exposures is shielding. The Volpe report addresses shielding on page 28 as follows:

> **2.1.7 Shielding Factors**
> The amount of shielding between the source and the affected population impacts the received dose rate.

Shielding factors are then summarized in a table. The excerpt below shows only the shielding factors affecting railroad workers.

**Table 10. Shielding Factor (Attenuation)**

| Population | Receptor Shielding Factor | Construction Type |
|---|---|---|
| Crew | 0.5 | Reflects gamma radiation attenuation by locomotives |
| Escorts | 1.0 | No shielding |
| Inspectors/Handlers | 1.0 | No shielding |
| General Yard and Workers | 0.1 | Reflects gamma radiation attenuation by other structures in the rail yard railcars |

After considering all of these factors, the Volpe study estimated the potential exposures of the different populations exposed during the transportation of the SNF/HLRW. These estimates were made using a software application called RADTRAN 5, which was developed by Sandia National Laboratories. RADTRAN 5 constructs simulations to estimate population effects of these kinds of shipments. This radiation report will look at the estimates for the railroad populations and begin with the explanation of the results on page 29 of the Volpe study.

> **2.2 INCIDENT-FREE RESULTS**
> The following section presents the radiological consequences of "incident-free" transportation of HLRW and SNF by the regular train, key train and dedicated train service modes for both the 35 mph (56.3 km/hr) and 50 mph (80.4 km/hr) speeds. The results are presented by route, service/speed, population type, and in-transit vs. stops. The intent of the incident-free analysis was to provide a general estimate of the differences between the alternate service modes and speeds. Simulations of the alternatives were conducted comparing service types for the same sets of routes. The results of these estimates are included as an example of the likely differences in exposure due to changes in service characteristics. All incident free radiological impact results are given for a single shipment, i.e., a single movement of a single cask.
>
> In general, these results show that dedicated trains expose populations to a lesser radiological dose than regular and key trains at all speeds, and that stop time risk dominates total exposure for regular and key trains.

> The term person-rem is used in this study to characterize the collective exposure dose for a particular group of people. The unit represents the product of the average dose per person times the number of people exposed (e.g., an exposure of 5 rem to each of 1,000 persons = 5,000 person-rem).

The dose estimates from the DTS that are most pertinent to this report are those for dedicated trains. It is important to note that the DOE has stated its intention to exclusively employ dedicated trains in its movements of laden casks. Those estimates are compiled below. Since it is difficult to predict with certainty the numbers of different groups of railroad workers who may be present, with the exception of the train crew and escorts, all values from the DTS estimates will assume a population of two employees in each group. The exposures will be translated from person-rems to exposure doses of mrem for comparison with OSHA and NRC regulatory limits.

**Train Crew and Escorts**

> "For train crews, dedicated train doses are higher than for the regular and key trains (assuming no special shielding provisions), primarily because of the closer proximity of the crew to the cask in the dedicated train. In-transit results are also speed dependent, with higher train speeds generating lower doses. Train crews could receive between a $1.17\times10^{-05}$ and $1.62\times10^{-03}$ person-rem dose per shipment."[20]

Since most train crews are made up of an engineer and a conductor, these values (0.0000117 to 0.00162 person-rem) translate to exposure doses that could range from 0.00585 mrem to 0.81 mrem per person per trip. (Note: It is assumed that the lower exposures reflected by the model used in the DTS are due to the shielding and distance from the source provided by the locomotive(s) used in the consist, as well as the shorter periods of exposure than the escorts, due to compliance with the hours of service law.)

> "For shipment escorts, dedicated train case doses are lower than regular and key train cases for both speed scenarios because of the shorter stop durations. Stop doses are higher than the in-transit doses for the regular and key train cases. Escorts could receive between a 0.108 and 0.041 person-rem dose per shipment."[21]

The number of escorts accompanying these shipments is not public information for security reasons. For the purposes of this report, we will use five persons to provide a basis for comparison. These values (0.108 to 0.041 person-rem) translate to exposure doses that could range from 22 mrem to 8 mrem per person per trip.

**Car Inspectors and Close Proximity Yard Workers**

> "Car inspectors/classification workers could receive stop doses between 0.0056 and 0.0613 person-rem per shipment. Since the exposures to this population group are for stops only (no in-transit), results are not speed dependent, but are driven

[20] Ibid., page 38
[21] Ibid., page 38

> by the number and duration of stops, which are route specific. In all cases, doses for dedicated trains are less than for regular and key trains."[22]

For two workers in this class, these values (0.0056 to 0.0613 person-rem) translate to exposure doses that could range from 2.8 mrem to 30.65 mrem per person per trip.

**Rail Yard Workers**

> "Rail yard workers (other than classification workers) could receive stop doses between $2.62\times10^{-03}$ and $6.09\times10^{-03}$ person-rem per shipment. Since the exposure for this population is for stops only (excludes intransit), results are driven by the number and duration of stops that are route specific. In all cases, doses for the dedicated train cases are less than the regular and key train cases."[23]

For two workers in this class, these values (0.00262 to 0.00609 person-rem) translate to exposure doses that could range from 1.31 mrem to 3.05 mrem per person per trip.

**Conclusions about the DTS Exposure Estimates**

DTS attempted to estimate the potential exposures to ionizing radiation from HLRW/SNF shipments among the various populations, including the different classes of railroad workers. Among those railroad workers, the highest potential exposures, due to proximity and time of exposure, were among the escorts.

In perspective, if escorts performed this duty over the shortest route studied, the Humboldt Nuclear Power Plant in California to Yucca Mountain—a distance of 1,090 miles—with an average speed of 33 mph, including 2½-hour stops for train crew changes every 11 hours and 1,090 miles traveled at 35 mph, the exposure would occur over 32.25 hours. If this same crew of escorts did this once a week for 50 weeks a year, their annual dose would be 1,100 mrem, just under one quarter of the OSHA permitted annual whole body dose.

Keep in mind that this is a theoretical dose estimate based on the permitted emissions from the casks, a maximum of 10 mrem/hr at 3.3 feet (1 meter) from the surface of the package (49 CFR § 173.441).

[22] Ibid., page 39
[23] Ibid., page 40

## Real-World Exposures

### U.S. Railroad Data–Norfolk Southern Railway

Beginning in May of 2005, NS initiated occupational exposure monitoring of employees involved in shipments of SNF for a U.S. Government client. These shipments involved dedicated trains made up in accordance with Association of American Railroads (AAR) Recommended Practice (AAR Circular No. OT-55-J, "Recommended Railroad Operating Practices for Transportation of Hazardous Materials") as detailed in Appendix A to this report.

FRA requested and received the NS SNF shipment radiation monitoring data. This data included train information and laboratory reports showing the results of NS's personal dosimetry monitoring (anonymous) and contractor cask monitoring reports (when available).

The data covers the only trains NS operated carrying SNF/HLNW; the intent was to monitor all such trains. Eight trains were monitored from May 2005 to October 2009.

All employees actively involved with the shipment were monitored for the full duration of their exposure. The data covered 176 individual employee measurements. NS employees monitored included locomotive engineers, conductors, transportation supervisors, environmental personnel, police, and various other NS personnel involved in the actual movements. All involved employees were provided video training before participation, and were provided test results in writing after the trips were completed.

Monitoring was done by means of thermoluminescent dosimeters (TLD)[24] which detect gamma, x-ray, beta, and neutron radiation with a detection limit of 10 mrem. The shortest period of time an employee would have been exposed was 6 hours.

All of the 176 employee exposure results were less than the detection limits of the dosimeters, with one exception—an employee (conductor) whose exposure was 13 mrem. The source of the exposure was not identified, so it could have been from the shipment or another external source. In the context of relevant occupational exposure limits, this exposure could occur almost 400 times in a year (or about twice a workday) and still be below the OSHA limit for annual exposure.

In addition to employee exposure measurements, the level of radiation at the surface of and surrounding the package (cask) were measured to determine compliance with the NRC/DOT limits for this type of shipment. The highest source measurements on the consist for these shipments were taken in contact with the surface of the cask; the measurements ranged from 0.60 mrem/hr to 0.45 mrem/hr for combined gamma and neutron radiation. All of these measurements were found on the bottom surface of the cask, a location where it is unlikely any member of the crew, or other railroad workers, would be occupying.

[24] Please see Appendix B for an explanation of the TLD technology.

Surface Measurements

| Location | Gamma Neutron (mR/hr) | Location | Gamma Neutron (mR/hr) |
|---|---|---|---|
| A | 0.01 - 0.00 | N | 0.01 - 0.00 |
| B | 0.01 - 0.00 | O | 0.01 - 0.00 |
| C | 0.39 - 0.00 | P | 0.01 - 0.00 |
| D | 0.42 - 0.00 | Q | 0.01 - 0.00 |
| E | 0.41 - 0.00 | R | 0.01 - 0.00 |
| F | 0.53 - 0.00 | S | 0.01 - 0.00 |
| G | 0.01 - 0.00 | T | 0.01 - 0.00 |
| H | 0.01 - 0.00 | U | 0.01 - 0.00 |
| I | 0.01 - 0.00 | V | 0.01 - 0.00 |
| J | 0.01 - 0.00 | W | 0.01 - 0.00 |
| K | 0.01 - 0.00 | X | 0.01 - 0.00 |
| L | 0.01 - 0.00 | Y | 0.01 - 0.00 |
| M | 0.01 - 0.00 | | |

*1 M Measurements

| Location | Gamma Neutron (mR/hr) |
|---|---|
| *1 | 0.01 - 0.00 |
| *2 | 0.01 - 0.00 |
| *3 | 0.01 - 0.00 |
| *4 | 0.01 - 0.00 |
| *5 | 0.01 - 0.00 |
| *6 | 0.01 - 0.00 |
| *7 | 0.01 - 0.00 |
| *8 | 0.01 - 0.00 |
| *9 | 0.01 - 0.00 |
| *10 | 0.01 - 0.00 |
| *11 | 0.01 - 0.00 |
| *12 | 0.01 - 0.00 |

Please Note:
All measurements NOT reproduced for clarity

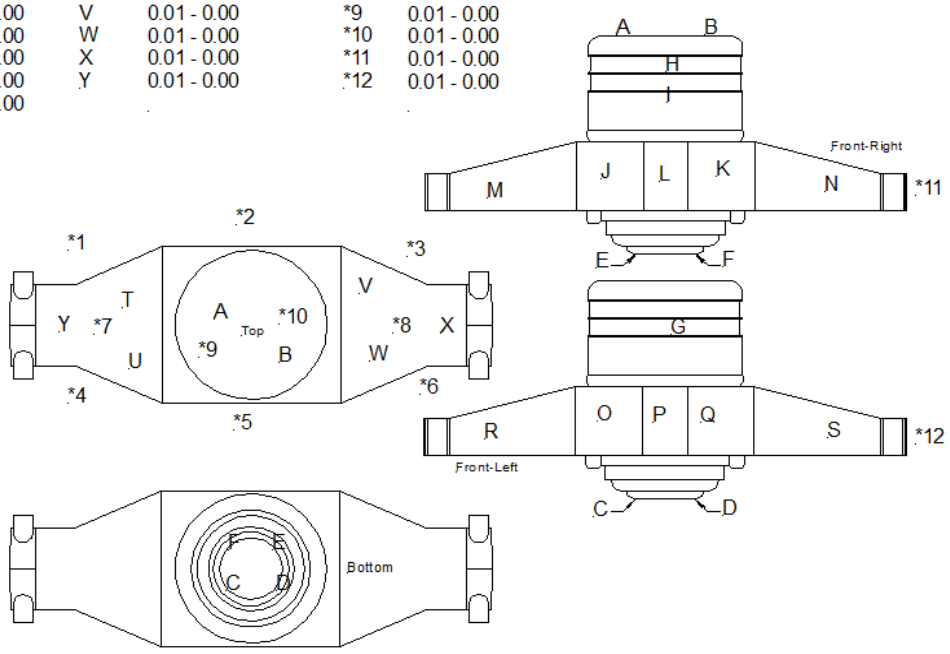


**Figure 2: Cask Emission Measurements for NS 10/23/2009**

The highest measurement at 1 meter from the surface of the cask for combined neutron/gamma radiation anywhere around the cask was 0.10 mrem/hr. Figure 2, above, shows a set of typical measurements and their locations around the cask. The monitoring results indicate very low potential for exposures in excess of the detection limit of the monitoring devices to NS employees involved in the shipments as measured since they began in 2005. The emission level measurements are significantly lower than those permitted by the applicable regulations and, as a result, the employee exposures were well below the permitted limits.

The actual dose measurements are consistent with the levels predicted by the DTS for most of the classes of railroad employees, and significantly lower than those predicted for the escort personnel.

**The French Study**

In 2004, the French Railway, Société Nationale des Chemins de fer Francais (SNCF), requested the assistance of the Institute for Radiological Protection and Nuclear Safety (IRSN)[25] to characterize the exposures of rail workers to ionizing radiation.[26] The units used to describe exposures characterized in the study were µSv/hr (micro Sieverts per hour). The following conversion was used, and all the numerical data contained in the IRSN study were converted to mrem for ease of comparison with other data in this report.

| |
|---|
| 1 Sv = 100 Rem<br>1 mSv = 0.1 Rem = 100 mrem<br>= 0.1 mrem |

In France, radioactive fuel and wastes are transported mainly by train and on a routine basis. The genesis of the study was recognition of this and the fact that employees are exposed. Rather than paraphrase, the essence of the study approach is summarized in the following quoted passages:

> "Radioactive fuel and wastes are frequently transported for storage and/or reprocessing purposes. The main part of this transport is generally done by train. Before, during and after the journey, operators and drivers, who work directly in contact with and in the vicinity of the wagons, are exposed to external irradiations due to the radioactive materials that are confined inside the containers."
>
> SNCF (French Railways) Directive RH 0824 relating to the prevention of accidents and protection against the risk of exposure to radiation and contamination during the carriage of radioactive goods by rail requires all shipments of this type of material to be covered by a Radiological Protection Programme (RPP). As part of this programme, SNCF is required to make an assessment of the external exposure to ionising radiation to which employees may be subjected.
>
> SNCF has asked the External Dosimetry Department of the Institute for Radiological Protection and Safety (IRSN) to carry out the necessary measurements in order to establish the values of ambient dose equivalents H(10) in the vicinity of shipments of radioactive materials, for convoys of nine different types, that are considered to be representative of all types of possible transports, involving photon[27] or mixed neutron–photon fields.

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[25] The IRSN is an agency of the French Government under the joint authority of the Defense Minister, the Environmental Minister, the Industry Minister, and the Health and Research Minister, with expert staff that perform investigations and studies in the fields of nuclear safety, protection against ionizing radiation, protection and control of nuclear material, and protection against accidents associated with these areas.

[26] "Workplace Characterisation in Case of Rail Transport of Radioactive Materials" L. Donadille, C. Itie, T. Lahaye, H. Muller, F. Trompier and J. F. Bottollier-Depois Institute for Radiological Protection and Nuclear Safety (IRSN), BP 17, F-92262 Fontenay-aux-Roses, France, Radiation Protection Dosimetry (2007), Vol. 125, No. 1-4, pp. 369-375

[27] Photon radiation measured consisted of x-rays and gamma rays.

> The measurement campaign had started in May 2004 and four types of radioactive convoys had already been investigated. By using survey meters and spectrometers, the study consisted in measuring the external exposure at different stages of the work that was done beside the wagons (e.g. coupling/decoupling two wagons, checking the brakes, etc.) and inside the locomotive (driving). For each one of these tasks, the exposure was estimated in terms of H*(10)[28] by summing the dose all along the different phases carried out by the operator. In addition, a dosimetric characterisation of each convoy was made by performing measurements along the wagons and spectrometric information about the photon and/or neutron fields were collected. This study provides helpful data to predict the dose that the operators are liable to integrate over long periods, typically 1 y."[29]

A variety of instruments were used that were more sophisticated than the TLDs used in NS's series of measurements described above. They were capable of measuring exposure over a wide range of intensities, from well below the 10 mrem lower level of detection of the TLDs to several thousand mrem. These instruments were used to ensure a variety of different types of emissions, including photon (x-rays, gamma rays) and neutron, were properly characterized. Where different types of instruments with different sensitivities were used for measuring the same emission types, the appropriate correction factors were applied to the data to ensure consistency in reporting.

In order to ensure that the measurements would not be affected by other shipments of radioactive materials, a loaded consist was placed at an isolated location. In addition, the activities of each of the groups of railroad workers who would be involved with the shipments were simulated and timed to ensure that projections of annual doses would be realistically characterized.

The exposures were then measured at locations that represented either the highest potential for exposure or where an employee would spend the most time, e.g., the cab of the locomotive. In the case of employees whose jobs required movement along the consist, which would result in exposures to different levels, the method used measured exposures at the locations, reproducing the exposure times at those locations and the movements of the employees.

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[28] The instruments used in this study were designed to measure H*(10)–the dose (rate) at some place in air (not at the body of a person). This was done to estimate the dose a person would receive if he or she would be at that same place for some time. This method of measurement was created to account for changes to the radiation field caused by the body of the person who finally went to that place without requiring a person to be actually exposed to the radiation field.

[29] "Workplace Characterisation in Case of Rail Transport of Radioactive Materials" L. Donadille, C. Itie, T. Lahaye, H. Muller, F. Trompier and J. F. Bottollier-Depois Institute for Radiological Protection and Nuclear Safety (IRSN), BP 17, F-92262 Fontenay-aux-Roses, France, Radiation Protection Dosimetry (2007), Vol. 125, No. 1-4, p. 369

SNCF/IRSN Surface Measurements

Values show readings found on three different cars (wagons)

| Location | Photon (mR/hr) Wagon | | | Neutron (mR/hr) Wagon | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 |
| A | 0.21 | 0.48 | 0.56 | 0.95 | 1.26 | 2.18 |
| B | 1.78 | 2.47 | 3.57 | 1.52 | 1.13 | 1.72 |
| C | 0.24 | 0.49 | 0.38 | 0.90 | 1.18 | 1.45 |
| D | 0.02 | 0.03 | 0.04 | 0.07 | 0.11 | 0.17 |
| E | 0.03 | 0.04 | 0.02 | 0.11 | 0.17 | 0.07 |
| F | 0.22 | 0.31 | 0.48 | 0.94 | 1.25 | 1.85 |
| G | 1.43 | 2.17 | 3.38 | 1.57 | 1.21 | 1.57 |
| H | 0.16 | 0.48 | 0.39 | 0.94 | 1.12 | 1.32 |

Original values shown as uSv/hr - conversion factor: 10 uSv = 1 mRem

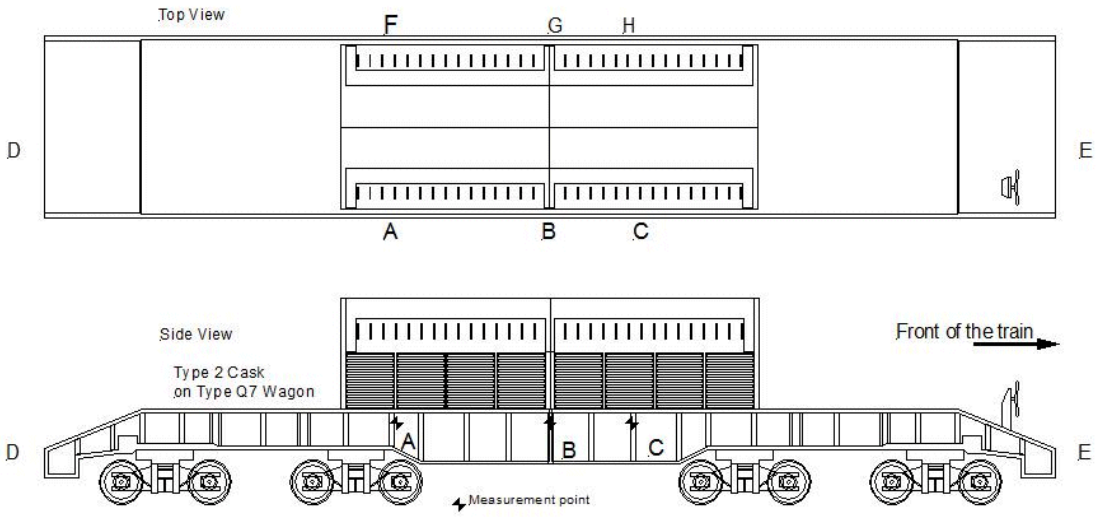


**Figure 3: SNCF/IRSN Surface Measurements**

The mapping of the intensities of radiation emissions in contact with each car in the consist are shown above in Figure 3. It shows a summary of the data reported in the study, with the values converted from µSv/hr to mrem/hr for ease of comparison with the values used in the United States.

For simplicity, the total dose measured is reproduced in the table below for comparison with TLD exposures reported in the NS study.

The final part of the study used the radiation exposure data and the time of exposure-by-task data to estimate an overall exposure dose. The study estimated that an employee who would conduct each of the tasks (with the exception of driving) 100 times would have an exposure of about 25 mrem. The driving task was estimated based on the hours exposed (see Table 1 below).

**Table 1: SNCF/IRSN Data Table**

| Task | Exposure time(s) | Total Dose* mrem |
|---|---|---|
| Coupling engine to wagon | 40 | 0.001 |
| Uncoupling engine from wagon | 40 | 0.001 |
| Testing brakes | 300 | 0.065 |
| Placing and removing rear warning lamps | 70 | 0.015 |
| Checking train status | 240 | 0.051 |
| Recording train details | 360 | 0.077 |
| Dispatching the train | 70 | 0.031 |
| **Total** | **1,120** | **0.241** |
| | | |
| Driving (mrem/hr)** | | 0.02 |

* Exposure, expressed in terms of H*(10), associated with the essential operational tasks.
**The results for the driving task are expressed in mrem/hr since the driving time cannot be easily estimated.

The results reported in this study indicate that, even with the different methods used to obtain exposure determinations, the exposures measured were of a similar order of magnitude as those predicted by the DTS and found in the NS studies.

**The German Study**

In July of 2003, a research study[30] was the basis for a presentation at the International Conference on the Safety of Transport of Radioactive Material sponsored by the International Atomic Energy Agency (IAEA). The paper summarized the principal findings and conclusions of a survey of radiation exposures incurred by workers and the public from the normal transport of radioactive material in Germany.[31]

The survey covered all major categories of radioactive materials, the large majority of these packages contained only relatively small quantities of radiopharmaceuticals, research and industrial sources, and other radioactive commodities. The study excluded consumer goods such as smoke detectors. The study covered approximately 750,000 radioactive material packages shipped annually over an 8-year period in Germany by all transportation modes, i.e., by road, rail, air, and sea. Large quantity shipments of radioactive materials, such as HLRW or SNF, accounted only for a small proportion of the total volume of radioactive material shipments within Germany.

[30] "Assessment of the Radiation Exposures associated with the Transport of Radioactive Material in Germany," G. Schwartz and F. Lange, Gesellschaft fur Anlagen und Realktorsicherheit (GRS) mbH, Schwertnergasse 1, 50667 Koln, Germany – Proc. IAEA Conference, July 7–11, 2003, Vienna, page 97.
[31] GRS mbH is a nonprofit, scientific and technical expert and research organization. It is Germany's leading expert institution in the area of nuclear safety and waste management.

The table below is an excerpt from the results of the survey and assessment in terms of occupational radiation exposures arising from the normal transport[32] of radioactive material in Germany. The transport-related doses cover a range of transport activities and cover fuel cycle and non-fuel cycle radioactive material shipments and their predominant mode of transport including the following:

- Unirradiated nuclear fuel cycle material, e.g., uranium concentrate, uranium hexafluoride, UO2-powder/pellets, fuel elements, and pins, etc.
- Irradiated nuclear fuel cycle material includes SNF, vitrified HLRW, irradiated fuel pins, etc., and large quantity radiation sources.
- Non-nuclear radioactive waste, e.g., medical and research waste.
- Supply and distribution of medical, research, and industrial isotopes.
- Radiography sources.

**Table 2: Occupational Radiation Exposures Arising from Normal Transport**

| **Material Category/Transport Activity** | **Transport Mode** | **Maximum Effective Dose Per Worker (mrem/a)*** |
|---|---|---|
| Unirradiated fuel cycle material, e.g., U3O8, UF6, UO2-powder/pellets, fuel pins & fuel assemblies, radiation sources | Road/Rail | < 100 |
| Unirradiated/irradiated nuclear fuel cycle material and large quantity radiation sources, e.g., activated/contaminated equipment and components, radioactive waste, spent nuclear fuel, high level radioactive waste etc. | Road | 100–300 |
| | Rail | < 100 |

* This unit is mrem per annum (per year)–an annual dose estimate.

In discussing the findings of the report the authors stated that:

> The exposure data presented in Figure 1 and Table 1 for the recent years indicate that the occupational and public exposures (effective dose) associated with the normal transport of radioactive material have -with few exceptions -been consistently in the range of or below of 1 mSv/yr (100 mrem/yr) for transport workers and well below of 0,05 mSv/yr (5 mrem/yr) for the general public (critical group individuals) for all major transport activities and categories of radioactive material. Radiation doses in these dose ranges represent only a small

[32] "Normal transport" means transport operations that occur without unusual delay, loss of, or serious damage to a radioactive material package, or an accident involving the conveyance.

> fraction of the relevant regulatory dose limit for radiation workers and members of the public of 20 mSv/yr (2000 mrem/yr) and 1 mSv/yr (100 mrem/yr), respectively.[33]

In the conclusions to the report the authors state:

> "The comprehensive survey and assessment results confirm that the transport-related radiation doses, incurred by transport workers and members of the public are generally low for all major categories of material and transport activities under normal conditions of transport and well below the applicable regulatory dose limits (20 mSv/yr for workers and 1 mSv/yr for members of the public)."[34]

Later they state:

> "This general observation is according to a European wide assessment study performed on behalf of the European Commission broadly consistent with the operational experience in other Central European EU Member States."[35]

And:

> "The occupational and public radiation exposures data described above are believed to reflect well-managed transport and sound management practices and may thereby serve as a reasonable basis and guidance material for the establishment of an optimised level of radiological protection and safety in transport. The radiation exposure data nationally available also indicate that the implementation and application of the international transport safety standards, i.e. TS-R-1, ensure an adequate level of radiological protection of both workers and members of the public for normal conditions of transport and satisfy the radiation protection principles of the International Basic Safety Standards (BSS)."[36]

As with the NS and French studies cited previously, the results of this study are consistent in the findings of low radiation exposures among rail transportation workers.

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[33] "Assessment of the Radiation Exposures associated with the Transport of Radioactive Material in Germany," G. Schwartz and F. Lange, Gesellschaft fur Anlagen und Realktorsicherheit (GRS) mbH, Schwertnergasse 1, 50667 Koln, Germany – Proc. IAEA Conference, July 7–11, 2003, Vienna, page 100.

[34] Ibid., page 100

[35] Ibid., page 100

[36] Ibid., page 100

## Conclusions in Response to the Congressional Mandates

Section 411(a) of the Federal Railroad Safety Improvement Act of 2008 (Pub. L. No. 110-432) (RSIA 2008) states:

> "STUDY. The Secretary of Transportation shall, in consultation with the Secretary of Energy, the Secretary of Labor, the Administrator of the Environmental Protection Agency, and the Chairman of the Nuclear Regulatory Commission, as appropriate, conduct a study of the potential hazards to which employees of railroad carriers and railroad contractors or subcontractors are exposed during the transportation of high-level radioactive waste and spent nuclear fuel ... (1) an analysis of the potential application of "as low as reasonably achievable" principles for exposure to radiation to such employees ..."

**Response:** The data presented in this report include that from the DTS, where the theoretical predictions of potential exposure to radiation were based on assumptions of emission levels from the packages at the allowed regulatory limit, and real-world exposure assessments in the United States and two European countries. Both the DTS theoretical findings and the real-world experience indicate that potential and actual exposures are well below the currently established permissible levels. All of the current regulatory permissible levels have been established recognizing the importance of the "as low as reasonably achievable" (ALARA) principles in minimizing exposures.

Section 411(a)(1) of the RSIA 2008 continues:

> "STUDY… with an emphasis on the need for special protection from radiation exposure for such employees during the first trimester of pregnancy ..."

**Response:** Aside from the medical and personal privacy issues raised by this question, the real-world exposures found in the three studies cited are well below regulatory limits. According to the Center for Disease Control, "Most radiation exposure events will not expose the fetus to levels likely to cause health effects. This is true for radiation exposure from most diagnostic medical exams as well as from occupational radiation exposures that fall within regulatory limits."[37]

Section 411(a)(1) of the RSIA 2008 continues:

> "STUDY … with an emphasis on the need for special protection from radiation exposure for such employees ... or who are undergoing or have recently undergone radiation therapy."

**Response:** Without considering the medical privacy issues raised by this question, the real-world exposures found in the three studies cited are very low. However, the medical and health

[37] Centers for Disease Control: http://www.bt.cdc.gov/radiation/prenatalphysician.asp (April 2010)

implications of someone undergoing radiation therapy can be extremely varied, and the interaction with occupational exposures cannot be presumed given the complexity of the medical procedures and types of therapy available in today's medical practice.

Section 411(a)(2) of the RSIA 2008 continues:

> "STUDY… the feasibility of requiring real-time dosimetry monitoring for such employees."

**Response:** Requiring real-time dosimetry for railroad or contractor employees involved in these activities does not appear to be warranted based on the exposures documented to date, nor by the very infrequent occurrence of these events.

Section 411(a)(3) of the RSIA 2008 continues:

> "STUDY… the feasibility of requiring routine radiation exposure monitoring in fixed railroad locations, such as yards and repair facilities."

**Response:** The use of dedicated trains minimizes the dwell-time of trains carrying HLRW/SNF in fixed locations such as yards and repair facilities. In addition, significant monitoring of the packages at the shipping point, required by regulation, along with the known shielding properties of the packages, would make monitoring in these locations redundant and would serve no practical purpose.

Section 411(a)(3) of the RSIA 2008 continues:

> "STUDY … a review of the effectiveness of the Department's packaging requirements for radioactive materials."

**Response:** The DTS was used to establish theoretical levels of exposure to various populations potentially exposed to radiation during rail transportation of HLRW/SNF, based on the assumption that the shielding afforded by the packages would at least meet the limits established in the regulations. The real-world levels measured by NS during actual shipments indicate that the packaging far exceeds the minimum requirements, thus providing an extra margin of safety for the employees as well as the general public.

Section 411(b) of the RSIA 2008 states:

> REPORT. Not later than 18 months after the date of enactment of this Act, the Secretary of Transportation shall transmit a report on the results of the study required by subsection (a) and any recommendations to further protect employees of a railroad carrier or of a contractor or subcontractor to a railroad carrier from unsafe exposure to radiation during the transportation of high-level radioactive waste and spent nuclear fuel …"

**Response:** Based on the findings of this study, it does not appear that any such recommendations are necessary at this time.

Section 411(c) of the RSIA 2008 states:

> "REGULATORY AUTHORITY. The Secretary of Transportation may issue regulations that the Secretary determines appropriate, pursuant to the report required by subsection (b), to protect railroad employees from unsafe exposure to radiation during the transportation of radioactive materials."

**Response:** The Secretary of Transportation does not believe that any regulatory action is necessary at this time to further protect railroad employees from unsafe exposure to radiation during the transportation of radioactive materials.

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# Appendix A:
## AAR Circular No. OT-55-J–Recommended Railroad Operating Practices for Transportation of Hazardous Materials

**ASSOCIATION OF AMERICAN RAILROADS**

**K.B. Dorsey**
*Executive Director - Tank Car Safety*

March 15, 2010

**Circular No. OT-55-J**

(CPC-1210, Supplement 1)

Subject: Recommended Railroad Operating Practices for Transportation of Hazardous Materials

TO: MEMBERS AND PRIVATE CAR OWNERS

On March 11, 2010, AAR's Hazardous Materials (BOE) Committee approved changes to Appendices A, B, and C which were modified to incorporate the latest information available.

Changes include:

- The addition of Hazardous Material Response Code (HMRC) - 4821029, 4921029, and 4921027 to Appendix A and B
- The addition of Hazard Class Column to Appendix A and B
- The addition of HMRC 4925224, 4925225, and 4825181 to Appendix C
- The removal of HMRC 4920183 and replaced with HMRC 4920326 in order to place the hazardous material into the appropriate HMRC classification range
- The removal of HMRC 4920196 since HMRC 4920342 already exist for the exact same hazardous material

The revised standard is included in this circular and is in effect as of the publication date of this circular. Under the provisions of Standard S-050, which may be found on the TTCI web site (www.AAR.com), this circular reflects the final action on this matter.

Sincerely,

K.B. Dorsey

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# ASSOCIATION OF AMERICAN RAILROADS

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Circular No. OT-55-J
Effective March 17, 2009
Appendices revised March 15, 2010

## Recommended Railroad Operating Practices For Transportation of Hazardous Materials

### Road Operating Practices

### I. "Key Trains"

A. Definition: A "Key Train" is any train with:

- one tank car load of Poison or Toxic Inhalation Hazard[1] (PIH or TIH) (Hazard Zone A, B, C, or D) or anhydrous ammonia, or;
- 20 car loads or intermodal portable tank loads of a combination of PIH or TIH (Hazard Zone A, B, C or D), anhydrous ammonia, flammable gas, Class 1.1 or 1.2 explosives, and environmentally sensitive chemicals, or;
- one or more car loads of Spent Nuclear Fuel (SNF), High Level Radioactive Waste (HLRW).

Attached as Appendix, A and B are lists of PIH or TIH (Hazard Zone A, B, C or D) including anhydrous ammonia, Appendix C is a list of environmentally sensitive chemicals, Appendix D is a list of time sensitive materials and Appendix E is a list of SNF and HLRW with 49 Hazmat Codes.

B. Restrictions:

1. Maximum speed -- "Key Train" - 50 MPH.

2. Unless siding or auxiliary track meets FRA Class 2 standards, a Key Train will hold main track at meeting or passing points, when practicable.

3. Only cars equipped with roller bearings will be allowed in a Key Train.

4. If a defect in a "Key Train" bearing is reported by a wayside detector, but a visual inspection fails to confirm evidence of a defect, the train will not exceed 30 MPH until it has passed over the next wayside detector or delivered to a terminal for a mechanical inspection. If the same car again sets off the next detector or is found to be defective, it must be set out from the train.

### II. Designation of "Key Routes"

A. Definition: Any track with a combination of 10,000 car loads or intermodal portable tank loads of hazardous materials, or a combination of 4,000 car loadings of PIH or TIH (Hazard zone A, B, C, or D), anhydrous ammonia, flammable gas, Class 1.1 or 1.2 explosives, environmentally sensitive chemicals, Spent Nuclear Fuel (SNF), and High Level Radioactive Waste (HLRW) over a period of one year.

[1] Poison Inhalation Hazard (PIH) and Toxic Inhalation Hazard (TIH) are used interchangeably and refer to the same list of chemicals.

B. Requirements:

1. Wayside defective bearing detectors shall be placed at a maximum of 40 miles apart on "Key Routes", or equivalent level of protection may be installed based on improvements in technology.

2. Main Track on "Key Routes" is inspected by rail defect detection and track geometry inspection cars or any equivalent level of inspection no less than two times each year; sidings are similarly inspected no less than one time each year; and main track and sidings will have periodic track inspections that will identify cracks or breaks in joint bars.

3. Any track used for meeting and passing "Key Trains" must be Class 2 or higher. If a meet or pass must occur on less than Class 2 track due to an emergency, one of the trains must be stopped before the other train passes.

## III. Yard Operating Practices

A. Maximum reasonable efforts will be made to achieve coupling of loaded placarded tank cars at speeds not to exceed 4 MPH.

B. Loaded placarded tank cars of PIH or TIH (Hazard zone A, B, C or D), anhydrous ammonia, or flammable gas which are cut off in motion for coupling must be handled in not more than 2-car cuts; and cars cut off in motion to be coupled directly to a loaded placarded tank car of PIH or TIH (Hazard zone A, B, C, or D), anhydrous ammonia, or flammable gas must also be handled in not more than 2-car cuts.

## IV. Storage

**Separation Distance for New Facilities**

Loaded Tank Cars and Storage Tanks from Mainline Class 2 Track or Higher

| Activity | PIH (Zone A, B, C or D), Class 3, Division 2.1, Division 2.2 and all other Hazard Classes | Combustible Liquids, Class 8, and Class 9 |
|---|---|---|
| Loading and Unloading | 100 FEET | 50 FEET |
| Storage of Loaded Tank Cars | 50 FEET | 25 FEET |
| Storage in Tanks | 100 FEET | 50 FEET |

***Note 1*** - With regard to existing facilities, maximum reasonable effort should be made to conform to this standard taking into consideration cost, physical and legal constraints.

***Note 2*** - The proposals apply to storage on railroad property and on chemical company property located close to railroad mainline.

## V. TRANSCAER® (Transportation Community Awareness and Emergency Response Implementation of Transcaer®)

Railroads will assist in implementing TRANSCAER®, a system-wide community outreach program to improve community awareness, emergency planning and incident response for the transportation of hazardous materials. Objectives of TRANSCAER® are as follows:

- Demonstrate the continuing commitment of chemical manufacturers and transporters to the safe transportation of hazardous materials;

- Improve the relationship between manufacturers, carriers and local officials of communities through which hazardous materials are transported;

- When requested assist Local Emergency Planning Committees (LEPC's) in assessing the hazardous materials moving through their communities and the safeguards that are in place to protect against unintentional releases. Upon written request, AAR members will provide bona fide emergency response agencies or planning groups with specific commodity flow information covering at a minimum the top 25 hazardous commodities transported through the community in rank order. The request must be made using the form included as Appendix F by an official emergency response or planning group with a cover letter on appropriate letterhead bearing an authorized signature. The form reflects the fact that the railroad industry considers this information to be restricted information of a security sensitive nature and that the recipient of the information must agree to release the information only to bona fide emergency response planning and response organizations and not distribute the information publicly in whole or in part without the individual railroad's express written permission. It should be noted that commercial requirements change over time, and it is possible that a hazardous materials transported tomorrow might not be included in the specific commodity flow information provided upon request, since that information was not available at the time the list was provided;

- Assist LEPC's in developing emergency plans to cope with hazardous materials transportation incidents;

- Assist community response organizations in preparations for responding to hazardous materials incidents.

*TRANSCAER® activities are also addressed in the Distribution Code of the American Chemistry Council's Responsible Care® program. Many members have joined the Responsible Care® Partnership Program to help describe and improve their ongoing safety, health and environmental programs.*

An important product of the TRANSCAER® program will be to overcome the widespread belief that every local firefighter and policeman must have the expert skills and equipment to respond personally to any hazardous materials emergency. Through the awareness training and contingency planning provided through TRANSCAER®, states and local communities will be able to pool their expertise and resources with those of industry to provide for a more coordinated and better managed emergency response system.

TRANSCAER® should be highly publicized to produce the maximum desirable enhancement of public awareness.

## VI. Criteria for Shipper Notification

The railroads will initiate the shipper's emergency response system by calling CHEMTREC, or the appropriate contact telephone number as required by regulation on the shipping document, when an incident occurs involving any car (load or residue) containing a hazardous material regulated in transportation by the Department of Transportation.

An incident is defined as a rail car which is derailed and not upright, or which has sustained body or tank shell damage, or has sustained a release of any amount of product.

The shipper's emergency response system should also be initiated if the carrier believes there is reason to suspect any other potential for injury to people, property or the environment.

In the event of a major rail accident, a consist (to include shipper, consignee and commodity description for each hazardous material), waybill or equivalent document, should be provided upon request to CHEMTREC or the appropriate shipper contact as identified by the emergency response telephone number displayed on the shipping document. This can be accomplished by facsimile or other appropriate and acceptable electronic means.

A major rail accident is defined as one resulting in fire, explosion, the potential for an explosion, fatalities, evacuation of the general public, or multiple releases of hazardous materials.

Anytime a consist or other document is provided to CHEMTREC or the appropriate contact a follow-up call by the carrier should be made to confirm the receipt of the information as well as to provide other additional information pertaining to the incident not contained in the facsimile or electronically transmitted document.

This practice does not preclude any carrier from notifying CHEMTREC or the appropriate shipper contact of a rail incident involving hazardous materials that does not meet the criteria outlined above.

## VII Time Sensitive Materials

Railroads and shippers will be responsible for monitoring the shipments (loads & residue) of products classified by the Department of Transportation as being time sensitive.

This monitoring process will, at a minimum, provide a means to ensure the movement of rail cars containing time sensitive materials (for list see Appendix D) in order to achieve delivery of the product within the time specified by the Department of Transportation.

As warranted, railroads will implement an internal escalation process and communicate with shippers, receivers and other rail carriers concerning any rail car containing a time sensitive product that has been delayed in transit to the extent that it may not reach destination within the time specified by the Department of Transportation. In such cases, an expedited movement of the rail car, or other action as deemed appropriate by the carrier and shipper will be taken.

## VIII Special Provision for Spent Nuclear Fuel (SNF) and High Level Radioactive Waste (HLRW)

When a train carrying SNF or HLRW meets another train carrying loaded tank cars of flammable gas, flammable liquids or combustible liquids in a single bore double track tunnel, one train shall stop outside the tunnel until the other train is completely through the tunnel.

## IX Applicability

These recommendations are adopted by each AAR and American Short Line and Regional Railroad Association (ASLRRA) member without reservation for its operations within the United States of America.

##########################################################################################

Supersedes Circular No. OT-55-I dated July 17, 2006

**Appendix A:**
**List of Poison Inhalation Hazard (PIH) or Toxic Inhalation Hazard Chemicals (TIH)**
**(Hazard Zone A, B, C, or D)**
**Sorted by Hazard Class and Proper Shipping Name**
**March 15, 2010**

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| **NON-FLAMMABLE GASES, HAZARD CLASS 2.2** | | | | | |
| 4904210 | Ammonia, Anhydrous | UN 1005 | | | 2.2 |
| 4904879 | Ammonia, Anhydrous | UN 1005 | | | 2.2 |
| 4904211 | Ammonia, Solution | UN 3318 | | | 2.2 |
| **POISON GASES, HAZARD CLASS 2.3** | | | | | |
| 4920359 | Ammonia, Anhydrous | UN 1005 | | D | 2.3 |
| 4920360 | Ammonia, Solution | UN 3318 | | D | 2.3 |
| 4920135 | Arsine | UN 2188 | | A | 2.3 |
| 4920349 | Boron Trichloride | UN 1741 | | C | 2.3 |
| 4920522 | Boron Trifluoride | UN 1008 | | B | 2.3 |
| 4920715 | Bromine Chloride | UN 2901 | | B | 2.3 |
| 4920343 | Carbon Monoxide and Hydrogen mixture, Compressed | UN 2600 | | | 2.3 |
| 4920399 | Carbon Monoxide, Compressed | UN 1016 | | D | 2.3 |
| 4920511 | Carbon Monoxide, refrigerated liquid | NA 9202 | | D | 2.3 |
| 4920559 | Carbonyl Fluoride | UN 2417 | | B | 2.3 |
| 4920351 | Carbonyl Sulfide | UN 2204 | | C | 2.3 |
| 4920523 | Chlorine | UN 1017 | | B | 2.3 |
| 4920189 | Chlorine Pentafluoride | UN 2548 | | A | 2.3 |
| 4920352 | Chlorine Trifluoride | UN 1749 | | B | 2.3 |
| 4920516 | Chloropicrin and Methyl Bromide mixtures | UN 1581 | | B | 2.3 |
| 4920547 | Chloropicrin and Methyl Bromide mixtures | UN 1581 | | B | 2.3 |
| 4920392 | Chloropicrin and Methyl Chloride mixtures | UN 1582 | | B | 2.3 |
| 4920527 | Coal Gas, Compressed | UN 1023 | | C | 2.3 |
| 4920101 | Compressed Gas, toxic, corrosive, n.o.s. | UN 3304 | | A | 2.3 |
| 4920324 | Compressed Gas, toxic, corrosive, n.o.s. | UN 3304 | | B | 2.3 |
| 4920301 | Compressed Gas, toxic, corrosive, n.o.s. | UN3304 | | D | 2.3 |
| 4920331 | Compressed Gas, toxic, corrosive, n.o.s. | UN 3304 | | C | 2.3 |
| 4920102 | Compressed Gas, toxic, flammable, corrosive, n.o.s. | UN 3305 | | A | 2.3 |
| 4920303 | Compressed Gas, toxic, flammable, corrosive, n.o.s. | UN 3305 | | B | 2.3 |
| 4920304 | Compressed Gas, toxic, flammable, corrosive, n.o.s. | UN 3305 | | C | 2.3 |
| 4920305 | Compressed Gas, toxic, flammable, corrosive, n.o.s. | UN 3305 | | D | 2.3 |
| 4920165 | Compressed Gas, toxic, flammable, n.o.s. | UN 1953 | | A | 2.3 |
| 4920396 | Compressed Gas, toxic, flammable, n.o.s. | UN 1953 | | B | 2.3 |
| 4920378 | Compressed Gas, toxic, flammable, n.o.s. | UN 1953 | | C | 2.3 |
| 4920379 | Compressed Gas, toxic, flammable, n.o.s. | UN 1953 | | D | 2.3 |
| 4920556 | Compressed Gas, toxic, n.o.s. | UN 1955 | | B | 2.3 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4920181 | Compressed Gas, toxic, n.o.s. | UN 1955 | | A | 2.3 |
| 4920570 | Compressed Gas, toxic, n.o.s. | UN 1955 | | B | 2.3 |
| 4920375 | Compressed Gas, toxic, n.o.s. | UN 1955 | | C | 2.3 |
| 4920373 | Compressed Gas, toxic, n.o.s. | UN 1955 | | D | 2.3 |
| 4920505 | Compressed Gas, toxic, n.o.s. | UN 1955 | | C | 2.3 |
| 4920517 | Compressed Gas, toxic, n.o.s. | UN 1955 | | | 2.3 |
| 4920525 | Compressed Gas, toxic, n.o.s. | UN 1955 | | | 2.3 |
| 4920103 | Compressed Gas, toxic, oxidizing, corrosive, n.o.s. | UN 3306 | | A | 2.3 |
| 4920306 | Compressed Gas, toxic, oxidizing, corrosive, n.o.s. | UN 3306 | | B | 2.3 |
| 4920307 | Compressed Gas, toxic, oxidizing, corrosive, n.o.s. | UN 3306 | | C | 2.3 |
| 4920308 | Compressed Gas, toxic, oxidizing, corrosive, n.o.s. | UN 3306 | | D | 2.3 |
| 4920104 | Compressed gas, toxic, oxidizing, n.o.s. | UN 3303 | | A | 2.3 |
| 4920337 | Compressed gas, toxic, oxidizing, n.o.s. | UN 3303 | | B | 2.3 |
| 4920309 | Compressed gas, toxic, oxidizing, n.o.s. | UN 3303 | | C | 2.3 |
| 4920310 | Compressed gas, toxic, oxidizing, n.o.s. | UN 3303 | | D | 2.3 |
| 4920395 | Cyanogen | UN 1026 | | B | 2.3 |
| 4920178 | Cyanogen Chloride, Stabilized | UN 1589 | | A | 2.3 |
| 4920107 | Diborane | UN 1911 | | A | 2.3 |
| 4920398 | Dichlorosilane | UN 2189 | | B | 2.3 |
| 4920174 | Dinitrogen Tetroxide | UN 1067 | | A | 2.3 |
| 4920342 | Ethylene Oxide and Carbon Dioxide mixture | UN 3300 | | D | 2.3 |
| 4920353 | Ethylene Oxide or Ethylene Oxide with Nitrogen | UN 1040 | | D | 2.3 |
| 4920180 | Fluorine, Compressed | UN 1045 | | A | 2.3 |
| 4920510 | Gas Identification set | NA 9035 | | | 2.3 |
| 4920536 | Gas sample, non-pressurized, toxic, n.o.s. | UN 3169 | | | 2.3 |
| 4920534 | Gas sample, non-pressurized, toxic, flammable, n.o.s. | UN 3168 | | | 2.3 |
| 4920354 | Germane | UN 2192 | | B | 2.3 |
| 4920515 | Hexaethyl tetraphosphate and compressed gas mixtures | UN 1612 | | C | 2.3 |
| 4920528 | Hexafluoroacetone | UN 2420 | | B | 2.3 |
| 4920502 | Hydrogen Bromide, anhydrous | UN 1048 | | C | 2.3 |
| 4920503 | Hydrogen Chloride, anhydrous | UN 1050 | | C | 2.3 |
| 4920504 | Hydrogen Chloride, refrigerated liquid | UN 2186 | | C | 2.3 |
| 4920348 | Hydrogen Iodide, anhydrous | UN 2197 | | C | 2.3 |
| 4920122 | Hydrogen Selenide, anhydrous | UN 2202 | | A | 2.3 |
| 4920513 | Hydrogen Sulfide | UN 1053 | | B | 2.3 |
| 4920115 | Insecticide gases, toxic, flammable, n.o.s. | UN 3355 | | A | 2.3 |
| 4920302 | Insecticide gases, toxic, flammable, n.o.s. | UN 3355 | | B | 2.3 |
| 4920322 | Insecticide gases, toxic, flammable, n.o.s. | UN 3355 | | C | 2.3 |
| 4920323 | Insecticide gases, toxic, flammable, n.o.s. | UN 3355 | | D | 2.3 |
| 4920550 | Insecticide gases, toxic, n.o.s. | UN 1967 | | C | 2.3 |
| 4920105 | Liquefied gas, toxic, corrosive, n.o.s. | UN 3308 | | A | 2.3 |
| 4920311 | Liquefied gas, toxic, corrosive, n.o.s. | UN 3308 | | B | 2.3 |
| 4920313 | Liquefied gas, toxic, corrosive, n.o.s. | UN 3308 | | C | 2.3 |
| 4920315 | Liquefied gas, toxic, corrosive, n.o.s. | UN 3308 | | D | 2.3 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4920108 | Liquefied gas, toxic, flammable, corrosive, n.o.s. | UN 3309 | | A | 2.3 |
| 4920314 | Liquefied gas, toxic, flammable, corrosive, n.o.s. | UN 3309 | | B | 2.3 |
| 4920316 | Liquefied gas, toxic, flammable, corrosive, n.o.s. | UN 3309 | | C | 2.3 |
| 4920318 | Liquefied gas, toxic, flammable, corrosive, n.o.s. | UN 3309 | | D | 2.3 |
| 4920164 | Liquefied gas, toxic, flammable, n.o.s. | UN 3160 | | A | 2.3 |
| 4920382 | Liquefied gas, toxic, flammable, n.o.s. | UN 3160 | | B | 2.3 |
| 4920380 | Liquefied gas, toxic, flammable, n.o.s. | UN 3160 | | C | 2.3 |
| 4920381 | Liquefied gas, toxic, flammable, n.o.s. | UN 3160 | | D | 2.3 |
| 4920195 | Liquefied gas, toxic, n.o.s. | UN 3162 | | A | 2.3 |
| 4920368 | Liquefied gas, toxic, n.o.s. | UN 3162 | | C | 2.3 |
| 4920369 | Liquefied gas, toxic, n.o.s. | UN 3162 | | D | 2.3 |
| 4920383 | Liquefied gas, toxic, n.o.s. | UN 3162 | | | 2.3 |
| 4920531 | Liquefied gas, toxic, n.o.s. | UN 3162 | | | 2.3 |
| 4920571 | Liquefied gas, toxic, n.o.s. | UN 3162 | | B | 2.3 |
| 4920110 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s. | UN 3310 | | A | 2.3 |
| 4920312 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s. | UN 3310 | | B | 2.3 |
| 4920320 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s. | UN 3310 | | C | 2.3 |
| 4920325 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s. | UN 3310 | | D | 2.3 |
| 4920111 | Liquefied gas, toxic, oxidizing, n.o.s. | UN 3307 | | A | 2.3 |
| 4920317 | Liquefied gas, toxic, oxidizing, n.o.s. | UN 3307 | | B | 2.3 |
| 4920319 | Liquefied gas, toxic, oxidizing, n.o.s. | UN 3307 | | C | 2.3 |
| 4920321 | Liquefied gas, toxic, oxidizing, n.o.s. | UN 3307 | | D | 2.3 |
| 4920518 | Methyl Bromide | UN 1062 | | C | 2.3 |
| 4920355 | Methyl Mercaptan | UN 1064 | | C | 2.3 |
| 4920394 | Methylchlorosilane | UN 2534 | | B | 2.3 |
| 4920113 | Nitric oxide and nitrogen dioxide mixtures or Nitric oxide and dinitrogen tetroxide mixtures | UN 1975 | | A | 2.3 |
| 4920112 | Nitric Oxide, Compressed | UN 1660 | | A | 2.3 |
| 4920175 | Nitrogen Trioxide | UN 2421 | | A | 2.3 |
| 4920509 | Nitrosyl Chloride | UN 1069 | | C | 2.3 |
| 4920344 | Oil Gas, Compressed | UN 1071 | | | 2.3 |
| 4920530 | Organic phosphate, mixed with compressed gas or Organic phosphate compound, mixed with compressed gas or Organic phosphorus compound, mixed with compressed gas | NA 1955 | | C | 2.3 |
| 4920173 | Oxygen Difluoride, Compressed | UN 2190 | | A | 2.3 |
| 4920535 | Parathion and Compressed gas mixture | NA 1967 | | C | 2.3 |
| 4920356 | Perchloryl Fluoride | UN 3083 | | B | 2.3 |
| 4920184 | Phosgene | UN 1076 | | A | 2.3 |
| 4920160 | Phosphine | UN 2199 | | A | 2.3 |
| 4920326 | Phosphorus Pentafluoride | UN 2198 | | B | 2.3 |
| 4920106 | Selenium Hexafluoride | UN 2194 | | A | 2.3 |
| 4920357 | Silicon Tetrafluoride | UN 1859 | | B | 2.3 |
| 4920167 | Stibine | UN 2676 | | A | 2.3 |
| 4920508 | Sulfur Dioxide | UN 1079 | | C | 2.3 |
| 4920187 | Sulfur Tetrafluoride | UN 2418 | | A | 2.3 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4920526 | Sulfuryl Fluoride | UN 2191 | | D | 2.3 |
| 4920188 | Tellurium Hexafluoride | UN 2195 | | A | 2.3 |
| 4920347 | Trifluoroacetyl Chloride | UN 3057 | | B | 2.3 |
| 4920346 | Trifluorochloroethylene, Stabilized | UN 1082 | | C | 2.3 |
| 4920371 | Tungsten Hexafluoride | UN 2196 | | B | 2.3 |
| **FLAMMABLE LIQUIDS, HAZARD CLASS 3** | | | | | |
| 4907434 | Ethyl Isocyanate | UN 2481 | I | A | 3 |
| 4907409 | Isobutyl Isocyanate | UN 2486 | I | A | 3 |
| 4909306 | Isopropyl Isocyanate | UN 2483 | I | A | 3 |
| 4910370 | Methacrylonitrile, Stabilized | UN 3079 | I | B | 3 |
| 4909307 | Methoxymethyl Isocyanate | UN 2605 | I | A | 3 |
| **SPONTANEOUSLY COMBUSTIBLE, HAZARD CLASS 4.2** | | | | | |
| 4916138 | Pentaborane | UN 1380 | I | A | 4.2 |
| **OXIDIZERS, HAZARD CLASS 5.1** | | | | | |
| 4918505 | Bromine Pentafluoride | UN 1745 | I | A | 5.1 |
| 4918507 | Bromine Trifluoride | UN 1746 | I | B | 5.1 |
| 4918180 | Tetranitromethane | UN 1510 | I | B | 5.1 |
| **POISONS, HAZARD CLASS 6.1** | | | | | |
| 4921402 | 2-Chloroethanal | UN 2232 | I | B | 6.1 |
| 4921495 | 2-Methyl-2-Heptanethiol | UN 3023 | I | B | 6.1 |
| 4921741 | 3, 5-Dichloro-2, 4, 6-Trifluoropyridine | NA 9264 | I | B | 6.1 |
| 4921401 | Acetone Cyanohydrin, Stabilized | UN 1541 | I | B | 6.1 |
| 4927007 | Acrolein, Stabilized | UN 1092 | I | A | 6.1 |
| 4921019 | Allyl Alcohol | UN 1098 | I | B | 6.1 |
| 4923113 | Allyl Chloroformate | UN 1722 | I | B | 6.1 |
| 4921004 | Allylamine | UN 2334 | I | B | 6.1 |
| 4923209 | Arsenic Trichloride | UN 1560 | I | B | 6.1 |
| 4921727 | Bromoacetone | UN 1569 | II | B | 6.1 |
| 4921558 | Chloroacetone, Stabilized | UN 1695 | I | B | 6.1 |
| 4921009 | Chloroacetonitrile | UN 2668 | II | B | 6.1 |
| 4923117 | Chloroacetyl Chloride | UN 1752 | I | B | 6.1 |
| 4921414 | Chloropicrin | UN 1580 | I | B | 6.1 |
| 4921746 | Chloropivaloyl Chloride | NA 9263 | I | B | 6.1 |
| 4921248 | Crotonalydehyde, Stabilized | UN 1143 | I | B | 6.1 |
| 4921010 | Cyclohexyl Isocyanate | UN 2488 | I | B | 6.1 |
| 4921254 | Diketene, Stabilized | UN 2521 | I | B | 6.1 |
| 4921405 | Dimethyl Sulfate | UN 1595 | I | B | 6.1 |
| 4921251 | Dimethylhydrazine, Symmetrical | UN 2382 | I | B | 6.1 |
| 4921202 | Dimethylhydrazine, Unsymmetrical | UN 1163 | I | B | 6.1 |
| 4921020 | Ethyl Chloroformate | UN 1182 | I | B | 6.1 |
| 4921745 | Ethyl Phosphonothioic Dichloride, Anhydrous | NA 2927 | I | B | 6.1 |
| 4921742 | Ethyl Phosphonous Dichloride, Anhydrous pyrophoric liquid | NA 2845 | I | B | 6.1 |
| 4921744 | Ethyl Phosphorodichloridate | NA 2927 | I | B | 6.1 |
| 4921404 | Ethyldichloroarsine | UN 1892 | I | B | 6.1 |
| 4921420 | Ethylene Chlorohydrin | UN 1135 | I | B | 6.1 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4921497 | Ethylene Dibromide | UN 1605 | I | B | 6.1 |
| 4927006 | Ethyleneimine, Stabilized | UN 1185 | I | A | 6.1 |
| 4921722 | Hexachlorocyclopentadiene | UN 2646 | I | B | 6.1 |
| 4921028 | Hydrocyanic acid, aqueous solutions or Hydrogen cyanide, aqueous solutions | UN 1613 | I | B | 6.1 |
| 4921239 | Hydrogen Cyanide, solution in alcohol | UN 3294 | I | B | 6.1 |
| 4927014 | Hydrogen Cyanide, stabilized | UN 1051 | I | A | 6.1 |
| 4927004 | Iron Pentacarbonyl | UN 1994 | I | A | 6.1 |
| 4921211 | Isobutyl Chloroformate | NA 2742 | I | B | 6.1 |
| 4921252 | Isopropyl Chloroformate | UN 2407 | I | B | 6.1 |
| 4921245 | Methanesulfonyl Chloride | UN 3246 | I | B | 6.1 |
| 4921438 | Methyl Bromide and Ethylene dibromide mixtures, liquid | UN 1647 | I | B | 6.1 |
| 4927008 | Methyl Chloroformate | UN 1238 | I | A | 6.1 |
| 4927012 | Methyl Chloromethyl Ether | UN 1239 | I | A | 6.1 |
| 4921304 | Methyl Iodide | UN 2644 | I | B | 6.1 |
| 4927009 | Methyl Isocyanate | UN 2480 | I | A | 6.1 |
| 4921487 | Methyl Isothiocyanate | UN 2477 | I | B | 6.1 |
| 4921255 | Methyl Orthosilicate | UN 2606 | I | B | 6.1 |
| 4921695 | Methyl Phosphonic Dichloride | NA 9206 | I | B | 6.1 |
| 4921008 | Methyl Phosphonous Dichloride | NA 2845 | I | B | 6.1 |
| 4927022 | Methyl Vinyl Ketone, Stabilized | UN 1251 | I | A | 6.1 |
| 4921275 | Methyldichloroarsine | NA 1556 | I | B | 6.1 |
| 4927011 | Methylhydrazine | UN 1244 | I | A | 6.1 |
| 4921730 | n-Butyl Chloroformate | UN 2743 | I | B | 6.1 |
| 4921027 | n-Butyl Isocyanate | UN 2485 | I | B | 6.1 |
| 4927010 | Nickel Carbonyl | UN 1259 | I | A | 6.1 |
| 4921756 | n-Propyl Chloroformate | UN 2740 | I | B | 6.1 |
| 4927025 | n-Propyl Isocyanate | UN 2482 | I | A | 6.1 |
| 4921473 | Perchloromethyl Mercaptan | UN 1670 | I | B | 6.1 |
| 4921216 | Phenyl Isocyanate | UN 2487 | I | B | 6.1 |
| 4921413 | Phenyl Mercaptan | UN 2337 | I | B | 6.1 |
| 4921587 | Phenylcarbylamine Chloride | UN 1672 | I | B | 6.1 |
| 4921016 | Phosphorus Trichloride | UN 1809 | I | B | 6.1 |
| 4921207 | sec-Butyl Chloroformate | NA 2742 | I | B | 6.1 |
| 4927026 | tert-Butyl Isocyanate | UN 2484 | I | A | 6.1 |
| 4923298 | Thiophosgene | UN 2474 | II | B | 6.1 |
| 4921024 | Toxic by Inhalation liquid, corrosive, n.o.s. | UN 3390 | I | B | 6.1 |
| 4921287 | Toxic by Inhalation liquid, corrosive, n.o.s. | UN 3390 | I | B | 6.1 |
| 4921288 | Toxic by Inhalation liquid, corrosive, n.o.s. | UN 3390 | I | B | 6.1 |
| 4927028 | Toxic by Inhalation liquid, corrosive, n.o.s. | UN 3389 | I | A | 6.1 |
| 4921003 | Toxic by Inhalation liquid, flammable, n.o.s. | UN 3384 | I | B | 6.1 |
| 4921029 | Toxic by Inhalation liquid, flammable, n.o.s. | UN 3384 | I | B | 6.1 |
| 4927019 | Toxic by Inhalation liquid, flammable, n.o.s. | UN 3383 | I | A | 6.1 |
| 4921000 | Toxic by Inhalation liquid, n.o.s. | UN 3382 | I | B | 6.1 |
| 4927018 | Toxic by Inhalation liquid, n.o.s. | UN 3381 | I | A | 6.1 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4921023 | Toxic by Inhalation liquid, oxidizing, n.o.s. | UN 3388 | I | B | 6.1 |
| 4927024 | Toxic by Inhalation liquid, oxidizing, n.o.s. | UN 3387 | I | A | 6.1 |
| 4921006 | Toxic by Inhalation liquid, water-reactive, n.o.s. | UN 3386 | I | B | 6.1 |
| 4927023 | Toxic by Inhalation liquid, water-reactive, n.o.s. | UN 3385 | I | A | 6.1 |
| 4921213 | Trimethoxysilane | NA 9269 | I | B | 6.1 |
| 4921063 | Trimethylacetyl Chloride | UN 2438 | I | B | 6.1 |
| 4821019 | Waste Allyl Alcohol | UN 1098 | I | B | 6.1 |
| 4821029 | Waste Toxic by Inhalation Liquid, Flammable, n.o.s. | UN 3384 | I | B | 6.1 |
| 4821722 | Waste Hexachlorocyclopentadiene | UN 2646 | I | B | 6.1 |
| **CORROSIVES, HAZARD CLASS 8** | | | | | |
| 4932010 | Boron Tribromide | UN 2692 | I | B | 8 |
| 4936110 | Bromine or Bromine Solutions | UN 1744 | I | A | 8 |
| 4936106 | Bromine Solutions | UN 1744 | I | B | 8 |
| 4930204 | Chlorosulfonic Acid | UN 1754 | I | B | 8 |
| 4933327 | Ethyl Chlorothioformate | UN 2826 | II | B | 8 |
| 4930024 | Hydrogen Fluoride, Anhydrous | UN 1052 | I | C | 8 |
| 4931201 | Nitric Acid, red fuming | UN 2032 | I | B | 8 |
| 4932352 | Phosphorus Oxychloride | UN 1810 | II | B | 8 |
| 4930050 | Sulfur Trioxide, Stabilized | UN 1829 | I | B | 8 |
| 4930030 | Sulfuric acid, fuming | UN 1831 | I | B | 8 |
| 4930260 | Sulfuryl Chloride | UN 1834 | I | A | 8 |
| 4932385 | Titanium Tetrachloride | UN 1838 | II | B | 8 |
| 4935231 | Trichloroacetyl Chloride | UN 2442 | II | B | 8 |
| 4830030 | Waste Sulfuric acid, fuming | UN 1831 | I | B | 8 |

**Appendix B:**
**List of Poison Inhalation Hazard (PIH) or Toxic Inhalation Hazard Chemicals (TIH)**
**(Hazard Zone A, B, C, or D)**
**Sorted by Hazmat Response Code #**
**March 15, 2010**

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4821019 | Waste Allyl Alcohol | UN 1098 | I | B | 6.1 |
| 4821029 | Waste Toxic by Inhalation Liquid, Flammable, n.o.s. | UN 3384 | I | B | 6.1 |
| 4821722 | Waste Hexachlorocyclopentadiene | UN 2646 | I | B | 6.1 |
| 4830030 | Waste Sulfuric acid, fuming | UN 1831 | I | B | 8 |
| 4904210 | Ammonia, Anhydrous | UN 1005 | | | 2.2 |
| 4904211 | Ammonia, Solution | UN 3318 | | | 2.2 |
| 4904879 | Ammonia, Anhydrous | UN 1005 | | | 2.2 |
| 4907409 | Isobutyl Isocyanate | UN 2486 | I | A | 3 |
| 4907434 | Ethyl Isocyanate | UN 2481 | I | A | 3 |
| 4909306 | Isopropyl Isocyanate | UN 2483 | I | A | 3 |
| 4909307 | Methoxymethyl Isocyanate | UN 2605 | I | A | 3 |
| 4910370 | Methacrylonitrile, Stabilized | UN 3079 | I | B | 3 |
| 4916138 | Pentaborane | UN 1380 | I | A | 4.2 |
| 4918180 | Tetranitromethane | UN 1510 | I | B | 5.1 |
| 4918505 | Bromine Pentafluoride | UN 1745 | I | A | 5.1 |
| 4918507 | Bromine Trifluoride | UN 1746 | I | B | 5.1 |
| 4920101 | Compressed Gas, toxic, corrosive, n.o.s. | UN 3304 | | A | 2.3 |
| 4920102 | Compressed Gas, toxic, flammable, corrosive, n.o.s. | UN 3305 | | A | 2.3 |
| 4920103 | Compressed Gas, toxic, oxidizing, corrosive, n.o.s. | UN 3306 | | A | 2.3 |
| 4920104 | Compressed gas, toxic, oxidizing, n.o.s. | UN 3303 | | A | 2.3 |
| 4920105 | Liquefied gas, toxic, corrosive, n.o.s. | UN 3308 | | A | 2.3 |
| 4920106 | Selenium Hexafluoride | UN 2194 | | A | 2.3 |
| 4920107 | Diborane | UN 1911 | | A | 2.3 |
| 4920108 | Liquefied gas, toxic, flammable, corrosive, n.o.s. | UN 3309 | | A | 2.3 |
| 4920110 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s. | UN 3310 | | A | 2.3 |
| 4920111 | Liquefied gas, toxic, oxidizing, n.o.s. | UN 3307 | | A | 2.3 |
| 4920112 | Nitric Oxide, Compressed | UN 1660 | | A | 2.3 |
| 4920113 | Nitric oxide and nitrogen dioxide mixtures or Nitric oxide and dinitrogen tetroxide mixtures | UN 1975 | | A | 2.3 |
| 4920115 | Insecticide gases, toxic, flammable, n.o.s. | UN 3355 | | A | 2.3 |
| 4920122 | Hydrogen Selenide, anhydrous | UN 2202 | | A | 2.3 |
| 4920135 | Arsine | UN 2188 | | A | 2.3 |
| 4920160 | Phosphine | UN 2199 | | A | 2.3 |
| 4920164 | Liquefied gas, toxic, flammable, n.o.s. | UN 3160 | | A | 2.3 |
| 4920165 | Compressed Gas, toxic, flammable, n.o.s. | UN 1953 | | A | 2.3 |
| 4920167 | Stibine | UN 2676 | | A | 2.3 |
| 4920173 | Oxygen Difluoride, Compressed | UN 2190 | | A | 2.3 |
| 4920174 | Dinitrogen Tetroxide | UN 1067 | | A | 2.3 |
| 4920175 | Nitrogen Trioxide | UN 2421 | | A | 2.3 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4920178 | Cyanogen Chloride, Stabilized | UN 1589 | | A | 2.3 |
| 4920180 | Fluorine, Compressed | UN 1045 | | A | 2.3 |
| 4920181 | Compressed Gas, toxic, n.o.s. | UN 1955 | | A | 2.3 |
| 4920184 | Phosgene | UN 1076 | | A | 2.3 |
| 4920187 | Sulfur Tetrafluoride | UN 2418 | | A | 2.3 |
| 4920188 | Tellurium Hexafluoride | UN 2195 | | A | 2.3 |
| 4920189 | Chlorine Pentafluoride | UN 2548 | | A | 2.3 |
| 4920195 | Liquefied gas, toxic, n.o.s. | UN 3162 | | A | 2.3 |
| 4920301 | Compressed Gas, toxic, corrosive, n.o.s. | UN3304 | | D | 2.3 |
| 4920302 | Insecticide gases, toxic, flammable, n.o.s. | UN 3355 | | B | 2.3 |
| 4920303 | Compressed Gas, toxic, flammable, corrosive, n.o.s. | UN 3305 | | B | 2.3 |
| 4920304 | Compressed Gas, toxic, flammable, corrosive, n.o.s. | UN 3305 | | C | 2.3 |
| 4920305 | Compressed Gas, toxic, flammable, corrosive, n.o.s. | UN 3305 | | D | 2.3 |
| 4920306 | Compressed Gas, toxic, oxidizing, corrosive, n.o.s. | UN 3306 | | B | 2.3 |
| 4920307 | Compressed Gas, toxic, oxidizing, corrosive, n.o.s. | UN 3306 | | C | 2.3 |
| 4920308 | Compressed Gas, toxic, oxidizing, corrosive, n.o.s. | UN 3306 | | D | 2.3 |
| 4920309 | Compressed gas, toxic, oxidizing, n.o.s. | UN 3303 | | C | 2.3 |
| 4920310 | Compressed gas, toxic, oxidizing, n.o.s. | UN 3303 | | D | 2.3 |
| 4920311 | Liquefied gas, toxic, corrosive, n.o.s. | UN 3308 | | B | 2.3 |
| 4920312 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s. | UN 3310 | | B | 2.3 |
| 4920313 | Liquefied gas, toxic, corrosive, n.o.s. | UN 3308 | | C | 2.3 |
| 4920314 | Liquefied gas, toxic, flammable, corrosive, n.o.s. | UN 3309 | | B | 2.3 |
| 4920315 | Liquefied gas, toxic, corrosive, n.o.s. | UN 3308 | | D | 2.3 |
| 4920316 | Liquefied gas, toxic, flammable, corrosive, n.o.s. | UN 3309 | | C | 2.3 |
| 4920317 | Liquefied gas, toxic, oxidizing, n.o.s. | UN 3307 | | B | 2.3 |
| 4920318 | Liquefied gas, toxic, flammable, corrosive, n.o.s. | UN 3309 | | D | 2.3 |
| 4920319 | Liquefied gas, toxic, oxidizing, n.o.s. | UN 3307 | | C | 2.3 |
| 4920320 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s. | UN 3310 | | C | 2.3 |
| 4920321 | Liquefied gas, toxic, oxidizing, n.o.s. | UN 3307 | | D | 2.3 |
| 4920322 | Insecticide gases, toxic, flammable, n.o.s. | UN 3355 | | C | 2.3 |
| 4920323 | Insecticide gases, toxic, flammable, n.o.s. | UN 3355 | | D | 2.3 |
| 4920324 | Compressed Gas, toxic, corrosive, n.o.s. | UN 3304 | | B | 2.3 |
| 4920325 | Liquefied gas, toxic, oxidizing, corrosive, n.o.s. | UN 3310 | | D | 2.3 |
| 4920326 | Phosphorus Pentafluoride | UN 2198 | | B | 2.3 |
| 4920331 | Compressed Gas, toxic, corrosive, n.o.s. | UN 3304 | | C | 2.3 |
| 4920337 | Compressed gas, toxic, oxidizing, n.o.s. | UN 3303 | | B | 2.3 |
| 4920342 | Ethylene Oxide and Carbon Dioxide mixture | UN 3300 | | D | 2.3 |
| 4920343 | Carbon Monoxide and Hydrogen mixture, Compressed | UN 2600 | | | 2.3 |
| 4920344 | Oil Gas, Compressed | UN 1071 | | | 2.3 |
| 4920346 | Trifluorochloroethylene, Stabilized | UN 1082 | | C | 2.3 |
| 4920347 | Trifluoroacetyl Chloride | UN 3057 | | B | 2.3 |
| 4920348 | Hydrogen Iodide, anhydrous | UN 2197 | | C | 2.3 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4920349 | Boron Trichloride | UN 1741 | | C | 2.3 |
| 4920351 | Carbonyl Sulfide | UN 2204 | | C | 2.3 |
| 4920352 | Chlorine Trifluoride | UN 1749 | | B | 2.3 |
| 4920353 | Ethylene Oxide or Ethylene Oxide with Nitrogen | UN 1040 | | D | 2.3 |
| 4920354 | Germane | UN 2192 | | B | 2.3 |
| 4920355 | Methyl Mercaptan | UN 1064 | | C | 2.3 |
| 4920356 | Perchloryl Fluoride | UN 3083 | | B | 2.3 |
| 4920357 | Silicon Tetrafluoride | UN 1859 | | B | 2.3 |
| 4920359 | Ammonia, Anhydrous | UN 1005 | | D | 2.3 |
| 4920360 | Ammonia, Solution | UN 3318 | | D | 2.3 |
| 4920368 | Liquefied gas, toxic, n.o.s. | UN 3162 | | C | 2.3 |
| 4920369 | Liquefied gas, toxic, n.o.s. | UN 3162 | | D | 2.3 |
| 4920371 | Tungsten Hexafluoride | UN 2196 | | B | 2.3 |
| 4920373 | Compressed Gas, toxic, n.o.s. | UN 1955 | | D | 2.3 |
| 4920375 | Compressed Gas, toxic, n.o.s. | UN 1955 | | C | 2.3 |
| 4920378 | Compressed Gas, toxic, flammable, n.o.s. | UN 1953 | | C | 2.3 |
| 4920379 | Compressed Gas, toxic, flammable, n.o.s. | UN 1953 | | D | 2.3 |
| 4920380 | Liquefied gas, toxic, flammable, n.o.s. | UN 3160 | | C | 2.3 |
| 4920381 | Liquefied gas, toxic, flammable, n.o.s. | UN 3160 | | D | 2.3 |
| 4920382 | Liquefied gas, toxic, flammable, n.o.s. | UN 3160 | | B | 2.3 |
| 4920383 | Liquefied gas, toxic, n.o.s. | UN 3162 | | | 2.3 |
| 4920392 | Chloropicrin and Methyl Chloride mixtures | UN 1582 | | B | 2.3 |
| 4920394 | Methylchlorosilane | UN 2534 | | B | 2.3 |
| 4920395 | Cyanogen | UN 1026 | | B | 2.3 |
| 4920396 | Compressed Gas, toxic, flammable, n.o.s. | UN 1953 | | B | 2.3 |
| 4920398 | Dichlorosilane | UN 2189 | | B | 2.3 |
| 4920399 | Carbon Monoxide, Compressed | UN 1016 | | D | 2.3 |
| 4920502 | Hydrogen Bromide, anhydrous | UN 1048 | | C | 2.3 |
| 4920503 | Hydrogen Chloride, anhydrous | UN 1050 | | C | 2.3 |
| 4920504 | Hydrogen Chloride, refrigerated liquid | UN 2186 | | C | 2.3 |
| 4920505 | Compressed Gas, toxic, n.o.s. | UN 1955 | | C | 2.3 |
| 4920508 | Sulfur Dioxide | UN 1079 | | C | 2.3 |
| 4920509 | Nitrosyl Chloride | UN 1069 | | C | 2.3 |
| 4920510 | Gas Identification set | NA 9035 | | | 2.3 |
| 4920511 | Carbon Monoxide, refrigerated liquid | NA 9202 | | D | 2.3 |
| 4920513 | Hydrogen Sulfide | UN 1053 | | B | 2.3 |
| 4920515 | Hexaethyl tetraphosphate and compressed gas mixtures | UN 1612 | | C | 2.3 |
| 4920516 | Chloropicrin and Methyl Bromide mixtures | UN 1581 | | B | 2.3 |
| 4920517 | Compressed Gas, toxic, n.o.s. | UN 1955 | | | 2.3 |
| 4920518 | Methyl Bromide | UN 1062 | | C | 2.3 |
| 4920522 | Boron Trifluoride | UN 1008 | | B | 2.3 |
| 4920523 | Chlorine | UN 1017 | | B | 2.3 |
| 4920525 | Compressed Gas, toxic, n.o.s. | UN 1955 | | | 2.3 |
| 4920526 | Sulfuryl Fluoride | UN 2191 | | D | 2.3 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4920527 | Coal Gas, Compressed | UN 1023 | | C | 2.3 |
| 4920528 | Hexafluoroacetone | UN 2420 | | B | 2.3 |
| 4920530 | Organic phosphate, mixed with compressed gas or Organic phosphate compound, mixed with compressed gas or Organic phosphorus compound, mixed with compressed gas | NA 1955 | | C | 2.3 |
| 4920531 | Liquefied gas, toxic, n.o.s. | UN 3162 | | | 2.3 |
| 4920534 | Gas sample, non-pressurized, toxic, flammable, n.o.s. | UN 3168 | | | 2.3 |
| 4920535 | Parathion and Compressed gas mixture | NA 1967 | | C | 2.3 |
| 4920536 | Gas sample, non-pressurized, toxic, n.o.s. | UN 3169 | | | 2.3 |
| 4920547 | Chloropicrin and Methyl Bromide mixtures | UN 1581 | | B | 2.3 |
| 4920550 | Insecticide gases, toxic, n.o.s. | UN 1967 | | C | 2.3 |
| 4920556 | Compressed Gas, toxic, n.o.s. | UN 1955 | | B | 2.3 |
| 4920559 | Carbonyl Fluoride | UN 2417 | | B | 2.3 |
| 4920570 | Compressed Gas, toxic, n.o.s. | UN 1955 | | B | 2.3 |
| 4920571 | Liquefied gas, toxic, n.o.s. | UN 3162 | | B | 2.3 |
| 4920715 | Bromine Chloride | UN 2901 | | B | 2.3 |
| 4921000 | Toxic by Inhalation liquid, n.o.s. | UN 3382 | I | B | 6.1 |
| 4921003 | Toxic by Inhalation liquid, flammable, n.o.s. | UN 3384 | I | B | 6.1 |
| 4921004 | Allylamine | UN 2334 | I | B | 6.1 |
| 4921006 | Toxic by Inhalation liquid, water-reactive, n.o.s. | UN 3386 | I | B | 6.1 |
| 4921008 | Methyl Phosphonous Dichloride | NA 2845 | I | B | 6.1 |
| 4921009 | Chloroacetonitrile | UN 2668 | II | B | 6.1 |
| 4921010 | Cyclohexyl Isocyanate | UN 2488 | I | B | 6.1 |
| 4921016 | Phosphorus Trichloride | UN 1809 | I | B | 6.1 |
| 4921019 | Allyl Alcohol | UN 1098 | I | B | 6.1 |
| 4921020 | Ethyl Chloroformate | UN 1182 | I | B | 6.1 |
| 4921023 | Toxic by Inhalation liquid, oxidizing, n.o.s. | UN 3388 | I | B | 6.1 |
| 4921024 | Toxic by Inhalation liquid, corrosive, n.o.s. | UN 3390 | I | B | 6.1 |
| 4921027 | n-Butyl Isocyanate | UN 2485 | I | B | 6.1 |
| 4921028 | Hydrocyanic acid, aqueous solutions or Hydrogen cyanide, aqueous solutions | UN 1613 | I | B | 6.1 |
| 4921029 | Toxic by Inhalation liquid, flammable, n.o.s. | UN 3384 | I | B | 6.1 |
| 4921063 | Trimethylacetyl Chloride | UN 2438 | I | B | 6.1 |
| 4921202 | Dimethylhydrazine, Unsymmetrical | UN 1163 | I | B | 6.1 |
| 4921207 | sec-Butyl Chloroformate | NA 2742 | I | B | 6.1 |
| 4921211 | Isobutyl Chloroformate | NA 2742 | I | B | 6.1 |
| 4921213 | Trimethoxysilane | NA 9269 | I | B | 6.1 |
| 4921216 | Phenyl Isocyanate | UN 2487 | I | B | 6.1 |
| 4921239 | Hydrogen Cyanide, solution in alcohol | UN 3294 | I | B | 6.1 |
| 4921245 | Methanesulfonyl Chloride | UN 3246 | I | B | 6.1 |
| 4921248 | Crotonalydehyde, Stabilized | UN 1143 | I | B | 6.1 |
| 4921251 | Dimethylhydrazine, Symmetrical | UN 2382 | I | B | 6.1 |
| 4921252 | Isopropyl Chloroformate | UN 2407 | I | B | 6.1 |
| 4921254 | Diketene, Stabilized | UN 2521 | I | B | 6.1 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4921255 | Methyl Orthosilicate | UN 2606 | I | B | 6.1 |
| 4921275 | Methyldichloroarsine | NA 1556 | I | B | 6.1 |
| 4921287 | Toxic by Inhalation liquid, corrosive, n.o.s. | UN 3390 | I | B | 6.1 |
| 4921288 | Toxic by Inhalation liquid, corrosive, n.o.s. | UN 3390 | I | B | 6.1 |
| 4921304 | Methyl Iodide | UN 2644 | I | B | 6.1 |
| 4921401 | Acetone Cyanohydrin, Stabilized | UN 1541 | I | B | 6.1 |
| 4921402 | 2-Chloroethanal | UN 2232 | I | B | 6.1 |
| 4921404 | Ethyldichloroarsine | UN 1892 | I | B | 6.1 |
| 4921405 | Dimethyl Sulfate | UN 1595 | I | B | 6.1 |
| 4921413 | Phenyl Mercaptan | UN 2337 | I | B | 6.1 |
| 4921414 | Chloropicrin | UN 1580 | I | B | 6.1 |
| 4921420 | Ethylene Chlorohydrin | UN 1135 | I | B | 6.1 |
| 4921438 | Methyl Bromide and Ethylene dibromide mixtures, liquid | UN 1647 | I | B | 6.1 |
| 4921473 | Perchloromethyl Mercaptan | UN 1670 | I | B | 6.1 |
| 4921487 | Methyl Isothiocyanate | UN 2477 | I | B | 6.1 |
| 4921495 | 2-Methyl-2-Heptanethiol | UN 3023 | I | B | 6.1 |
| 4921497 | Ethylene Dibromide | UN 1605 | I | B | 6.1 |
| 4921558 | Chloroacetone, Stabilized | UN 1695 | I | B | 6.1 |
| 4921587 | Phenylcarbylamine Chloride | UN 1672 | I | B | 6.1 |
| 4921695 | Methyl Phosphonic Dichloride | NA 9206 | I | B | 6.1 |
| 4921722 | Hexachlorocyclopentadiene | UN 2646 | I | B | 6.1 |
| 4921727 | Bromoacetone | UN 1569 | II | B | 6.1 |
| 4921730 | n-Butyl Chloroformate | UN 2743 | I | B | 6.1 |
| 4921741 | 3, 5-Dichloro-2, 4, 6-Trifluoropyridine | NA 9264 | I | B | 6.1 |
| 4921742 | Ethyl Phosphonous Dichloride, Anhydrous pyrophoric liquid | NA 2845 | I | B | 6.1 |
| 4921744 | Ethyl Phosphorodichloridate | NA 2927 | I | B | 6.1 |
| 4921745 | Ethyl Phosphonothioic Dichloride, Anhydrous | NA 2927 | I | B | 6.1 |
| 4921746 | Chloropivaloyl Chloride | NA 9263 | I | B | 6.1 |
| 4921756 | n-Propyl Chloroformate | UN 2740 | I | B | 6.1 |
| 4923113 | Allyl Chloroformate | UN 1722 | I | B | 6.1 |
| 4923117 | Chloroacetyl Chloride | UN 1752 | I | B | 6.1 |
| 4923209 | Arsenic Trichloride | UN 1560 | I | B | 6.1 |
| 4923298 | Thiophosgene | UN 2474 | II | B | 6.1 |
| 4927004 | Iron Pentacarbonyl | UN 1994 | I | A | 6.1 |
| 4927006 | Ethyleneimine, Stabilized | UN 1185 | I | A | 6.1 |
| 4927007 | Acrolein, Stabilized | UN 1092 | I | A | 6.1 |
| 4927008 | Methyl Chloroformate | UN 1238 | I | A | 6.1 |
| 4927009 | Methyl Isocyanate | UN 2480 | I | A | 6.1 |
| 4927010 | Nickel Carbonyl | UN 1259 | I | A | 6.1 |
| 4927011 | Methylhydrazine | UN 1244 | I | A | 6.1 |
| 4927012 | Methyl Chloromethyl Ether | UN 1239 | I | A | 6.1 |
| 4927014 | Hydrogen Cyanide, stabilized | UN 1051 | I | A | 6.1 |
| 4927018 | Toxic by Inhalation liquid, n.o.s. | UN 3381 | I | A | 6.1 |

| HMRC | Proper Shipping Name | UN/NA# | Packing Group | Hazard Zone | Hazard Class |
|---|---|---|---|---|---|
| 4927019 | Toxic by Inhalation liquid, flammable, n.o.s. | UN 3383 | I | A | 6.1 |
| 4927022 | Methyl Vinyl Ketone, Stabilized | UN 1251 | I | A | 6.1 |
| 4927023 | Toxic by Inhalation liquid, water-reactive, n.o.s. | UN 3385 | I | A | 6.1 |
| 4927024 | Toxic by Inhalation liquid, oxidizing, n.o.s. | UN 3387 | I | A | 6.1 |
| 4927025 | n-Propyl Isocyanate | UN 2482 | I | A | 6.1 |
| 4927026 | tert-Butyl Isocyanate | UN 2484 | I | A | 6.1 |
| 4927028 | Toxic by Inhalation liquid, corrosive, n.o.s. | UN 3389 | I | A | 6.1 |
| 4930024 | Hydrogen Fluoride, Anhydrous | UN 1052 | I | C | 8 |
| 4930030 | Sulfuric acid, fuming | UN 1831 | I | B | 8 |
| 4930050 | Sulfur Trioxide, Stabilized | UN 1829 | I | B | 8 |
| 4930204 | Chlorosulfonic Acid | UN 1754 | I | B | 8 |
| 4930260 | Sulfuryl Chloride | UN 1834 | I | A | 8 |
| 4931201 | Nitric Acid, red fuming | UN 2032 | I | B | 8 |
| 4932010 | Boron Tribromide | UN 2692 | I | B | 8 |
| 4932352 | Phosphorus Oxychloride | UN 1810 | II | B | 8 |
| 4932385 | Titanium Tetrachloride | UN 1838 | II | B | 8 |
| 4933327 | Ethyl Chlorothioformate | UN 2826 | II | B | 8 |
| 4935231 | Trichloroacetyl Chloride | UN 2442 | II | B | 8 |
| 4936106 | Bromine Solutions | UN 1744 | I | B | 8 |
| 4936110 | Bromine or Bromine Solutions | UN 1744 | I | A | 8 |

# Appendix C
## Environmentally Sensitive Chemicals
## March 15, 2010

| Proper Shipping Name | Hazmat STCC |
|---|---|
| Allyl Chloride | 4907412 |
| Carbon Tetrachloride | 4821831 / 4860106 / 4921830 / 4921831 / 4960115 |
| Chlorobenzene | 4909153 |
| Chloroform | 4921767 / 4921769 / 4925224 / 4925225 |
| o-Dichlorobenzene | 4915132 / 4925203 |
| Dichloropropane (Propylene dichloride) | 4909265 |
| Dichloropropane/Dichloropropene mixture | 4910234 |
| Dichloropropene | 4909255 |
| Ethyl Chloride | 4905712 / 4908129 / 4908162 / |
| Ethylene Dibromide (already listed as PIH) | |
| Ethylene Dibromide and Methyl Bromide Mixtures (already listed as PIH) | |
| Ethylene Dichloride | 4909166 / 4912081/ 4908129 / 4910437 / 4913242 / 4913295 / 4921030 |
| Epichlorohydrin | 4921005 |
| Methyl Chloroform (1,1,1 Trichloroethane) | 4825182 / 4925182 / 4910463 / 4910475 / 4925310 / 4960205 |
| Methylene Chloride (Dichloromethane) | 4925131 / 4905764 |
| Methylene chloride/chloroform mixture | 4960150 |
| Perchloroethylene (Tetrachlorothylene) | 4825202 / 4910134 / 4925202 |
| Perchloroethylene/Trichloroethylene mixture | 4940373 |
| Trichloroethylene | 4825181 / 4925181 |

# Appendix D
## Time Sensitive Materials
## July 17, 2006

| Proper Shipping Name | Haz Mat STCC |
|---|---|
| **20 Day** | |
| Ethylene, refrigerated liquid | 4905735 |
| Hydrogen, refrigerated liquid | 4905745 |
| Vinyl Fluoride, stabilized | 4905793 |
| Chloroprene, stabilized | 4907223 |
| Flammable Liquid, n.o.s. (Methyl Methacrylate Monomer, uninhibited) | 4907255 |
| Hydrogen chloride, refrigerated liquid | 4920504 |
| **30 day** | |
| Styrene monomer, stabilized | 4907265 |
| Flammable Liquid, n.o.s. (Recycled styrene) | 4910159 |
| Styrene monomer, stabilized | 4907235 |

# Appendix E
## Spent Nuclear Fuel (SNF) and High Level Radioactive Waste (HLRW)
## March 17, 2009

| HMRC | Proper Shipping Description |
|---|---|
| 4929142 | Radioactive Material, Type B(U) Package, Fissile |
| 4929143 | Radioactive Material, Type B(M) Package, Fissile |
| 4929144 | Radioactive Material, Transported Under Special Arrangement, Fissile |
| 4929147 | Radioactive Material, Transported Under Special Arrangement |

**Appendix F to**
**Circular OT-55**

**Sample Request for Hazardous Materials Commodity Flow Information**

**March 1, 2005**

[Company LOGO]

Request for Hazardous Materials COMMODITY FLOW INFORMATION

Organization Requesting Information: _____

Contact Person: _____

Phone Number: _____

Email Address: _____

Mailing Address: _____
(Street Address)

_____
(City, State, Zip)

Geographical Description of Area for study: _____

_____

Preferred method to receive report: ☐ Email ☐ U.S. Mail (Mark One)

By signing below I acknowledge and agree to the terms set forth by **[RAILROAD NAME]** for use and dissemination of the **[RAILROAD'S]** Hazardous Materials Commodity Flow Information . [RAILROAD'S NAME] considers this information to be restricted information of a security sensitive nature. I thus affirm and agree that the information provided by **[RAILROAD NAME]** in this report will be used solely for and by bona fide emergency planning and response organizations for the expressed purpose of emergency and contingency planning. This information will not be distributed publicly in whole or in part without the expressed written permission of **[RAILROAD NAME]**.

_____
(Signature of person requesting commodity flow information)

**Return Completed Form to: [INSERT RAILROAD NAME AND ADDRESS]**

---

For [RAILROAD] Use Only

**[PERSON RESPONSIBLE FOR APPROVAL]**: ___Yes___ NO Date: _____

Hazardous Materials Service Support:

Date Request Received: _____

Time Period Covered: _____

Date Report Sent: _____

Report sent via: ☐ Email ☐ U.S. Mail

# Appendix B:
## Thermoluminescent Dosimetry

Radiation absorbed dose is measured using different instruments, one of which is the thermoluminescent dosimeter (TLD). This is a simple explanation of how the TLD works: When ionizing radiation interacts with any material, some or all of the energy is deposited in that material. The energy interacts with the atoms in the material, causing some to lose an electron—called ionization—and results in the formation of a charged atom, called an ion.

Thermoluminescence (TL) is the ability of some materials to convert the energy from the ionizing radiation absorbed to a radiation of a different wavelength, normally in the visible light range through the application of heat to the material. Generally the materials that are used for this purpose are crystalline in form. Most crystalline materials contain impurities, thus producing irregularities within the crystal structure (lattice). The imperfections in the crystal lattice act as sites where free electrons from the ionization process can become trapped, locking them in the crystal. The crystalline materials most commonly used in TLDs are made of lithium fluoride (LiF) and calcium fluoride (CaF), although some other materials can be used for specific applications.

Heating the crystal causes the crystal lattice to release the trapped electrons, thus releasing the captured energy from ionization as light. The intensity of the light released in this way is measured using a very sensitive device based on photomultiplier tubes. The number of photons is then counted and is proportional to the amount of energy deposited in the crystal.

Sophisticated TLDs have up to four identical crystals mounted on a card with filters made of different materials (for example, plastic, aluminum, copper, etc.), and thicknesses placed in front of each of the crystals. The filters help determine the type and energy of the incident radiation since different filter material reduces the amount of ionizing radiation getting to the crystals differently. The automated reader then heats the four crystals simultaneously and light output from each crystal is read out separately. Dose calculating algorithms are applied to the readings from the crystals to calculate the radiation dose to the individual wearing the dosimeter.

For situations where a specific type of radiation is expected or the measurement of one type is more "important," filter materials of different types and thickness can be tailored along with calibration procedures using specific sources for the type of radiation of concern to ensure the accuracy of those specific measurements. The tailoring of filter materials is also useful for estimating exposures to different parts of the body, e.g., skin and shallow tissue, lenses of the eyes, and deep body tissue doses.

The minimum reportable dose is 10 millirem for gamma radiation and x-rays. This is the smallest dose that can be measured reliably and accurately.

Once the TLD is put through the reading process, the crystals are essentially "renewed" since the absorbed energy is released by the reading process, and the TLD can be used again.

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Jay Rockefeller
Chairman, Committee on Commerce, Science, and Transportation
United States Senate
Washington, DC 20510

Dear Chairman Rockefeller:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

The enclosed copy of FRA's most recent summary work plan and status report for the RSIA lists in detail what FRA has delivered so far and what else the agency expects to be able to provide within the stated time periods. This summary work plan and status report is the fourth of a series that also includes FRA's original plan and status report dated January 16, 2009, which covered both divisions of the same public law, and a second and third updated plan and status report dated December 18, 2009, and September 29, 2010, respectively, which also covered the entire public law.

FRA is pleased to note additional accomplishments since the agency's September 29, 2010, report to the Committee was written. FRA's additional accomplishments under the RSIA include (1) a model State law on sight obstructions at passively signed highway-rail grade crossings; (2) final rule amendments of the January 2010 Positive Train Control final rule; (3) a final rule on operating employees' use of distracting electronic devices; (4) proposed rules on emergency escape breathing apparatus, conductor certification, and camp car sleeping quarters; (5) an advance notice of proposed rulemaking on safety risk reduction programs; (6) an annual report on enforcement; and (7) a periodic audit of a Class I railroad.

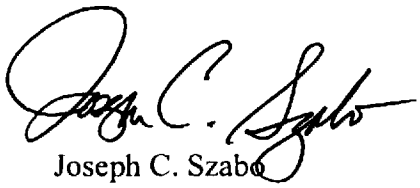
The agency remains committed to fulfilling its assigned responsibilities under the RSIA and invites the Committees' suggestions concerning prioritization and related matters.

The identical text of this letter has been sent to the Ranking Member of the Senate Committee on Commerce, Science, and Transportation; as well as each Chairman and Ranking Member of the House Subcommittee on Railroads, Pipelines, and Hazardous Materials; the House Appropriations Committee; the House Subcommittee on Transportation, Housing and Urban Development, and Related Agencies; the House Committee on

Transportation and Infrastructure; the Senate Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security; the Senate Committee on Appropriations; and the Chairwoman of the Senate Subcommittee on Transportation, Housing, Urban Development.

I appreciate your interest in this important transportation matter.

Sincerely,



Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Kay Bailey Hutchison
Ranking Member, Committee on Commerce, Science, and Transportation
United States Senate
Washington, DC 20510

Dear Senator Hutchison:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

The enclosed copy of FRA's most recent summary work plan and status report for the RSIA lists in detail what FRA has delivered so far and what else the agency expects to be able to provide within the stated time periods. This summary work plan and status report is the fourth of a series that also includes FRA's original plan and status report dated January 16, 2009, which covered both divisions of the same public law, and a second and third updated plan and status report dated December 18, 2009, and September 29, 2010, respectively, which also covered the entire public law.

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The agency remains committed to fulfilling its assigned responsibilities under the RSIA and invites the Committees' suggestions concerning prioritization and related matters.

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Infrastructure; the Senate Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security; the Senate Committee on Appropriations; and the Chairwoman of the Senate Subcommittee on Transportation, Housing, Urban Development.

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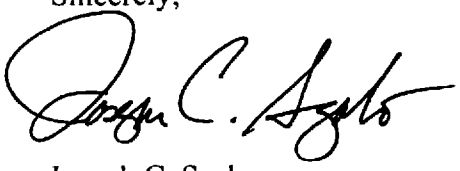

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable John Thune
Ranking Member, Subcommittee on Surface Transportation and Merchant Marine
Infrastructure, Safety, and Security
Committee on Commerce, Science, and Transportation
United States Senate
Washington, DC 20510

Dear Congressman Thune:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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The agency remains committed to fulfilling its assigned responsibilities under the RSIA and invites the Committees' suggestions concerning prioritization and related matters.

The identical text of this letter has been sent to the Chairman of the Senate Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security; as well as each Chairman and Ranking Member of the Senate Committee on Commerce, Science, and

Transportation; the House Subcommittee on Railroads, Pipelines, and Hazardous Materials; the House Appropriations Committee; the House Subcommittee on Transportation, Housing and Urban Development, and Related Agencies; the House Committee on Transportation and Infrastructure; the Senate Committee on Appropriations; and the Chairwoman of the Senate Subcommittee on Transportation, Housing, Urban Development.

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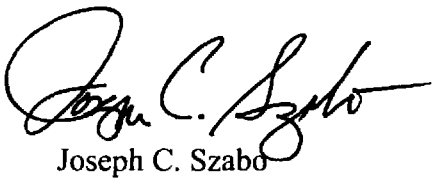

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Thad Cochran
Ranking Member, Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Senator Cochran:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

The enclosed copy of FRA's most recent summary work plan and status report for the RSIA lists in detail what FRA has delivered so far and what else the agency expects to be able to provide within the stated time periods. This summary work plan and status report is the fourth of a series that also includes FRA's original plan and status report dated January 16, 2009, which covered both divisions of the same public law, and a second and third updated plan and status report dated December 18, 2009, and September 29, 2010, respectively, which also covered the entire public law.

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The agency remains committed to fulfilling its assigned responsibilities under the RSIA and invites the Committees' suggestions concerning prioritization and related matters.

The identical text of this letter has been sent to the Chairman of the Senate Committee on Appropriations; as well as each Chairman and Ranking Member of the House Subcommittee on Railroads, Pipelines, and Hazardous Materials; the House Appropriations Committee; the House Subcommittee on Transportation, Housing and Urban Development, and Related Agencies; the House Committee on Transportation and Infrastructure; the Senate

Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security; the Senate Committee on Commerce, Science, and Transportation; and the Chairwoman of the Senate Subcommittee on Transportation, Housing, Urban Development.

I appreciate your interest in this important transportation matter.

Sincerely,

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Daniel Inouye
Chairman, Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Chairman Inouye:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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The agency remains committed to fulfilling its assigned responsibilities under the RSIA and invites the Committees' suggestions concerning prioritization and related matters.

The identical text of this letter has been sent to the Ranking Member of the Senate Committee on Appropriations; as well as each Chairman and Ranking Member of the Senate Committee on Commerce, Science, and Transportation; the House Subcommittee on Railroads, Pipelines, and Hazardous Materials; the House Appropriations Committee; the House Subcommittee on Transportation, Housing and Urban Development, and Related Agencies; the House

Committee on Transportation and Infrastructure; the Senate Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security; and the Chairwoman of the Senate Subcommittee on Transportation, Housing, Urban Development.

I appreciate your interest in this important transportation matter.

Sincerely,

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Patty Murray
Chairwoman, Subcommittee on Transportation, Housing, Urban Development
Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Chairwoman Murray:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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The agency remains committed to fulfilling its assigned responsibilities under the RSIA and invites the Committees' suggestions concerning prioritization and related matters.

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Agencies; the House Committee on Transportation and Infrastructure; the Senate Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security; the Senate Committee on Appropriations.

I appreciate your interest in this important transportation matter.

Sincerely,

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Frank R. Lautenberg
Chairman, Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security
Committee on Commerce, Science, and Transportation
United States Senate
Washington, DC 20510

Dear Chairman Lautenberg:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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The agency remains committed to fulfilling its assigned responsibilities under the RSIA and invites the Committees' suggestions concerning prioritization and related matters.

The identical text of this letter has been sent to the Ranking Member of the Senate Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security; as well as each Chairman and Ranking Member of the Senate Committee on

Commerce, Science, and Transportation; the House Subcommittee on Railroads, Pipelines, and Hazardous Materials; the House Appropriations Committee; the House Subcommittee on Transportation, Housing and Urban Development, and Related Agencies; the House Committee on Transportation and Infrastructure; the Senate Committee on Appropriations; and the Chairwoman of the Senate Subcommittee on Transportation, Housing, Urban Development.

I appreciate your interest in this important transportation matter.

Sincerely,

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Nick Rahall
Ranking Member, Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington, DC 20515

Dear Congressman Rahall:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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Agencies; the Senate Subcommittee on Surface Transportation and Merchant Marine Infrastructure, Safety, and Security; the Senate Committee on Appropriations; and the Chairwoman of the Senate Subcommittee on Transportation, Housing, Urban Development.

I appreciate your interest in this important transportation matter.

Sincerely,

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable John Mica
Chairman, Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Mica:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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Joseph C. Szabo
Administrator

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U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable John Olver
Ranking Member, Subcommittee on Transportation, Housing and Urban Development, and Related Agencies
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Congressman Olver:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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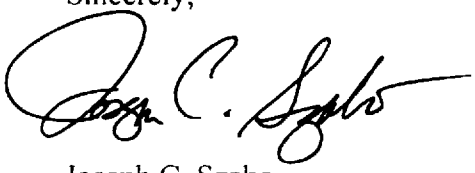

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Tom Latham
Chairman, Subcommittee on Transportation, Housing and Urban Development, and Related Agencies
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Latham:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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I appreciate your interest in this important transportation matter.

Sincerely,

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Norm Dicks
Ranking Member, Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Congressman Dicks:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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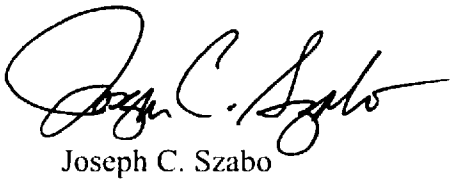

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Harold "Hal" Rogers
Chairman, Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Rogers:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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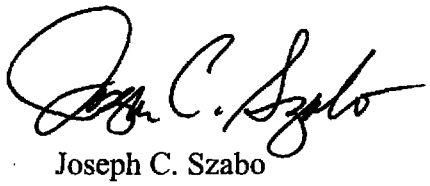

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Corinne Brown
Ranking Member, Subcommittee on Railroads, Pipelines, and Hazardous Materials
Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington, DC 20515

Dear Congresswoman Brown:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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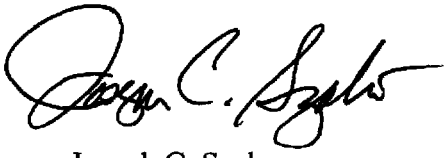

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable William "Bill" Shuster
Chairman, Subcommittee on Railroads, Pipelines, and Hazardous Materials
Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Shuster:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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I appreciate your interest in this important transportation matter.

Sincerely,

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Jay Rockefeller
Chairman, Committee on Commerce, Science, and Transportation
United States Senate
Washington, DC 20510

Dear Chairman Rockefeller:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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Sincerely,

Joseph C. Szabo
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Railroad
Administration**

**Administrator**

1200 New Jersey Avenue, SE
Washington, DC 20590

FEB 10 2011

The Honorable Kay Bailey Hutchison
Ranking Member, Committee on Commerce, Science, and Transportation
United States Senate
Washington, DC 20510

Dear Senator Hutchison:

I am writing to provide the Committee with the current status of projects that the Federal Railroad Administration (FRA) has undertaken to perform its assigned responsibilities to carry out numerous mandates of Public Law No. 110-432, Division A, the Rail Safety Improvement Act of 2008 (RSIA), which was enacted October 16, 2008.

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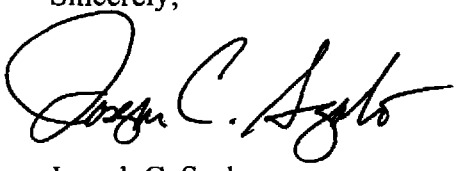

Joseph C. Szabo
Administrator

Enclosure

**Enclosure**

# Summary Work Plan and Status Report for Public Law No. 110-432,

## Division A—Rail Safety Improvement Act of 2008 (RSIA) [1]

**Priority Actions (Short-term)**

**Section 104** requires, inter alia, that certain railroads submit by April 16, 2010, their plans for implementing a ***Positive Train Control (PTC) system.*** The law appropriately references further rulemaking by the Federal Railroad Administration (FRA) that will need to specify, in more technical detail, the required functionalities, and describe the means by which the technology will be qualified. **Status:** This initial rulemaking has been conducted. FRA invited its Railroad Safety Advisory Committee (RSAC) to participate in development of the rule, and achieved RSAC consensus on the proposed rule. The notice of proposed rulemaking (NPRM) was published in the *Federal Register* (FR) on July 21, 2009. 74 FR 35950. On August 31-September 2, 2009, the RSAC PTC Working Group reconvened to discuss and attempt to resolve issues from the statements given at the August 13, 2009, public hearing and the comments submitted to the rulemaking docket (Docket No. FRA-2008-0132). A final rule was published on January 15, 2010, with an effective date of March 16, 2010. 75 FR 2598. The final rule also sought comments on various specific issues to be addressed in a subsequent final rule; FRA received several sets of comments on these issues. In further response to the January 15, 2010, final rule, FRA received three petitions for reconsideration and two comments that were treated as such petitions from various parties, including the Association of American Railroads (AAR). In addition, on March 18, 2010, the AAR filed a petition for review of the January 15, 2010, final rule in the U.S. Court of Appeals for the District of Columbia Circuit. On June 11, 2010, the court granted the Government's motion to dismiss the AAR's petition for review as premature since FRA had not ruled on the AAR's petition for reconsideration. On July 8, 2010, FRA issued its response to the petitions for reconsideration and quasi-petitions for reconsideration of the January 15, 2010, final rule. On July 28, 2010, the AAR filed a petition for review of FRA's denial of its petition for reconsideration of the January 15, 2010, final rule in the same court, alleging that certain provisions of FRA's PTC rule are contrary to law and constitute arbitrary and capricious agency action. On September 27, 2010, FRA published final rule amendments to the January 15, 2010, final rule. 75 FR 59108. AAR's challenge to that final rule has been consolidated with its court challenge to the January 15, 2010, final rule. Briefs have been exchanged, the last being the AAR's reply brief on December 30, 2010, and oral argument has been scheduled for March 7, 2011.

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[1] For brevity, references in the RSIA to the Secretary of Transportation (Secretary) are often treated in this work plan and status report as references to the Federal Railroad Administration (FRA), the agency of the U.S. Department of Transportation (DOT) that normally carries out the Secretary's rail safety statutory duties. The Secretary has delegated most of his responsibilities under the RSIA to the Administrator of FRA. 74 FR 26981 (June 5, 2009) and Title 49 of the Code of Federal Regulations (CFR), Section 1.49. In general, forthcoming regulations of agencies of DOT are mentioned in the DOT's semiannual regulatory agenda. See, e.g., 75 FR 79812 (December 20, 2010).

Meanwhile, pursuant to the January 15, 2010, final rule, a total of 41 PTC Implementation Plans (PTCIP) were filed with FRA. The agency completed its review of the plans and provided written notice of its decision approving or disapproving the plans, with the specific issues needing to be addressed identified, to each submitting railroad by July 15, 2010, within the 90 days specified in the rule. FRA has completed review, comment exchange, and cooperative meetings or conference calls with the representatives of the railroads necessary, toward successful correction of all deficiencies within the PTCIPs of the seven railroads whose plan submissions FRA originally disapproved. A total of 39 PTCIPs have been either approved or provisionally approved (e.g., those submitted with a PTC Notice of Product Intent), leaving only 2 railroads remaining that have further corrections to make to their PTCIPs. FRA staff continues to work closely with those railroads toward successful resolution of the remaining issues. A 42nd railroad has recently been identified that is required to submit a PTCIP for a single small section of trackage, and FRA staff is working closely with a representative of that railroad to successfully accomplish that task. FRA staff is also currently working with several railroads toward the successful creation of their PTC Development Plans, such that the railroads may gain Type Approval for their proposed PTC systems.

**Section 108(f)** requires FRA to complete a rulemaking on ***hours of service recordkeeping and reporting*** by April 16, 2009.[2] This rulemaking was needed to identify the data elements that railroads must track in order to comply with the more complex requirements of the hours of service laws, as amended. The RSIA expressly excuses FRA from the requirement to issue a proposed rule for comment if the RSAC is invited to participate in development of the final rule. It was critical that a final rule be completed so that railroads could put records systems in place by the time the freight hours of service changes became effective on July 16, 2009. **Status:** RSAC made its recommendations to FRA. The final rule was issued on May 19, 2009, and published on May 27, 2009. 74 FR 25330. Many of the new changes to the hours of service laws, together with the new recordkeeping requirements, became effective on July 16, 2009. FRA received one petition for reconsideration of the final rule, which it denied on October 21, 2010.

**Next-Tier Actions**

**Title I. Railroad Safety Improvements**

**Section 102** requires the Secretary to develop a ***railroad safety strategy*** and to report to Congress annually, beginning on November 1, 2009. This action is to be coordinated with the President's budget, which is typically submitted in February for the fiscal year (FY) beginning on October 1 of that calendar year (CY). **Status:** FRA has provided extensive testimony to the Senate Committee on Commerce, Science, and Transportation and the House Committee on Transportation and Infrastructure (Committees) during the two sessions of the 110th Congress, and that testimony clearly conveys FRA goals and strategic objectives addressing the reduction of injuries to persons and damage to property. In addition, FRA has prepared a document containing its 5-year forecast (Government Performance and Results Act goals) and its railroad safety strategy, including annual plans for those years, which was submitted with the President's

[2] The Office of Management and Budget (OMB) approval number for this paperwork collection is OMB No. 2130-0005.

FY 2011 budget. The document covers FY 2011 through FY 2015. A copy of that document, titled "Railroad Safety Strategy, U.S. Department of Transportation, Federal Railroad Administration, December 2009," was submitted to the Committees with the previous iteration of this Work Plan and Status Report, on September 29, 2010.

**Section 103** establishes a statutory charter for the ***Risk Reduction Program (RRP)***, which FRA officially launched in August 2008. FRA looks forward to providing regulations to implement this program within the allotted 4-year period and will be working in the interim to demonstrate successful program elements through selected pilots. **Status:** In July 2008, a Risk Reduction Division was established in the Office of Railroad Safety, with a staff director selected and staff selections in process. On June 16, 2009, FRA issued a Broad Agency Announcement supporting Class I railroad pilot projects. Proposal evaluations were conducted, and project selections were announced in September 2009; seven grants, totaling $433,000, were awarded for pilot projects on six Class I railroads. FRA solicited proposals (due to limited funding, only from Class I railroads) in July 2010, and FRA awarded five grants in September 2010. Also, FRA is currently coordinating with the system safety regulatory development effort to ensure compatibility, and an advance notice of proposed rulemaking in this significant rulemaking was published on December 8, 2010. 75 FR 76345. Comments are due by February 7, 2011.

**Section 104** also requires a ***report to Congress*** by December 31, 2012, on ***the progress of railroad carriers in implementing PTC***. **Status:** Data will be collected, and work on this report will begin midyear 2011.

**Section 105** requires the establishment of a ***grant program for railroad safety technology*** and authorizes $50 million per year for FY 2009 through 2013. **Status:** In FY 2010 FRA received $50 million in funding to carry out this section. The submission period for grant proposals closed on September 3, 2010, and the proposals are currently in the review process.

**Section 106** requires an ***annual report to Congress on unmet statutory mandates*** and open National Transportation Safety Board (NTSB) and DOT Office of the Inspector General (OIG) recommendations regarding railroad safety. **Status:** The first report was issued on schedule on December 31, 2008. FRA has developed a SharePoint system for tracking the status of the mandates (Regulations and Program Development Tracking), which is updated biweekly. The second report was submitted on July 7, 2010, and the report for CY 2010 through December 30, 2010, is complete and currently in review in the Executive Branch.

**Section 107** requires that FRA incorporate in its safety standards only dated ***consensus and industry standards*** that have been subject to notice and comment. **Status:** This requirement reflects FRA's consistent practice for a number of years and should require no programmatic changes.

**Section 108(e)** invests FRA with certain residual ***regulatory authority for hours of service***. FRA is authorized to make changes more restrictive than the statutory limits under the amended law. FRA expects to take no action under this provision until the effects of newly conformed schedules are determined. Although safety challenges remain, particularly related to unscheduled assignments that extend into early morning hours, the very extensive changes to the

hours of service laws leave limited room to regulate without causing significant expense and disruption to crew availability. This provision also provides a period of 3 years to issue alternative ***hours of service rules for train employees of intercity and commuter passenger railroads***, and states that the RSAC may be used to achieve this goal. FRA needed to acquire additional data through work/rest surveys and analysis of work schedules of the affected railroads in order to carry out this mandate. **Status:** An RSAC working group held its first meeting on June 24, 2009. Late appropriations for FY 2009 and the need to consult and coordinate with the RSAC parties resulted in some delays in the necessary work/rest survey. Approval of the information collection was received, the contracted survey data collection and analysis were completed, and FRA provided the report and survey results to the working group for consideration. The working group approved the draft rule text by electronic ballot on September 22, 2010, and the consensus draft language was approved by the full RSAC on October 15, 2010, by unanimous electronic vote as the recommendation from the full RSAC to the FRA Administrator. The draft NPRM is in review in the Executive Branch.

**Section 108(e)** also requires that FRA conduct, by October 16, 2010, at least ***two specified pilot projects to analyze specific practices that might be used to reduce fatigue***. In one project, a railroad must provide 10 hours of notice of the next assigned shift; in the other project, a railroad must assign employees to defined shifts subject to unscheduled calls, followed by shifts not subject to calls. FRA may temporarily waive the requirements of 49 U.S.C. 21109 (regulatory authority), if necessary, to complete the pilot projects. **Status:** FRA must receive requests from railroads and rail labor organizations in order to fulfill this requirement with any reasonable prospect for success. FRA has not received any requests as of this writing, but continues to encourage affected parties to use this option. Please note related activity under Section 110, below.

**Section 109** requires an FRA ***study on the advantages and disadvantages of barring discovery of RRP information in tort litigation***. In particular, this section requires FRA to evaluate whether it is in the public interest (including public safety and the legal rights of persons injured in railroad accidents) to withhold from discovery or admission in court proceedings, for damages involving personal injury or wrongful death against a carrier any report or data compiled in order to evaluate or implement a required RRP. There is no deadline. The section also requires FRA to solicit input from railroads, labor organizations, accident victims and families, and the general public. After completing the study, the Secretary, if in the public interest, may prescribe a rule, subject to notice and comment, to address the results of the study. Any such rule prescribed must not become effective until 1 year after its adoption. **Status:** FRA identified funds with which to contract out the study; finalized a statement of work; and in mid-September 2010 issued a request for proposals. FRA is currently reviewing the proposals received prior to the contract award. FRA anticipates that the study will take 8 months to complete.

**Section 110** requires a report by December 31, 2012, on ***hours of service pilot projects under waiver pursuant to joint labor-management petition***, involving the implementation of alternatives to the requirements of the hours of service laws as amended by the RSIA (including the maximum and minimum duty requirements). If no pilot projects are yet completed, the report is due 6 months after completion of the project. **Status of potential hours of service pilot projects:** If such a pilot project is conducted, data will be collected, and work on this

report will begin midyear 2011. As information, FRA has received and approved one request for a pilot project that permits the railroad to divide the employee pool into two sections based upon the start date for application of the 276-hour monthly cap on service for the railroad. FRA is also beginning to resolve several waiver requests, principally related to the requirement for 48 hours off following 6 consecutive days with on-duty starts. To the extent that the requests are approved, experience under these waivers will be reported pursuant to this section.

## Title II. Highway-Rail Grade Crossing and Pedestrian Safety; Trespass Prevention

**Section 201** requires FRA to provide guidance to railroads on strategies to prevent casualties to ***pedestrians at or near passenger stations***. As the Committees are aware, FRA has been working with the Federal Transit Administration and industry stakeholders on this issue, and it was an active RSAC task when the law was enacted. **Status:** FRA staff prepared a draft of a preliminary guidance document and provided it in the fall of 2009 to the RSAC General Passenger Safety Task Force for its initial review. After receiving input from the task force, FRA has refined the preliminary guidance based on these comments and plans to submit it for further clearance within FRA. After approval by the Executive Branch, the preliminary guidance will be sent to Congress and also posted on the FRA Web site. The task force will have a last opportunity to review and recommend revisions of the preliminary guidance. The guidance document is in final FRA coordination. The final approved version will be posted on FRA's Web site.

**Section 202** requires that by ***October 16, 2009***, FRA identify the 10 States that have had the most grade crossing collisions, on average, over the preceding 3 calendar years, and require those States to submit ***State-specific grade crossing safety plans*** within a reasonable period of time, as determined by FRA, for FRA approval. The section also requires that FRA provide assistance to the States in developing and carrying out the plan. **Status:** FRA issued a direct final rule on August 21, 2009, which was published on September 2, 2009. 74 FR 45336. FRA received one adverse comment on the direct final rule; therefore, FRA was required to withdraw the direct final rule and issue an NPRM. The documents withdrawing the direct final rule and issuing the NPRM were published on November 13, 2009. 74 FR 58589. The final rule was published on July 28, 2010, with an effective date of August 27, 2010. 75 FR 36551. The rule addresses the contents of the highway-rail grade crossing action plans and certain time periods for plan implementation. FRA identified the 10 States that have had the most highway-rail grade crossing collisions over the past 3 years, as follows: Alabama, California, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Ohio, and Texas. This identification was made in the preambles of both the NPRM and the final rule. FRA sent letters to the appropriate State agencies on August 8, 2010, advising them of the requirements of the final rule and providing points of contact for assistance. At this writing, FRA has received one State Action Plan from Indiana.

**Section 203** requires the Department to develop and make available model legislation to address ***roadway user sight obstructions*** at passively signed highway-rail grade crossings by April 16, 2010. **Status:** FRA worked on the mandated model law with advice from the Federal Highway Administration, and FRA consulted at length on its content within the rail industry and provided

a draft of the model law at the National Conference of State Legislatures in July 2009, including information on how to provide feedback on the FRA draft. (A copy of this draft was provided to the Committees as an attachment to the previous iteration of this Work Plan and Status Report submitted under a letter dated September 29, 2010.) FRA met with AAR in January 2010 to receive its input on the model law. On January 7, 2011, FRA submitted the model law to relevant congressional committees, the Governor of each State, and local governmental organizations. The model legislation has also been posted on FRA's public Web site.

**Section 204**, which was derived from the Department's reauthorization proposal, will, for the first time, make reporting to the ***National Highway-Rail Crossing Inventory*** (Inventory) mandatory for the States and the railroads, potentially leading to the correction of a significant data-quality issue that affects the Department's collective ability to move against the remaining areas of grade crossing risk. The section also authorizes a rulemaking to implement the section and authorizes enforcement of each provision of certain departmental guidelines until the provision is superseded by a regulation prescribed under the authority of that section. **Status:** FRA completed a guidance document to assist railroads and States as they comply with the mandatory Inventory updating. The instructions on updates, including those on private crossings, were posted on FRA's public Web site. The site includes a new Inventory Program Web page with 35 documented items to assist States, railroads, and all other stakeholders. FRA has a contract in place for an impact assessment of the new requirements on FRA's Inventory database system. FRA is also evaluating and researching issues of data quality. States have been contacted to provide corrections and updates, and FRA personnel have made presentations on the requirements of Section 204 at regional conferences of the American Short Line and Regional Railroad Association (ASLRRA) held in Indiana and Florida and at the National Crossing Safety Conference held in Texas. The FRA rulemaking team has been formed and is currently working on identifying major issues and setting up a timetable for developing the rule.

**Section 205** mandates that FRA, by April 16, 2010, require all railroads, regardless of size, to establish an ***emergency notification system*** (ENS) whereby the public can advise the railroad of safety issues at grade crossings, public and private, through which they dispatch trains. This service is provided, and related signage is posted, at a majority of public highway-rail grade crossings in the United States, as set forth in FRA's Report to Congress titled, "Pilot Programs for Emergency Notification Systems at Highway-Rail Grade Crossings" (May 2006), which has been placed on FRA's Web site at http://www.fra.dot.gov/downloads/safety/1_800_report.pdf; however, this section requires that FRA mandate such systems not only for public highway-rail grade crossings but also for private highway-rail grade crossings and for public and private pathway grade crossings. Further, smaller railroads with limited resources would be subject to the requirements. It should be noted that the benefits that result from these systems are directly related to the numbers of trains and motor vehicles using the subject crossings. Higher-speed train operations generate greater risk than can be mitigated using ENS programs. On that basis, the ENS programs currently in place with FRA encouragement already capture the vast majority of benefits that are available. **Status:** An NPRM is currently being drafted, with a projected publication date of February 2011.

**Section 206** authorizes FRA to make ***grant(s) to Operation Lifesaver, Inc. (OL)*** to carry out a public information and education program in order to prevent and reduce accidents and improve

awareness along railroad rights-of-way and at grade crossings. OL grants may also be used for a pilot program that addresses the need for targeted and sustained community outreach to reduce pedestrian and vehicle accidents along railroad rights-of-way and at crossings; grantee(s) for such a pilot program must be in a State identified under Section 202 and follow other specified strictures. Funds are authorized for FY 2010–2013. **Status:** OL submitted its request for an FY 2009 grant in the amount of $1.015 million on June 30, 2009. The grant agreement was completed and signed on July 31, 2009. OL submitted its request for an FY 2010 grant, also in the amount of $1.015 million, on June 3, 2010. The grant agreement was signed by FRA and OL on August 26, 2010, and the money was obligated on September 3, 2010.

**Section 207** authorizes FRA to make two types of ***crossing safety grants***. The authorization provides that FRA may make grants to a maximum of three States per year for development or continuance of public education and awareness activities to reduce violations of traffic laws at crossings and reduce injuries and fatalities along railroad rights-of-way, or other stated purposes. Second, FRA may make grants to States for up to $250,000 each for priority crossing safety infrastructure improvements, on an expedited basis, at crossings that have had crossing collisions within the previous 2 years involving major loss of life or multiple serious bodily injuries. The authorization is for FY 2010–2013. **Status:** Congress has not provided funds for this program to date. A request for resources has been included in the FY 2011 budget.

**Section 208(a)** requires the Department to ***review current Federal, State, and local laws*** dealing with trespassing on railroad property, vandalism affecting railroad safety, and violations of grade crossing warning devices. The first evaluation was to be completed by October 16, 2009. The section also requires FRA to develop model strategies on trespass prevention and enforcement of traffic laws at highway-rail grade crossings. **Status:** The updated Compilation of State Laws, which reviews existing State laws regarding trespassing on railroad property, vandalism affecting railroad safety, and violations of grade crossing warning devices by motorists, has been released and made available on FRA's Web site. The model strategies are in final FRA coordination and will be posted on FRA's Web site.

**Section 208(a)** also requires DOT to make available by April 16, 2010, ***model State legislation*** regarding motorists' compliance with grade crossing warning devices, after consulting with State and local governments and with railroads. **Status:** A draft model State law that addresses violations of highway-rail grade crossing traffic control devices has been completed and is currently under final review in FRA. As part of the required consultation process, the draft model State law will be submitted to a large number of organizations representing State and local governments and the railroad industry with a request for their comments.

**Section 208(e)** requires the Department to prescribe guidelines for the exercise of the authority to buy items of nominal value and give them to the public without charge as part of an educational or awareness program to improve safety at highway-rail grade crossings and to prevent trespassing on railroad rights-of-way. **Status:** FRA provided this guidance on June 25, 2009. A copy of this guidance was attached to FRA's previous iteration of this Work Plan and Status Report, which was submitted under a letter to the Committees dated September 29, 2010.

**Section 209** requires FRA to ***audit at specified intervals railroads' reporting of grade crossing accidents, including crossing fatalities,*** to any Federal national accident database, each Class I railroad every 2 years and each non-Class I every 5 years. Before the enactment of the RSIA, the frequency with which FRA conducted audits of railroads' reporting of crossing accidents reflected the agency's acceptance of recommendations made by the OIG. The OIG had suggested that FRA carry out these audits on the Class I railroads, including Amtrak, once every 3 years and on the Class II and III railroads, including commuter railroads, once every 5 years. Now, with the passage of the RSIA, the Class I railroads must be audited once every 2 years, instead of the previous 3-year interval. This law has left unchanged FRA's practice of auditing the Class II and III railroads every 5 years. **Status:** FRA has integrated the new reporting requirement into internal tracking systems such as the National Safety Performance Plan. FRA has completed the required audits of all eight Class I railroads by the October 16, 2010, deadline. With respect to the Class II and III railroads, subject to such audits every 5 years, FRA senior management has delegated to each of the eight FRA regions the responsibility to satisfy this requirement with respect to railroads that have their headquarters within the geographical territory of the individual region. The regions will have their own team members and a separate target date of 5 years after October 16, 2008 (i.e., October 16, 2013).

In performing the mandated audits of the Class I railroads, FRA requests and obtains records relating to "immediate notification" of such events as received by another department within the railroad other than the accident reporting office. Each of these larger railroads has computerized systems from which it can generate output reports for a requested time period, either from its police department (in the case of Norfolk Southern Railway Company and CSX Transportation, Inc.); from its "Service Interruption Center" in its network operations center (BNSF Railway Company); or from its "Resource Communication Center" (Union Pacific Railroad Company). FRA will typically receive records for the time period to be audited, and perform a reconciliation of those records against lists of highway-rail grade crossing accidents that the railroad has reported to FRA. FRA checks each record on the other department's listing against the records on the FRA listing. When finished with this first phase, FRA then looks at the records on the other department's listing that were not accounted for on the FRA list. FRA then requests further records for each of these "suspected unreported" grade crossing accidents from the railroad's safety and claims department. After examining these additional records, FRA is able to eliminate those cases that were the responsibility of another railroad to have reported; or eliminate records that did not meet FRA's criteria as being a highway-rail grade crossing accident, e.g., vehicle parked too close to the track or vehicle not at a crossing site. During this final process, FRA typically finds some confirmed unreported highway-rail grade crossing accidents. A few additional unreported highway-rail grade crossing accidents are found during FRA's inspection of the railroad's claims department files, and the accident reporting officer's internal files for rail equipment accidents.

## Title III. Federal Railroad Administration

**Section 303** requires FRA to publish an ***annual enforcement report for the preceding fiscal year***, beginning December 31, 2009, regarding a wide range of enforcement actions and the handling of locomotive engineer certification reviews. **Status:** FRA posted its first enforcement

report pursuant to this section on its Web site on April 7, 2010. The enforcement report for FY 2010 was completed and posted to the FRA Web site before December 30, 2010.

**Section 307** requires FRA ***to update*** its ***public Web site*** to better facilitate the ability of infrequent visitors to find current information on FRA activities and submit written complaints of possible rail safety or hazardous materials violations. **Status:** Dead links on the FRA Web site have been removed or repaired, and the search engine now returns a coherent message when the request does not yield a match, along with suggestions on how to refine the search. The FRA main Web site was redesigned with a new graphical interface on February 26, 2010. Additional changes are planned to improve overall ease of use. FRA is developing requirements for a Web portal for the public to submit written complaints of possible rail safety violations. The document on system and functional requirements is complete. This document outlines an approach to handling public submissions of complaints of alleged violations using existing processes. FRA has restated the criteria that inspectors should use to determine whether a railroad is in violation of Federal laws, regulations, and orders, and has used these criteria to develop a form for submitting complaints. The form package has been approved and is currently under review in the Executive Branch.

**Title IV. Railroad Safety Enhancements**

**Section 401** requires that FRA issue regulations requiring ***training standards*** for safety-related railroad employees and equivalent employees of railroad contractors and subcontractors by October 16, 2009, after which the affected entities will be required to submit plans that FRA must review and approve. As the Committees are aware, FRA already has in place significant training requirements for a variety of subjects, and it has regularly included training elements in each of the new and revised regulatory programs that FRA has promulgated in recent years. Nevertheless, given the number of technical disciplines represented on the railroad properties and the breadth of the knowledge, skills, and abilities required to execute the tasks that they are required to accomplish safely, this provision has required an extensive effort. FRA began the process by conducting a "gap analysis" to determine what areas need to be addressed. **Status:** Putting regulations in place that are complementary to those already in place, well constructed, and workable, has required significantly more than the 12 months allowed by the statute. Information provided by the railroads in May 2009 was insufficient for data analysis. FRA offered the task to the RSAC on March 18, 2010, and the Training Standards Working Group was formed and began the effort. The draft proposed rule text was approved by the RSAC on December 14, 2010, and FRA anticipates having an NPRM ready for publication by midyear 2011. The draft will integrate the impact on current training standards. Please note that training standards for conductors are being developed in connection with the conductor certification rulemaking. FRA continues to add additional training standards in specific regulatory proceedings as appropriate (see, e.g., final rule on hours of service recordkeeping and reporting, 49 CFR § 228.207 in 74 FR 25330, 25352 (May 27, 2009), and final rule on PTC, 49 CFR §§ 236.1041-236.1049 in 75 FR 2598, 2714-2715 (January 15, 2010)).

**Section 402** requires a program of ***conductor certification***, and regulations are required to be in place by April 16, 2010. **Status of rulemaking:** The rulemaking was offered to the RSAC on December 10, 2008, and the Conductor Certification Working Group was formed to develop

recommendations on a proposed regulation. The resulting NPRM was published in the *Federal Register* on November 10, 2010. 75 FR 69166. The working group may be called back to meet and review the comments received on the NPRM. After the final rule is published, the working group will reconvene to propose conforming amendments to the locomotive engineer certification regulation (49 CFR Part 240) as appropriate.

**Section 402** also requires a report on the possible certification of other crafts and classes of railroad employees. **Status of report:** Work on this report will begin immediately after promulgation of the rules on training standards under Section 401.

**Sections 403(a) and (b)** require a study of inspection practices and the amount of time required for inspections under the ***Track Safety Standards***, and another set of revisions to those regulations. The report is due by October 16, 2010, on the results of a specified track-inspection time and track safety study. FRA is to make recommendations for rule changes and, under **Section 403(c)**, not later than 2 years after completion of the study, prescribe regulations based on its results. **Status:** FRA organized an independent study by an outside contractor and developed a questionnaire used to get information from railroad track inspectors throughout the country; interviews with railroad and union officials were also conducted for additional perspectives. The study and report have been completed and are currently in final coordination. Any appropriate regulatory effort will commence immediately upon completion of the report.

**Section 403(d)** requires a rulemaking on ***concrete ties*** to be completed by April 16, 2010. **Status:** As the Committees were advised, this activity had already begun in the RSAC, and the full RSAC accepted the consensus working group's recommendations for an NPRM on December 10, 2008. The resulting NPRM, which took into consideration the RSAC recommendations, was published on August 26, 2010. 75 FR 52490. Public comments were due by October 12, 2010. Currently, the Track Safety Standards contain specific requirements for concrete crossties only for track used for high-speed operations (Class 6 track and above). Although this approach works well for the major concerns with concrete crossties, it does not address the critical issue of rail seat abrasion (the failure of the concrete surface between the rail and crossties). The proposed rule would establish with respect to track Classes 1–5 (the lower speed classes of track) specific requirements for concrete crossties, rail fastening systems connected to such crossties, automated inspections of track constructed with such crossties, and for training track inspectors whose territories include such track concerning how to handle exceptions involving rail seat abrasion.

**Section 404** requires a report on a ***study of methods to improve or correct station platform gaps***, due by October 16, 2010, "to determine the most safe, efficient, and cost-effective way to improve the safety of" platform gaps at rail passenger stations in order to increase compliance with the Americans with Disabilities Act (ADA) requirements and minimize safety risks. **Status:** FRA published the "Gap Guide" ("FRA Approach to Managing Gap Safety"), prepared by the RSAC General Passenger Safety Task Force, in December 2007. In order to reduce the risk of gap accidents, FRA advocates that all passenger train operators develop a long-term gap safety management program that uses engineering evaluation and analysis to establish gap standards for all high-level stations. Gap safety management programs should also use hazard management techniques, including hazard analyses, to identify hazards and hazard mitigation

strategies to eliminate or control gap hazards, thereby lowering the risk of passenger injury. FRA also recommends the creation of a hazard management team, made up of interdepartmental technical and safety experts, who will implement the gap safety management program by identifying hazards and agreeing on mitigation strategies.

Gap safety programs should also include the following elements: station gap standards, maintenance procedures, inspection procedures, hazard mitigation strategies, passenger outreach, employee training, and passenger behavior. These seven elements, taken in combination, define a system safety approach for managing platform gap safety and are incorporated and discussed in greater detail in the guidance document enclosed with this letter report. FRA will file an additional report on the safety issues within the time allowed. The issue of increasing compliance with the ADA is a somewhat separate matter. The FRA Office of Civil Rights has taken this on as an action item and has begun a literature review to determine what information is already available. The FRA Offices of Railroad Policy and Development, Railroad Safety, and Civil Rights coordinated with each other in formulating a report that is currently in final clearance in the Executive Branch.

**Section 405(a)** requires a report within 6 months of completing a required study on the ***safety effects of the use of personal electronic devices*** and other distracting devices by safety-related railroad employees during the employees' performance of safety-related duties. The study must be completed by October 16, 2009, and must consider "the prevalence of the use of such devices." **Section 405(d)** authorizes regulatory action based on the study, but sets no deadline. **Status:** This provision was put into the legislation prior to the issuance of Emergency Order No. 26 (EO 26), which prohibits use of the devices that were feared to cause distraction. On October 1, 2008, FRA issued EO 26 (73 FR 58702), severely restricting the use of personal electronic devices by railroad operating crews. This action followed detailed discussion of the issue with the Railroad Operating Rules Working Group of the RSAC. On May 18, 2010, FRA published an NPRM in what was one of several departmental rulemakings on "distracted driving." FRA's NPRM proposed to restrict railroad operating employees' use of cellular telephones and other electronic devices pursuant to a regulation rather than an order; EO 26 would be supplanted when a final rule becomes effective. 75 FR 27672. A final rule in this significant rulemaking was published at 75 FR 59579 on September 27, 2010, with an effective date of March 28, 2011. Meanwhile, on May 27, 2010, the Secretary submitted a report to Congress on the use of personal electronic devices by railroad operating employees. A separate report dealing with the use of personal electronic devices by other safety-related employees is planned.

**Section 405(b)** provides that the Secretary may also study other aspects of the locomotive cab environment and their effect on an employee's health and safety. **Status:** FRA is employing the RSAC to identify issues that need to be addressed in the study. FRA has already initiated additional research on whole-body vibration and cab seating in response to this section. FRA will report the results of this work when it is complete. It should also be noted that an NPRM to amend to Locomotive Safety Standards was published on January 12, 2011. 76 FR 2200. A number of the amendments would change requirements for locomotive cabs (e.g., proposed Section 229.119(d)), which would require an "occupied locomotive cab to be provided with proper ventilation and with a heating arrangement that maintains a temperature of at least 60 degrees Fahrenheit...." 76 FR 2230.

**Section 406** requires that the agency prescribe standards, guidance, regulations, or orders governing the development and use of ***technology in nonsignaled (dark) territory***. Examples provided in the provision include such technology as radio-controlled switches and switch position monitoring. **Status:** FRA has previously published research results on a switch position monitoring system developed through research partially funded by FRA (RR07-04 April 2007); and on April 19, 2007, FRA conducted a hearing as part of a special safety inquiry conference on this topic. 72 FR 14641, March 28, 2007. Although these efforts have been useful in preparing technology for use and for evaluating in a preliminary way, the challenges associated with selecting and deploying technology in dark territory, much more work needs to be done. This work was delayed because it called on the same technical skills and personnel required to review railroad plans and product safety submissions under the PTC mandate of Section 104; indeed, many dark territory lines will be equipped with PTC during that effort (largely mooting the issue of lesser technology for those lines). The PTC effort having matured, FRA presented a task statement regarding dark territory to the RSAC for acceptance during its September 23, 2010, meeting. The task presented and accepted on that date was to provide advice regarding development of standards, guidance, regulations, or orders governing the development, use, and implementation of rail safety technology in dark territory responsive to the legislative mandate and to report recommendations for a proposed rule or an interim final rule to the Administrator by September 30, 2011. RSAC member organizations have submitted expressions of interest in participating in the Dark Territory Working Group, and the working group has formed. FRA is currently holding planning meetings on this task, and the first meeting of the working group is scheduled for March 2011.

**Section 408** requires a ***study*** by October 16, 2009, ***on the impacts of repealing*** 45 U.S.C. 797(j), ***"the Conrail exemption,"*** which exempts the Consolidated Rail Corporation (Conrail), its successors, and other railroads operating in an 18-State region from State laws in that region requiring a certain number of employees to perform a certain function (e.g., provisions on train crew size) or payment of protective benefits to employees. Not later than 6 months after completing the study (arguably, on or before April 16, 2010), FRA must report to Congress on its results. **Status:** FRA is conducting this study in-house due to lack of funding for contract support. Background information gathering and research are currently underway, and a draft of the report is expected to be completed in early 2011.

**Section 410** requires that FRA initiate a proceeding within 30 days (by November 15, 2008) to define the term "critical incident" within the context of ***critical incident stress debriefing*** programs. **Status:** On November 15, 2008, FRA initiated action within DOT to commence a rulemaking on this topic. FRA would like to note that a significant number of additional issues should be addressed by regulation before railroads submit plans to FRA for approval. Because poorly conceived programs can actually cause harm to those they seek to assist, FRA expects to conduct further rulemaking before requiring submission of the plans. FRA offered the task to the Medical Standards Working Group of the RSAC in September 2009, and the Critical Incident Response Task Force has been formed. On June 28, 2010, FRA published a Solicitation of Applications and Notice of Funding Availability for a grant to assess the applicability of current knowledge of post traumatic interventions and to advance evidence-based recommendations for controlling the risks associated with traumatic exposure in the railroad setting. After awarding the grant, FRA anticipates scheduling a meeting of the task force to undertake the task and for

industry members to present their current practices on responding to critical incidents. Further, in accordance with Section 410's directive, FRA has contacted the U.S. Department of Health and Human Services and the U.S. Department of Labor and has begun working in consultation with doctors from those departments on this requirement. Best practices and lessons learned will also be considered in developing recommendations for rulemaking.

**Section 411** requires a ***report on*** the results of a "***[r]ailroad carrier employee exposure to radiation study.***" The report is due by April 16, 2010. The Secretary must conduct the study (in consultation with the U.S. Department of Energy (DOE), the U.S. Department of Labor, the U.S. Environmental Protection Agency (EPA), and the Nuclear Regulatory Commission) regarding the potential hazards of transporting high-level radioactive waste and spent nuclear fuel, and transmit the report to Congress by April 16, 2010. If warranted, based on the study results, FRA may issue regulations to protect railroad employees from unsafe exposure. **Status:** FRA determined that a very small amount of high-level radioactive waste and spent nuclear fuel is actually being transported by rail at this time. Shipments that occur are intermittent, thus making it difficult to conduct and obtain any meaningful field measurements for the purposes of the study. FRA assembled a team that includes representatives of the DOT's Pipeline and Hazardous Materials Safety Administration, DOE, the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA), the EPA, and the Nuclear Regulatory Commission. The team developed a plan to address the study in light of the absence of this type of radioactive material being transported by rail at this time. FRA followed the plan, compiled data from exposure assessments done by one American railroad and two European agencies to characterize the expected exposures when these materials are transported by rail, and completed a draft of the final report, which is currently under review in the Executive Branch.

**Section 412** requires that FRA revise its existing regulations to ***include maintenance-of-way workers in the FRA alcohol/drug program*** by October 16, 2010. **Status:** FRA has been holding outreach meetings with industry stakeholders to determine issues related to this proceeding. Additionally, FRA is using this rulemaking to address several open NTSB recommendations and other important proposed clarifications. FRA is preparing a proposed rule to accomplish all of this, and the agency is close to having the NPRM ready for the review and clearance process. FRA anticipates that an NPRM will be published by the summer of 2011.

**Section 413** mandates, in a very specific manner, the provision of ***emergency breathing apparatus*** that is to be made available on locomotives. A period of only 18 months was allowed to complete the rulemaking. **Status:** FRA completed a contract study to determine the feasibility of providing appropriate breathing apparatus capable of protecting crew members from the chemicals that may pose inhalation hazards. FRA held initial discussions with the railroad industrial hygienists to explore options, and the RSAC was briefed on the proposed approach on June 25, 2009. The resulting NPRM was published on October 5, 2010 (75 FR 61386). The comment period closed on December 6, 2010. A draft of the final rule, including a response to comments received in the docket, is currently being prepared.

**Section 415** requires a ***museum locomotive study and report*** by October 16, 2010. The study is to look at the safety inspections of diesel-electric locomotives and equipment operated in limited service by railroad-related museums, etc., and the safety effects of reducing the inspection

frequency for such locomotives. **Status:** A nationwide inventory of museum, tourist, and excursion railroads within the scope of the mandated study was completed, as well as a survey and analysis to assess compliance with Federal regulations. The study did not support requiring less frequent inspections of such locomotives and equipment. A report to Congress detailing FRA's findings and recommendations was delivered on July 27, 2010.

**Section 417** requires that ***bridge safety regulations*** be issued within 12 months. **Status:** As the statute was enacted, FRA had just concluded an RSAC task that described the essential elements of a sound bridge management program. The American Railway Engineering and Maintenance-of-Way Association had completed a new "Bridge Inspection Handbook" that, with FRA assistance, has been published and distributed to each major and shortline railroad. In addition, ASLRRA had established a task force that was working to provide assistance and guidance to member railroads on sound bridge management. FRA's RSAC Railroad Bridge Working Group assisted FRA with the mandated rulemaking. An NPRM, which took into consideration the RSAC recommendations, was published on August 17, 2009, at 74 FR 41558, and a final rule, which took into consideration RSAC recommendations, was published on July 15, 2010, with an effective date of September 13, 2010. 75 FR 41282.

**Section 418** requires the Secretary to establish a **grant program for safety improvements to railroad safety infrastructure** and authorizes $5 million per year for FY 2010 through 2013. **Status:** FRA has not received any funds with which to carry out this program.

**Section 420** requires new ***regulations on railroad camp cars by*** April 1, 2010. The regulations will replace existing guidelines (49 CFR Part 228, Appendix C) and must be developed in coordination with the Secretary of Labor. These guidelines define "camp cars" as "trailers and on-track vehicles, including outfit, camp, or bunk cars, or modular homes mounted on flatcars used to house or accommodate railroad employees." **Status:** To craft the proposed regulation, FRA has coordinated with the U.S. Department of Labor and examined OSHA's regulation of temporary labor camps, FRA's existing guidelines on camp cars, and the U.S. Food and Drug Administration's authority over potable water on vehicles in interstate commerce. The resulting NPRM was published at 76 FR 64 on January 3, 2010. The NPRM proposes minimum safety and health requirements for camp cars that a railroad provides as sleeping quarters to any of its train employees, signal employees, and dispatching service employees and individuals employed to maintain its right-of-way. The NPRM also proposes to extend the location restrictions in Subpart C of 49 CFR Part 234 to camp cars occupied exclusively by MOW workers. The comment period closes on March 4, 2011.

### Title V. Rail Passenger Disaster Family Assistance

**Section 503** requires the establishment of a ***task force for passenger rail accidents, and a report*** by October 16, 2009. In cooperation with the NTSB and others, the Secretary must establish a task force to develop a model plan to assist rail passenger carriers in responding to passenger rail accidents, and must transmit a report to Congress containing the plan and related recommendations developed by the task force, by October 16, 2009. **Status:** The task force was formed, drafted a model plan (based on the family assistance plan for the aviation mode), and developed recommendations to assist in the notification and conduct of matters relating to family

members of passengers involved in passenger rail accidents. The draft report to Congress containing the task force's model plan and recommendations has been cleared by the U.S. Department of State and within FRA. On January 13, 2011, FRA submitted the draft report for review and clearance in the Executive Branch.

## Title VII. Technical Corrections

**Section 701(c), which amends Section 245(a) of the Energy Independence and Security Act of 2007 (Pub. L. No. 110-140),** requires a ***joint study with DOE and a report on the adequacy of transportation of domestically produced renewable fuels.*** DOT and DOE are to jointly submit a report with results of the study to Congress by June 2008. **Status:** The draft report is complete and is currently under review in the Executive Branch.

Federal Railroad Administration


# Office of Railroad Policy and Development Fiscal Year 2011 Interim Monitoring Plan

for the High-Speed Intercity Passenger Rail Program

March 31, 2011

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# Background and Introduction

The Federal Railroad Administration (FRA) manages a variety of grant programs designed to support rail projects. The largest of these is the High-Speed Intercity Passenger Rail (HSIPR) program. The foundation for the HSIPR program is contained in two pieces of legislation. The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) established the framework for the program. In February 2009, President Obama signed the American Recovery and Reinvestment Act of 2009 (Recovery Act or ARRA) into law, making a major investment of $8 billion for new high-speed and intercity passenger rail grants.

In December 2009, Congress appropriated an additional $2.5 billion for the HSIPR program in the Fiscal Year (FY) 2010 Department of Transportation Appropriations Act. This funding builds on the investments made under the Recovery Act and provides additional funding for new planning and environmental studies, individual projects, and service development programs.

The HSIPR program is administered by the Office of Railroad Policy and Development (RPD) within FRA. The FY 2011 Interim Monitoring Plan focuses on the HSIPR program to maximize coverage of Federal funding; however, it is the intention of RPD to develop a long-term, comprehensive plan that encompasses all of its grant programs. Additionally, while this plan describes the activities performed by RPD staff, RPD leadership recognizes that these activities will be closely coordinated with Office of Financial Management and Administration (RAD), the FRA division responsible for financial oversight. RPD leadership will also work with the Office of Safety to ensure monitoring efforts are planned with ongoing safety regulation and oversight in mind. This interim plan documents the processes and protocols for determining the monitoring population, the steps taken before, during, and after a scheduled monitoring activity, roles and responsibilities, and the needed tools and checklists to carry out the plan. Scheduled monitoring activities refer to compliance and programmatic review elements performed through desk reviews and site visits.

In the months to come, RPD will be developing a longer-term monitoring program that will:

- Take a more risk-based approach to project selection by exploring a variety of options that narrowly and strategically measure risk. As projects mature, RPD will determine the best methods for selecting projects for desk reviews and site visits.
- Include a robust set of monitoring checklists and protocols designed to tailor monitoring activities to specific types of programs, relative risk levels, and other factors.
- Employ tools that will streamline and simplify the processes, strategically leverage resources, and ensure consistency.
- Include formal collaboration with all FRA offices with oversight responsibilities, including RAD and the Office of Safety.
- Consider the lessons learned based on activities outlined in this monitoring plan.

## Applicability and Scope

The FY 2011 Interim Monitoring Plan applies to RPD's post-award scheduled monitoring activities for the HSIPR program. It is effective beginning March 15, 2011 and continues through March 14, 2012, unless superseded prior to that date. RPD leadership will ensure that all scheduled monitoring is coordinated with oversight activities managed by RAD and the Office of Safety. The policies and procedures outlined in this document are intended as supplements to the monitoring policies and procedures outlined in RPD's Grant Management Manual (GMM).

## Definitions

**Compliance monitoring** measures how well recipients are following the terms of the notice of grant or cooperative agreement (NGA), the HSIPR program, and applicable regulations.

**Desk reviews** are one method of scheduled monitoring that involve a review conducted from RPD headquarters.

**Obligated projects** are those where the recipient is legally and financially authorized to expend funds for the work outlined in the cooperative agreement or grant.

**Potential monitoring population** is the group of selected projects that are obligated or are immediately pending obligation and, as a result, are ready or near ready for monitoring.

**Programmatic monitoring** assesses the substantive portions of the project such as the scope, schedule, and budget as described in the NGA Statement of Work (SOW). This also includes a review of targeted technical matters, such as engineering, environmental, and financial analysis.

**Reviewers** are the grant manager for compliance monitoring portions of the review or the Customer Service Lead (CSL) for programmatic monitoring.

**Scheduled monitoring** is a collective term describing activities performed by desk review or site visit involving both compliance and programmatic elements.

**Selected monitoring population** is the group of projects chosen from within the potential monitoring population for scheduled monitoring activities.

**Selected projects** are those chosen by RPD for funding after the application review process but may not yet obligated.

**Significant findings** are issues noted through a scheduled monitoring review that require corrective action on the part of the recipient and a plan for remediation, including a timeline.

**Site visits** are one method of scheduled monitoring that involve a review conducted on-site at the recipient's office(s) and/or the project location that allow for a deeper level of review, inspection, and testing of project progress and documentation.

# Project Portfolio Overview

To date, RPD has selected 130 projects from 36 states, representing an estimated $8.4 billion in HSIPR funding. As of March 15, 2011, 27 projects have been awarded, 11 are expected to be obligated in the next few weeks, and the remaining projects will be obligated on a rolling basis over the next few months as prerequisites are completed.

The potential monitoring population includes 38 projects within four project types. Table 1 provides an overview of these types and the number of projects within the potential monitoring population.

*Table 1: Funded Project Types*

| Project Type | Description | Potential Monitoring Population |
|---|---|---|
| **Service Development Programs** | A series of projects designed to develop large and small rail corridors. | 8 |
| **Individual Final Design/Construction Projects** | Activities such as station improvements, bridge construction, and track rehabilitation. | 15 |
| **Individual PE/NEPA Projects** | Preliminary Engineering (PE) and environmental assessment for a variety of construction projects. | 2 |
| **Planning Projects** | Planning efforts for state rail plans, service development plans, and corridor plans. | 13 |
| **Total** | | **38** |

# Identifying the Monitoring Population

## Goals

For the purposes of identifying the initial monitoring population, RPD has the following goals:

- To mitigate risk and achieve appropriate coverage in scheduled monitoring activities (considering currently available time and resources) that include:
    - Coverage of the largest possible percentage of committed Federal funds.
    - Coverage of all types of projects with an emphasis on Service Development Programs and FD/Construction projects over PE/NEPA and Planning projects.
    - A balanced geographic distribution across regions, where appropriate.
- To create a monitoring population in a way that considers readily available and reliable data and employs a valid, straightforward methodology.
- To form the foundation for more robust processes after projects mature and additional information is available.

## Process

RPD took the following steps to determine the potential monitoring population for scheduled programmatic and compliance monitoring activities:

- RPD projected obligation dates for each of the 130 selected projects under the HSIPR program using project status data. Projected obligation dates were grouped into four categories:
    1. **Obligated**: Projects that are currently obligated.
    2. **Obligated in March 2011**: Projects that are nearing technical completion as defined by RPD staff input.
    3. **Obligated in July 2011:** Remaining ARRA projects that are not obligated; FY09 Non-Residual projects; FY10 Service Development Programs with existing stakeholder agreements; and FY10 Planning projects over $1M in funding.
    4. **Obligated after September 2011**: FY09 Residual projects; remaining FY10 SDP projects; FY10 Planning projects under $1M in funding; and all FY10 Individual projects.
- Because only active projects can be monitored, RPD considered only those projects that are obligated or nearing obligation in March, bringing the potential monitoring population to 38 projects.

Within the potential monitoring population of 38 projects, the data was divided into four funding tiers based on the Federal contribution. To ensure coverage of the largest projects within the population, RPD designated all major capital projects as the first tier. Major capital projects are defined within the program guidance as those over $100 million. RPD then divided the remaining projects equally into terciles. For the purposes of this plan, they are categorized as large, medium, and small projects and roughly 11 or 12 projects fall into each tier. Based on the goals above, RPD established the monitoring population using the following methodology:

- To cover the largest percentage of federal funds, the potential monitoring population was narrowed by selecting 100 percent of major capital projects; 75 percent of large projects; 50 percent of medium projects; and 25 percent of small projects. Specific projects were selected by choosing those with the highest dollar value within each funding tier.
- To ensure coverage of all types of projects, a PE/NEPA project was added to the sample by selecting the larger of the two projects within that type. A corresponding reduction was then made by removing the smallest project within the same funding tier from the monitoring population.

Using this methodology, RPD's selected monitoring population is 22 projects (Appendix A).

## Characteristics

The selected monitoring population is subject to adjustments based on recipient needs and RPD's management priorities. The 22 projects within the initially selected monitoring population reflect the following characteristics, which align with RPD's goals:

- Covers a large percentage of the total Federal funding
- Includes a higher concentration of Service Development Programs and FD/Construction projects than of PE/NEPA and Planning projects
- Achieves a balanced regional distribution, while still ensuring that high value projects receive priority.

Table 2 shows a high-level analysis of the population, which covers a significant portion of HSIPR funding.

*Table 2. Analysis of Selected Monitoring Population*

| | | |
|---|---|---|
| **Funding** | Potential population | $5,009,135,561 |
| | Selected population | $4,969,369,092 |
| | Percent of potential pool selected | 99% |
| **Projects** | Potential population | 38 |
| | Selected population | 22 |
| | Percent of potential pool selected | 56% |
| **Recipients** | Potential population | 23 |
| | Selected population | 17 |
| | Percent of potential pool selected | 74% |

## Project Type

Scheduled monitoring activities focus most on Service Development Programs and FD/Construction projects. These more complex projects are generally those with a high Federal funding allocation and therefore have a higher relative level of risk. Planning and PE/NEPA projects generally have a lower Federal funding amounts and lower relative risk because they follow a more standardized approach at this stage of the project development process. The table below compares the monitoring population with the potential population by project type.

*Table 3. Monitoring Population by Project Type*

| Project Type | Monitoring Population | Potential Population |
|---|---|---|
| **Service Development Program** | 7 | 8 |
| **FD/Construction** | 12 | 15 |
| **PE/NEPA** | 1 | 2 |
| **Planning** | 2 | 13 |
| **Total** | **22** | **38** |

## Regional Balance

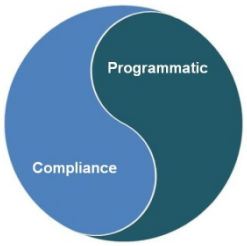
With limited resources, it is critical to balance workload among regions and to ensure an appropriate distribution of scheduled monitoring activities across the country. While regional balance was not used as a criterion for selection, the regional representation of the monitoring population and the potential monitoring population closely align. The table below shows the number of projects selected by region within the overall potential monitoring population.

*Table 4. Monitoring Population by Region*

| Type | Monitoring Population | Potential Population |
|---|---|---|
| Midwest | 4 | 7 |
| Northeast | 8 | 13 |
| Southeast | 3 | 6 |
| West | 7 | 12 |
| Total | 22 | 38 |

## Monitoring Activities

RPD's overall monitoring program involves scheduled compliance and programmatic reviews, conducted through desk reviews or site visits, as well as routine monitoring activities.




- **Compliance monitoring components** measure how well recipients are following the terms of the NGA, the HSIPR program, and applicable regulations.
- **Programmatic monitoring components** assess the substantive portions of projects such as the scope, schedule, and budget that are described in the NGA SOW, as well as applicable regulations and program requirements. This component also includes a review of targeted technical matters, such as engineering, environmental, and financial analysis.

While this monitoring plan focuses specifically on scheduled monitoring activities, RPD will also conduct routine monitoring as part of a comprehensive oversight program. The table below outlines the frequency of RPD's scheduled and routine monitoring activities.

*Table 5: Types of Scheduled and Routine Monitoring Activities*

| | Monitoring Activity | Frequency | Responsible Party |
|---|---|---|---|
| Scheduled | Desk Review | Desk reviews are conducted periodically, based on the monitoring schedule. These reviews may also occur to address specific concerns or other reasons determined by RPD. (It will be common for the compliance portion of most reviews to use this method, unless a site visit is warranted based on issues or other factors.) | Grant Manager for compliance monitoring or CSL for programmatic monitoring |
| | Site Visit | Site visits are conducted periodically, based on the monitoring schedule. These reviews may also occur to address specific concerns or other reasons determined by RPD. (It will be common for the programmatic portion of most reviews to use this method, unless issues and resource allocation warrant use of a desk | Grant Manager for compliance monitoring or CSL for programmatic monitoring |

| | | | |
|---|---|---|---|
| | | review.) | |
| Routine | Progress Report Review | All progress reports are reviewed on a quarterly basis. | Grant Manager |
| | ARRA Report Review | All ARRA 1512(c) data is reviewed on a quarterly basis. ARRA 1201(c) reports are reviewed annually. | Grant Manager |
| | Financial Status Report Review | All financial status reports (SF-425) are reviewed on a quarterly basis. | RAD Personnel |
| | Reimbursement Request Review | Reimbursement request reviews occur whenever a request is submitted. All are reviewed but the frequency of requests varies by recipient. | Grant Manager |
| | Check-ins | RPD staff check-in with recipients on a regular basis. The frequency of check-ins may vary across recipients, as determined by appropriate staff. | CSL and Grant Manager |

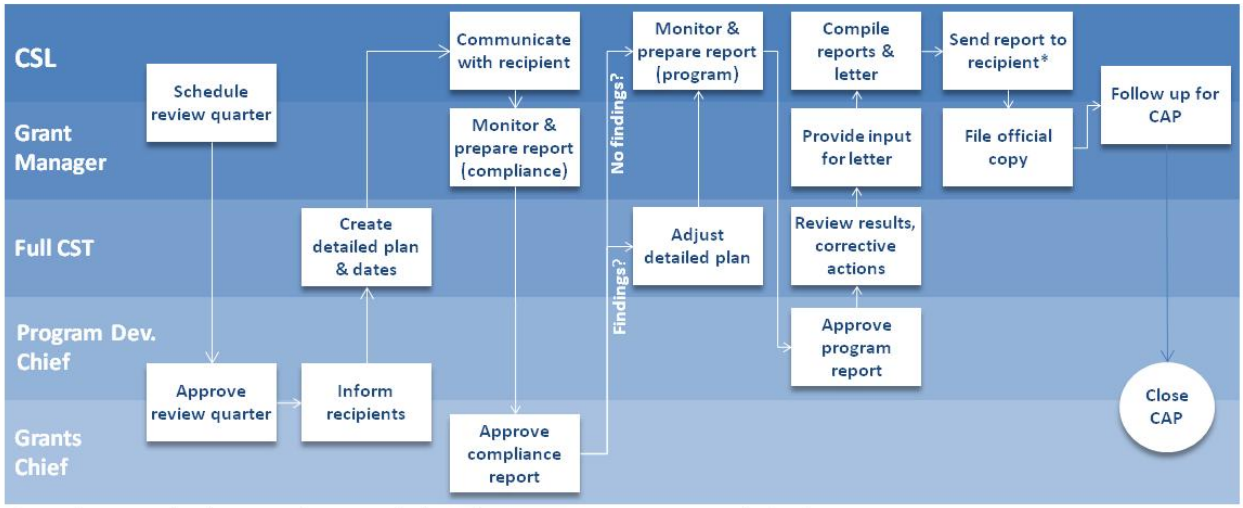
## Scheduled Monitoring Protocols

Compliance and programmatic monitoring are the two required components of a single, scheduled monitoring review for each project in the selected monitoring population. The compliance portion of the review must precede the programmatic portion. The overall process consists of:

- Scheduling reviews for a specific quarter,
- Pre-review activities including setting specific dates for both compliance and programmatic review components, developing detailed monitoring plans, and communicating specific expectations and dates to recipients,
- Review activities including conducting both the compliance and programmatic portions of the overall review, whether by desk review or on-site visit,
- Post-review activities including determining the review elements, conducting reviews, discussing results, preparing appropriate documentation, and sending the report to the recipient, and
- Post-report activities including reviewing corrective action plans, tracking remediation activities, and closing corrective action plans.

The chart below depicts a workflow of these responsibilities, by role, for a single award.

*Chart 1: Scheduling Monitoring Work Flow*




* Copy the Director of Rail Project Development and Delivery if report requires a corrective action plan (CAP).

It is critical that grant managers and CSLs work closely together in performing scheduled monitoring reviews and with the full members of their customer service team, as needed. The team is responsible for overseeing and guiding development related to any project or recipient, and therefore can provide support throughout the scheduled monitoring process. RPD staff conducting or overseeing reviews will do so according to the following guidelines and the policies provided in Chapter 7 of the GMM.

## Scheduling

The CSL and the grant manager will work together, seeking input from the customer service team as needed, to schedule a compliance and programmatic review for each project. To develop the monitoring schedule, the CSL and the grant manager will:

- Discuss the project and identify issues that may influence the urgency of completing the review.
- Select a planned fiscal quarter for conducting the compliance component.
- Select a planned fiscal quarter for conducting the programmatic component. Whenever possible, the compliance component should be scheduled no more than 3 months prior to the programmatic component.
- Determine, for planning purposes, whether desk review or site visit methods will be used or if a joint compliance-programmatic site visit may be warranted, given information available at the time. This initial determination can be changed during the process of developing the detailed monitoring plan.
- Compile the schedule for all projects in the monitoring population that are assigned to the customer service team and make a recommendation to the Program Development and Strategy Division Chief (Program Development Chief) and the Grants Management Division Chief (Grants Chief). The division chiefs will collectively approve or request changes to the schedule.

The Program Development Chief and the Grants Chief are responsible for collectively reviewing, approving, and maintaining a master monitoring schedule for all projects. Any changes to the schedule for either portion of the review must be discussed with the customer service team, agreed upon by both the grant manager and the CSL, and approved by both of these division chiefs.

## Pre-Review Activities

Prior to commencing either component of a review, several steps are required. This includes developing a detailed monitoring plan and other preparation activities using the pre-review checklist.

### *Detailed Monitoring Plans*

No less than one month prior to commencing the compliance component of a scheduled monitoring review, the CSL will convene the customer service team to discuss the project and create a detailed monitoring plan. During this meeting the team will:

- Discuss all risks or concerns about the project or recipient. If there are major concerns, the team should focus only on critical elements that they believe represent a risk that can be reviewed during scheduled monitoring. This may require adding review components or specific questions to those already included in the monitoring checklists (Appendices C and E). In developing these detailed plans, the grant manager, for the compliance portion, and the CSL, for the programmatic portion, will be responsible for making the final decisions regarding the plan for those portions, after considering the input of the customer service team.
- Confirm or change the determination made in the scheduling step as to whether each of the compliance and programmatic portions of the review should be conducted using a desk review or a site visit.

If during the compliance portion of the review the grant manager indicates significant findings or areas of concern warranting further discussion, the grant manager will inform the CSL who will reconvene the customer service team to discuss how these findings may impact the components of the programmatic portion. The team can determine if the detailed monitoring plan needs to be amended or if a joint site visit is warranted.

### *Pre-Review Checklist Activities*

Prior to conducting a monitoring review, the CSL and the grant manager will use the Pre-Review Checklist (Appendix B) and follow the procedures in the GMM Chapter 7 to notify the recipient, collect and review relevant documents and records, and arrange logistics for desk review phone conferences or site visits. These activities also include incorporating the detailed monitoring plan elements into the appropriate checklist.

As part of the communication with the recipient:

- The CSL, with input from the grant manager, will send an email to the recipient at least three weeks prior to the compliance review that explains the elements of both types of review.

- Two weeks prior to the compliance portion of the review, the grant manager will send a list of the monitoring questions and/or types of documents that will be needed, if any.
- Two weeks prior to the programmatic portion of the review, the CSL will send a list of monitoring questions, documents that will be needed during the site visit, personnel that should be available for meetings, and planned activities to the recipient to help them prepare for the review.
- The CSL and the grant manager may hold a joint conference call with the recipient to prepare for the review, providing further explanation about the process and answering any of the recipient's questions.

## Review Activities

In addition to the activities outlined in this plan, all RPD staff involved in this process will use the policies and procedures in GMM Chapter 7 to conduct scheduled compliance and programmatic monitoring activities.

### *Monitoring Components*

The scheduled monitoring review for a recipient includes two components, a compliance portion and a programmatic portion, which must be completed in this order.

#### Compliance Monitoring

Grant managers will use the Compliance Checklist (Appendix C) to complete that portion of the review. This checklist includes a core set of review components at a desk-review level. The checklist includes questions that guide grant managers in reviewing the grant file, progress reports, special conditions, financial status reports, and recipient drawdown history for overall compliance and potential issues with award management. If a site visit is warranted, the grant manager will identify any additional information or records to be reviewed and discuss with the CSL and, if needed, the customer service team.

#### Programmatic Monitoring

For the programmatic portion of a review, CSLs will use the Programmatic Checklist (Appendix E). This checklist includes a core set of monitoring components at a site-visit level. The checklist provides questions to guide CSLs in assessing items such as adherence to the scope, schedule, and budget from the SOW. This review also involves examining compliance with safety and security requirements and quality control methods, all of which help RPD monitor the project's progress towards fulfilling its goals. If the customer service team determines that a desk review is appropriate for a particular project review, the reviewer and team should discuss which components are not required or may not be feasible using a desk review.

### *Monitoring Methods*

Programmatic and compliance monitoring components can be accomplished using either a desk review or a site visit. In general, a desk review is the default method for compliance monitoring and a site visit is the default method for programmatic monitoring. A decision to use a method other than the default

review will be based on professional judgment, relative risk, or other concerns. This decision will be made while developing the detailed monitoring plan.

### Desk Reviews

The reviewer will use the appropriate checklist and detailed monitoring plan to conduct the review. The reviewer may also request additional information needed from the recipient and may require phone conferences with recipient staff, as needed to complete all review elements and explore any areas of concern. While conducting the review, the reviewer should document all findings and observations in the appropriate checklist.

### Site Visits

Upon arrival at each site visit location, the reviewer(s) will conduct an entrance interview with key recipient personnel. Following the entrance interview, the reviewer(s) will carry out all necessary activities to complete the appropriate checklist and the detailed monitoring plan (if applicable). These activities may include reviewing project records, meeting with recipient personnel, visiting work locations, and inspecting materials and/or equipment. While conducting a visit, the reviewer(s) should document all findings and observations in the appropriate checklist.

In addition, when conducting a site visit, reviewers will use the following guidance:

- During the entrance interview with key recipient staff, discuss the scope of the review, the general agenda, any documents or records required for review, and the logistics for visiting other locations, as necessary.
- Use the appropriate checklist and the detailed monitoring plan to verify information through review of records, visual inspections, and other methods.
- Provide helpful guidance, technical assistance, or training as appropriate.
- Conduct an exit interview with key recipient staff to discuss initial findings and conclude the site visit.

## Post-Review Activities

Following the review, the CSL and the grant manager will work with the customer service team, as well as the Program Development Chief and Grants Chief, to discuss and finalize any findings and develop final reports.

### *Results Review*

The customer service team is the appropriate group to collectively review monitoring results and provide input on any required follow-up actions, corrective action plans, or technical assistance needs.

- Following the compliance portion of the review, the grant manager may document findings that warrant discussion or significant findings. Significant findings are defined as those that the recipient or reviewer member cannot immediately resolve and must be addressed through a formal corrective action plan. If the grant manager does so, the CSL will convene the customer service team to discuss the findings and potential corrective actions. Additionally, if the team

determines that a finding is relevant to the programmatic portion of the review, the CSL may update the detailed monitoring plan.

- Following the programmatic portion of the review, the CSL will convene the customer service team to review the outcomes of both components of the review. The team will discuss whether or not there are significant findings and determine if technical assistance is needed.
- If under either portion of the review, a corrective action plan is required, the CSL must notify the Program Development Chief and the Grants Chief and request a meeting to discuss the plan. After discussion, the chiefs will notify the Director of Rail Project Development and Delivery that an individual corrective action plan will be developed and any additional information that is deemed pertinent. If the finding is of critical importance, this notification should be immediate. Otherwise, the Director of Rail Project Development and Delivery may simply be copied on the final report.

### *Report Development*

After either portion of the review, the reviewer will finalize the review by documenting findings and other information needed to complete the checklist and/or report.

#### Reviews with No Findings

If the compliance and/or programmatic portions of the review yield no findings then the reviewer will finalize the checklist, including the review summary section. This checklist will then become the final monitoring report for the compliance or programmatic portion of the review, as appropriate. These checklists must be filed in the official grant file and should not be sent to the recipient as an attachment to the monitoring cover letter.

#### Reviews with Findings

If either the compliance or the programmatic review components lead to any findings then the reviewer must create a formal report using the appropriate template (Appendices D and F). In preparing the report, the reviewer must follow the procedures in GMM Chapter 7 and the guidelines below:

- Prepare a draft report within 15 days of the completion of the review.
- Send the draft report to the customer service team providing an opportunity for feedback.
- Finalize the draft report and submit to the appropriate approver, the Grants Chief for the compliance monitoring portion or the Program Development Chief for programmatic monitoring portion, within 30 days of the completion of the full review.
- Incorporate any changes required by the approver and finalize the report within 5 days of receiving such feedback.
- File the final report in working files and forward to the appropriate grant manager (if programmatic) for inclusion in the official grant file.

### *Sending the Report to the Recipient*

The CSL will work with the grant manager to create a monitoring cover letter for the programmatic and compliance review components that briefly describes the review and any findings or best practices. The letter should also include any relevant follow-up requirements and deadlines, including the need for a corrective action plan. Additionally, the letter should be signed by both the CSL and the grant manager and should indicate correct contact information for questions, either overall or by finding if there is more than one. If there are no findings in either the programmatic or the compliance portion of the review, the CSL can state so in the letter and does not need to attach the report. The letter and any reports must be sent to the recipient no later than 45 days after the final day of the programmatic review.

## Follow-Up

If any findings were identified during a monitoring activity, the CSL and grant manager will determine respective roles in working with the recipient, based on the substance of the findings and follow-up requirements. According to these roles, the appropriate reviewer will work with the recipient to develop a corrective action plan for each finding and track resolution progress, as described in the GMM. The CSL and/or grant manager, as appropriate, must perform any additional follow-up actions in consultation as needed with the Program Development Chief as well as the Grants Chief, which may include the following activities:

- Track the required actions and timelines and send reminders, as needed.
- Provide updates on outstanding corrective actions during customer service team meetings and notify the Program Development Chief and the Grants Chief.
- Work with the recipient to ensure completion of required actions.
- Determine if a follow-up visit or review is needed to confirm compliance or completion of corrective actions.
- Arrange for and ensure delivery of any needed technical assistance.

# Updating the Potential Monitoring Population

As new obligations are made and at intervals determined by the Director of Rail Project Development and Delivery, RPD will run the selection methodology on the expanded potential monitoring population and make necessary updates to the selected monitoring population. When these updates are conducted, the CSLs and grant managers will meet to review the revised list, convening the customer service team if needed, and make a recommendation to the Program Development Chief and the Grants Chief who will, in turn, make a joint recommendation to the Director of Rail Project Development and Delivery for final approval of an updated selected monitoring population.

# Quarterly Executive Monitoring Report Development

Approximately 30 days after the end of each fiscal quarter the Program Development Chief and the Grants Chief will provide a collective report with monitoring results to the Director of Rail Project Development and Delivery. This report will, at a minimum, include all projects that have been reviewed

and any significant findings or technical assistance needs that have been identified. The report will also include the status of corrective action plans and technical assistance delivery, as applicable.

Additionally, the Director of Rail Project Development and Delivery will work with the division chiefs to ensure that appropriate analysis of monitoring results is completed and integrated into RPD's post-award management of project delivery.

### Implementation of this Plan

CSLs, grant managers, and other customer service team members, as appropriate, will receive training on the implementation of this plan prior to commencing monitoring duties. Training will include an overview of process, instructions for completing checklists and reports, and a summary of relevant portions of the GMM.

To implement this plan with recipients in the selected monitoring population, prior to commencing monitoring activities, the Program Development Chief and the Grants Chief will jointly send a letter to each recipient selected for scheduled monitoring providing an overview of the interim monitoring plan, its purpose, a list of projects subject to review, and expectations regarding future communications.

## Monitoring Roles and Responsibilities

RPD has primary responsibility for administration and monitoring of the HSIPR program. Following are those responsible for monitoring activities and their respective roles.

| | |
|---|---|
| **Director of Rail Project Development and Delivery** | Responsible for oversight of monitoring activities, monitoring planning, and program development. |
| **Program Development and Strategy Division Chief** | Process owner for programmatic monitoring and approver of the programmatic monitoring portions of reports or completed checklists. |
| **Grants Management Division Chief** | Process owner for compliance monitoring and approver of all the compliance portions of monitoring reports or completed checklists. |
| **Customer Service Leads (CSL)** | RPD Program Development and Strategy Division staff that manage the portfolios of projects and convene the customer service teams that collectively provide input and assessment needed to manage and monitor projects. Under the interim plan, the CSL will conduct the programmatic portions of reviews, coordinate the team to determine monitoring priorities by project, and conduct routine monitoring activities such as routine check-ins and other communication, review of the status of special conditions, etc. |

| | |
|---|---|
| **Customer Service Team** | A group of experts, organized into regional teams, responsible for providing support to the CSL and the recipient throughout the life of the project. Under the interim monitoring plan, this team provides support to CSL and grant manager to plan, execute, and close scheduled monitoring activities. |
| **Technical Experts** | Members of the customer service teams specializing in Environment and Systems Planning, Engineering and Project Development, and Financial and Economic Analysis. These experts will provide input on award progress and special condition status and may conduct on-site reviews, desk reviews, or other activities in coordination with the CSL, should their specific expertise be required. |
| **Grant Managers** | Members of the customer service teams specializing in the management and stewardship of awards. These experts will provide input on award progress and recipient compliance with rules and requirements, conduct the compliance portions of the reviews, and perform routine monitoring activities, such as reviewing reports and requests for reimbursement. |
| **Project Management Oversight Contractors** | RPD contractors that conduct regular communication with recipients; provide assistance as needed; and maintain knowledge of project progress, obstacles, and status at all times. PMOCs will not conduct the scheduled monitoring activities outlined in this plan, however, they will be expected to contribute information to the CSLs and identify findings of concern as they arise that might warrant monitoring or indicate the need for technical assistance. |

## Appendix A: Selected Monitoring Population

Provided under separate cover.

## Appendix B: Pre-Review Checklist

Provided under separate cover.

## Appendix C: Compliance Checklist

Provided under separate cover.

## Appendix D: Compliance Report

Provided under separate cover.

## Appendix E: Programmatic Checklist

Provided under separate cover.

## Appendix F: Programmatic Report

Provided under separate cover.

March 2011
Federal Railroad Administration
Office of Railroad Policy and Development

# FY11 HSIPR Interim Monitoring Plan Appendices

## List of Appendices

# Appendix A: Selected Monitoring Population

## Selected Monitoring Population Summary

| Summary | Total |
|---|---|
| Total Number of States | 15 |
| Total Number of Projects | 22 |
| Corridor Program | 7 |
| Individual - FD/Construction | 12 |
| Individual - PE/NEPA | 1 |
| Planning | 2 |
| Total Federal Funding | $4,969,369,092 |

## Selected Monitoring Population Project List

| State | Project Name | Applicant | Project Type | Region | Funding Amount |
|---|---|---|---|---|---|
| CA | California High-Speed Rail | California High-Speed Rail Authority | Corridor Program | West | $2,466,176,231 |
| CA | Transbay Transit Center Train Box | Transbay Joint Powers Authority | Corridor Program | West | $400,000,000 |
| CA | Cab Car Bicycle Storage (Rolling Stock) | California Department of Transportation | Individual - FD/Construction | West | $8,230,000 |
| CA | Capital Corridor-Track Relocation | California Department of Transportation | Individual - FD/Construction | West | $6,200,000 |
| CA | Capital Corridor: South Terminal Station Improvement | California Department of Transportation | Individual - FD/Construction | West | $18,000,000 |
| DC | Track 4 Union Station Garage Escalator Replacement | DC Department of Transportation | Individual - FD/Construction | Northeast | $4,270,500 |
| IL | Chicago-St. Louis | Illinois Department of Transportation | Corridor Program | Midwest | $1,142,324,000 |
| MD | Baltimore-Washington International Airport Station Improvements | Maryland Department of Transportation | Individual - PE/NEPA | Northeast | $9,400,000 |
| ME | Downeaster Portland North Project | Northern New England Passenger Rail Authority (NNEPRA) | Corridor Program | Northeast | $35,000,000 |
| MI | Chicago to Detroit Corridor: Battle Creek, MI Station | Michigan Department of Transportation | Individual - FD/Construction | Midwest | $3,620,552 |
| MN | Wisconsin Service NEPA | Minnesota Department of Transportation | Planning Project | Midwest | $600,000 |
| NC | Charlotte-Raleigh | North Carolina Department of Transportation | Corridor Program | Southeast | $58,905,390 |
| NC | Congestion Mitigation | North Carolina Department of Transportation | Individual - FD/Construction | Southeast | $26,560,839 |
| NY | Empire Corridor West: Buffalo-Depew Station Improvement | NYSDOT | Individual - FD/Construction | Northeast | $727,400 |
| NY | Empire Corridor South: Albany to Schenectady 2nd Track | NYSDOT | Individual - FD/Construction | Northeast | $91,200,000 |
| OR | Pacific Northwest Corridor: Union Station Roof | Oregon Department of Transportation | Individual - FD/Construction | West | $5,900,000 |

| State | Project Name | Applicant | Project Type | Region | Funding Amount |
|---|---|---|---|---|---|
| PA | Keystone Corridor: Grade Crossings | Pennsylvania Dept of Transportation | Individual - FD/Construction | Northeast | $18,000,000 |
| TX | Crossing Signal Timing, Burlington Northern Santa Fe Fort Worth Sub | Texas Department of Transportation | Individual - FD/Construction | Southeast | $3,754,180 |
| VT | Vermonter New England Central Railroad Route Improvements | Vermont Agency of Transportation | Individual - FD/Construction | Northeast | $50,000,000 |
| VT | NY-VT Bi-State Intercity Passenger Rail Project | Vermont Agency of Transportation | Planning Project | Northeast | $500,000 |
| WA | Portland-Seattle-Vancouver | Washington State Department of Transportation | Corridor Program | West | $590,000,000 |
| WI | Milwaukee-Madison | Wisconsin Department of Transportation | Corridor Program | Midwest | $30,000,000 |

# Appendix B: Pre-Review Checklist

After working together to schedule a monitoring review, CSLs and grant managers should use this checklist to prepare for the review. At minimum, one checklist should be used for each recipient selected for monitoring. Refer to the Grant Management Manual (GMM) Chapter 7 and the FY 2011 Interim Monitoring Plan for additional guidance on monitoring preparation. Enter information for all fields as you prepare for the reviews. The grant manager and CSL may wish to complete this checklist individually for the compliance and programmatic reviews, respectively.

## Award Information

| | |
|---|---|
| **Project Title(s):** | **Award Numbers(s):** |
| **Recipient:** | |
| **Project Type(s):** | |

## Review Information

| | | | | |
|---|---|---|---|---|
| **Customer Service Lead Name:** | | | | |
| **Grant Manager Name:** | | | | |
| **Customer Service Team Name(s):** | | | | |
| **Compliance Review:** | | **Desk Review** | | **Site Visit** |
| | **If Site Visit, Note the Location:** | | | |
| | **Planned Date/Date Complete:** | | | |
| **Comments:** | | | | |
| **Programmatic Review:** | | **Desk Review** | | **Site Visit** |
| | **If Site Visit, Note the Location:** | | | |
| | **Planned Date/Date Complete:** | | | |
| **Comments:** | | | | |

## Pre-Review Activities

To complete the checklist, indicate if each activity has been completed, note the date the activity was completed (where appropriate), and provide any additional information that will support the review in the comments field above.

| Activity | Complete | Date |
|---|---|---|
| **At least one month prior to the compliance review:** | | |
| 1. CSL and grant manager work together to confirm or change the target dates for the compliance and programmatic reviews. | | |

| Activity | Complete | Date |
|---|---|---|
| 2. CSL convenes appropriate members of the Customer Service Team (CST) to develop a detailed monitoring plan:<br>• Discuss issues or concerns related to the project(s) under review.<br>• Identify any review components and questions to be explored in addition to those given in the compliance and programmatic checklists.<br>• Record the detailed monitoring plan questions in the appropriate compliance or programmatic checklist, updating as needed. | | |

**Three weeks prior to the compliance review:**

| | | |
|---|---|---|
| 3. CSL, with input from the grant manager, contacts the recipient to share the timeframe for the compliance and programmatic portions of the review, including specific dates for a site visit (if planned), and a description of the review. | | |

**Two weeks prior to the compliance review:**

| | | |
|---|---|---|
| 4. Grant manager arranges logistics for teleconferences (if applicable). | | |
| 5. Grant manager compiles all materials needed on-hand during the review. | | |
| 6. Grant manager sends the recipient a list of monitoring questions and/or types of documents that are requested prior to the review. | | |

**After completion of the compliance review and prior to the programmatic review:**

| | | |
|---|---|---|
| 7. If any issues were identified during the compliance review, the grant manager will inform the CSL who will convene the CST to discuss these issues. The team can determine if the detailed monitoring plan for the programmatic review should be updated or if a joint compliance/programmatic site visit is warranted. | | |
| 8. CSL and the grant manager discuss any relevant award documentation, including the SOW project budget and recent drawdown history. The discussion should cover the:<br>• Most recent project budget report showing approved original budget; any proposed, planned, and approved budget revisions; and budget projections.<br>• Estimate to Completion (ETC) and Estimated Cost at Completion (EAC), including a physical percent complete. | | |
| 9. CSL develops agendas for the site visit entrance and exit interviews. | | |

**Two weeks prior to the programmatic review:**

| | | |
|---|---|---|
| 10. CSL arranges logistics for the teleconference and/or site visit. | | |
| 11. CSL compiles all materials needed on-hand during the review. | | |
| 12. CSL sends the recipient a list of monitoring questions, required documents, recipient staff that should be available during the review, and planned activities (e.g., locations to be visited). | | |

# Appendix C: Compliance Checklist

| | |
|---|---|
| **Project Title(s):** | **Award Numbers(s):** |
| **Recipient:** | |
| **Project Type(s):** | |
| **Prepared By:** | **Completion Date:** |
| **Additional Reviewers:** | |
| **Comments:** | |

**Instructions**

The grant manager should complete this checklist to assess compliance with the terms of the NGA, the program, and applicable regulations. For additional guidance, refer to the FY 2011 Interim Monitoring Plan and Grant Management Manual Chapter 7. Prior to starting the review, the grant manager should collect the grant file materials and consult the CSL regarding any additional recipient correspondence.

Complete the checklist by responding "Y" or "N" for each question and entering comments as needed to support or expand upon the response. If a question is not applicable, mark the "NA" and provide justification in the comments field. A question may not be applicable because the review component does not apply to the project or because the question is not within the scope of a particular review. Overall comments or notes known prior to the review (e.g., whether the review is being conducted as part of a joint site visit) should be entered in the comments field at the top of this checklist.

| REVIEW COMPONENT | Y/N/NA | COMMENTS |
|---|---|---|
| **1. Award Management** | | |
| ***1a. Status*** | | |
| Are there known issues with this project? | | |
| Will the award end in the next 90 days? | | |
| Has the recipient requested an extension, if applicable? If yes, has a modification been issued? | | |
| Does the recipient appear to be in compliance with all regulations and circulars? | | |
| If an audit (e.g., A-133 or DOT OIG) of the project was performed in the last year, were there any findings? | | |
| Is this the first review for this award? If no, please note the date of the most recent review and list any unresolved findings. | | |

| REVIEW COMPONENT | Y/N/NA | COMMENTS |
|---|---|---|
| ***1b. Grant File Completion*** | | |
| Are the following documents up-to-date and present in the grant file?<br>*For the following section, the reviewer should identify any missing documents and request copies from the recipient.* | | |
| FRA application and SF-424 | | |
| Signed Assurances | | |
| Signed NGA including SOW and amendments (if applicable) | | |
| Approved detailed budget | | |
| Documents to release special conditions (e.g., project management plan, financial plan) | | |
| Additional deliverables (if applicable) | | |
| Quarterly programmatic and financial progress reports from the previous four quarters (if available) | | |
| Grant modifications and supporting documentation | | |
| Significant correspondence with the recipient | | |
| Applicable funding certifications | | |
| SF-425 reports from the previous four fiscal quarters (if available) | | |
| Recipient payment requests and associated documentation from the previous four quarters (if available) | | |
| Any other supporting award documentation | | |
| Were any progress reports, financial reports, or other required documentation submitted late? If yes, has the recipient resolved the issue? | | |
| **2. Project Execution** | | |
| ***2a. Budget and Expenditures / Drawdowns*** | | |
| Have there been any changes to the budget? | | |
| Have any of the changes exceeded the 10% margin of budget? If so, have the changes been approved? | | |
| Do there appear to be any deviations from the budget or modifications not in the file? | | |
| Compare drawdowns versus federal outlays on the SF-425. Is there excess cash? | | |

| REVIEW COMPONENT | Y/N/NA | COMMENTS |
|---|---|---|
| Is drawdown activity consistent with the budget? | | |
| When comparing all payment requests, do any appear inconsistent (specifically equipment procurement)? | | |
| Does the recipient demonstrate proper and accurate financial reporting? | | |
| ***2b. Scope and Schedule*** | | |
| Is the work on-schedule? | | |
| If special conditions apply, does the SOW summary sheet accurately reflect the status of deliverables? If any are late, is the recipient resolving the issue? | | |
| Have any changes been made to the SOW in the NGA? If so, explain why and summarize the actual or projected impacts. | | |
| Do there appear to be any unanticipated barriers to implementation? | | |
| **3. Training and Technical Assistance** | | |
| Based on this review, do you recommend training or technical assistance? Note if it should be provided via phone or on-site? | | |
| **4. Promising Practices** | | |
| Are there practices that would be helpful to other recipients? | | |

| REVIEW COMPONENT | Y/N/NA | COMMENTS |
|---|---|---|
| **5. American Reinvestment and Recovery Act Questions (if applicable)** | | |
| Has the recipient complied with the reporting requirements under Section 1512 of the Recovery Act, to date? | | |
| Has the recipient complied with the Recovery Act 1201 reporting requirement? Is the Section 1201 certification on file at DOT? | | |
| Is the Section 1511 re-certification on file at DOT? | | |
| Are any Buy American (Section 1605) waivers on file at FRA? | | |

**Certification**

____ There were no findings noted during this review. See compliance review summary for details.

____ There were findings noted during this review. See the separate report for a description of the review, a list of all findings, and details about RPD follow-up or the need for a corrective action plan.

I have conducted this review in accordance with RPD standard procedures, using the appropriate monitoring checklists, for the purpose of forming an opinion on the general administration and execution of the award.

_____

Reviewer Signature Date

## Compliance Review Summary

**Instructions**

If no findings were identified, summarize the review in this section.

1. **Describe the purpose of the review.**
   - Briefly explain why the monitoring review was conducted. If simply part of the monitoring schedule, then state so.
     - Was the review scheduled to follow up on specific issues or concerns? If so, describe the issues or concerns identified.

2. **Explain the review process.**
   - Describe if the review was conducted as a joint site visit with a programmatic review.
   - List the names and roles of the RPD staff who participated in the review.
   - List the names and roles of the recipient representatives who participated in the review, if any.

3. **Describe key review outcomes and observations.**

4. **Identify concerns and issues that should be discussed with the customer service team and should be reviewed on-site.**

# Appendix D: Compliance Report

| | |
|---|---|
| **Project Title(s):** | **Award Numbers(s):** |
| **Recipient:** | |
| **Project Type(s):** | |
| **Prepared By:** | **Completion Date:** |
| **Additional Reviewers:** | |

**Instructions**

This report should be completed if any findings were identified during the compliance review.

**I. Summary**

**A. Purpose**

- Briefly explain why the monitoring review was conducted. If simply a part of the monitoring schedule, then state so.
    - Was the review scheduled to follow up on specific issues or concerns? If so, describe the issues or concerns.

**B. Review Process**

- Describe if the review was conducted as a joint site visit with a programmatic review.
- List the names and roles of the RPD staff who participated in the review.
- List the names, roles, and organizations of the recipient representatives who participated in the review, if any.

**II. Award Management**

- Based on your review of the award management elements described in the monitoring checklist, provide your comments or findings.

**III. Project Execution**

- Based on your review of the project execution elements described in the grant manager checklist, provide your comments or findings.

**IV. American Recovery and Reinvestment Act (ARRA) Requirements** (If this section is not applicable, then delete.)

- Based on your review of the ARRA requirements described in the monitoring checklist, provide your comments or findings.

**V. Promising Practices** (If this section is not applicable, then delete.)

- Describe any innovative processes, procedures, or activities that could be considered as successful models for others to follow.

**VI. Issue Follow-up**

- Identify significant findings that require follow-up by RPD or corrective action by the recipient and describe the recommended resolution or corrective action for each issue. Also include general findings or issues observed during the review.
- Note if and when follow-up correspondence has been, or will be, sent to the recipient about any issues.

**VII. Training and Technical Assistance**

- Describe any training or technical assistance needs identified during or prior to the review, along with the actions you and/or other RPD staff plan to take to meet these needs. Also include any training or technical assistance that has already been provided.
- Note if and when follow-up correspondence has been, or will be, sent to the recipient about these needs.

**Certification**

I have conducted this review in accordance with RPD standard procedures using the appropriate monitoring checklists for the purpose of forming an opinion on the general administration and execution of the award.

_____

Reviewer Signature Date

# Appendix E: Programmatic Checklist

| | |
|---|---|
| **Project Title(s):** | **Award Numbers(s):** |
| **Recipient:** | |
| **Project Type(s):** | |
| **Prepared By:** | **Completion Date:** |
| **Additional Reviewers:** | |
| **Review Location(s):** | |
| **Comments:** | |

**Instructions**

The Customer Service Lead should use this checklist to assess award progress and performance as a part of programmatic monitoring. For additional guidance, refer to the FY 2011 Interim Monitoring Plan and Grant Management Manual Chapter 7.

Complete the checklist by responding "Y" or "N" for each question and entering comments as needed to support or expand on the response. If a question is not applicable, mark "NA" and provide justification in the comments field. A question may not be applicable because the review component does not apply to the project or because the question is not within the scope of this particular review (e.g., conducting a programmatic review from FRA headquarters). Overall comments or notes known prior to the review should be entered in the comments field at the top of this checklist.

| REVIEW COMPONENT | Y/N/NA | COMMENTS |
|---|---|---|
| **1. Financial Assessment** | | |
| ***1a. Budgeting & Expenditures*** | | |
| Identify if there been any changes to the most recently approved project budget? | | |
| If so, have any of the changes exceeded a 10% margin of the budget? If so, have the changes been approved? | | |
| Are there pending or planned budget revisions? If so, describe them. | | |
| Are costs being committed and incurred at the anticipated pace? | | |
| Have project changes/contingencies been properly planned for in the budget? | | |
| ***1b. Financial Management*** | | |
| Have there been changes in the funding sources for the project? If yes, have these changes been accounted for in the financial management plan? | | |
| Does the recipient properly manage and monitor expenditures and budget? | | |

| REVIEW COMPONENT | Y/N/NA | COMMENTS |
|---|---|---|
| **2. Compliance Assessment** | | |
| ***2a. Administrative*** | | |
| Are project records properly maintained and are they current? Conduct a review of files (optional). | | |
| Are meetings with contractors held periodically and documented in minutes or logs? | | |
| Are files documenting costs and other project details (e.g., contractor invoices, certified payroll reports, time sheets, notice of defect, RFIs, submittals) maintained in an orderly fashion? | | |
| Are materials observed on-site in compliance and consistent with Buy American? | | |
| ***2b. American Recovery and Reinvestment Act (ARRA) ( if applicable)*** | | |
| Is the method or process for collecting ARRA data centralized, organized, and consistent? | | |
| Does documentation support reported ARRA data? Specifically, look for evidence on-site to support the reported number of jobs created/retained. | | |
| ***2c. Project Controls*** | | |
| Have contracts been procured according to award requirements? | | |
| Is the necessary oversight structure in place to monitor contractors? | | |
| Are metrics in place to monitor contractor performance? If yes, what are these metrics? | | |
| Are the project schedule and budget being monitored adequately? How are these monitored? | | |
| Are materials and equipment observed on-site properly accounted for in records? | | |
| Has a Risk Register been created for the project? If no, how are risks accounted for and addressed? | | |
| ***2d. Safety and Security*** | | |
| Do the recipient and contractors maintain compliance with Occupational Health and Safety Administration (OSHA) requirements and other regulations? | | |
| Have reports for safety and security been produced on a regular basis? | | |
| Have any issues been identified in these reports? If so, what were these issues and what remedies are proposed or in place? | | |
| Were any obvious dangers observed during the site visit? | | |

| REVIEW COMPONENT | Y/N/NA | COMMENTS |
|---|---|---|
| **3. Project Delivery** | | |
| ***3a. SOW Review for Scope and Schedule*** | | |
| Are the activities within the scope described in the NGA SOW? | | |
| Have there been changes to the scope? Have those changes been properly accounted for? | | |
| Have milestones been achieved in accordance with the project schedule (those that can be verified) in the NGA SOW? | | |
| Are there any project changes pending approval? | | |
| ***3b. Deliverables and Work Products*** | | |
| Are there any concerns with recent or upcoming deliverables? | | |
| Are there any concerns about the capacity of the recipient to continue to deliver quality deliverables within the approved schedule? | | |
| ***3c. QA/QC*** | | |
| Are proper QA/QC methods in place? | | |
| ***3d. Construction Management*** | | |
| Have major materials and equipment been delivered? If yes, list these. | | |
| Can materials and equipment observed on-site be tied to invoices? | | |
| Are there any concerns about materials storage or construction staging observed while on-site? | | |
| Is staffing adequate and timely (e.g., oversight personnel, designers, and contractors)? | | |
| ***3e. Environmental*** | | |
| Have any environmental issues or concerns been identified? If so, what are these? | | |
| Are planned mitigation measures being implemented and are they effective? | | |
| Are there any new or unexpected issues since the NEPA process was completed? | | |
| Were any obvious environmental concerns observed on-site (open chemicals, improper dumping, etc.)? | | |
| **4. Training and Technical Assistance** | | |
| Does the recipient require additional training or technical assistance? | | |
| Are there specific resources or technical skills that would be helpful to the recipient in better executing the project? | | |

| REVIEW COMPONENT | Y/N/NA | COMMENTS |
|---|---|---|
| **5. Promising Practices** | | |
| Are there observable project practices that would be helpful to other recipients? | | |

**Certification**

____ There were no findings noted during this review. See programmatic review summary for details.

____ There were findings noted during this review. See the separate report for a description of the review, a list of all findings, and details about RPD follow-up or the need for a corrective action plan.

I have conducted this review in accordance with RPD standard procedures, using the appropriate monitoring checklists, for the purpose of forming an opinion on the general administration and execution of the award as well as overall project performance.

_____

Reviewer Signature Date

## Programmatic Review Summary

**Instructions**

If no findings were identified, summarize the review in this section.

1. **Describe the purpose of the review.**
   - Briefly explain why the monitoring review was conducted. If simply a part of the monitoring schedule, then state so.
     - Was the review scheduled to follow up on specific issues or concerns? If so, describe the issues or concerns identified.

2. **Explain the review process.**
   - Describe if the review was conducted as a joint site visit with a compliance review.
   - List the names and roles of the RPD staff who participated in the review.
   - List the names, roles, and organizations of the recipient representatives who participated in the review.

3. **Describe key review outcomes and observations.**

4. **Identify concerns and issues that should be discussed with the customer service team.**

# Appendix F: Programmatic Report

| Project Title(s): | Award Numbers(s): |
|---|---|
| **Recipient:** | |
| **Project Type(s):** | |
| **Prepared By:** | **Completion Date:** |
| **Additional Reviewers:** | |

**Instructions**

This report should be completed if any findings were identified during the programmatic review.

## I. Summary

### A. Purpose

- Briefly explain why the monitoring review was conducted. If a part of monitoring schedule, state so.
  - Was the review scheduled to follow up on specific issues or concerns? If so, describe the issues or concerns identified.

### B. Process

- Describe if the review was conducted as a joint site visit with a compliance review.
- List the names and roles of the RPD staff who participated in the review.
- List the names, roles, and organizations of the recipient representatives who participated in the review.
- Describe where the review was conducted (e.g., project site, recipient administrative site, conference or other event) and list the locations visited.

## II. Financial Review

- Based on your review of the financial elements described in the programmatic checklist, provide your comments and/or findings. This may include budget variances due to changes in project scope/schedule or incomplete financial documentation.

## III. Compliance Review

- Provide your comments and/or findings based on the compliance review elements listed in the programmatic checklist.
  - Did the recipient raise any concerns that may impact successful completion of the project?
  - Does the recipient comply with the policies and procedures defined in approved project management documents (e.g., Project Management Plan, Financial Management Plan Safety, and Security Plan)?

## IV. Project Delivery

- Provide your comments and/or findings based on the project delivery elements listed in the programmatic checklist. At a minimum, address the following questions:
  - Is performance to-date in line with the NGA SOW scope and schedule?
    - Did you observe any deviations from the NGA SOW?
    - Does the project appear to be on-track to achieve project milestones and deadlines according to schedule in the NGA SOW?
  - Does the recipient provide sufficient quality control and oversight?
  - Are equipment and materials purchased for the project being used effectively and appropriately?

## V. Promising Practices (If this section is not applicable, then delete.)

- Describe any innovative processes, procedures, or activities that could be considered as successful models for others to follow.

## VI. Issue Follow-up

- Identify significant findings that require follow-up by RPD or corrective action by the recipient and describe the recommended resolution or corrective action for each issue. Also include general findings or issues observed during the review.
- Note if and when follow-up correspondence has been, or will be, sent to the recipient about any issues.

## VII. Training and Technical Assistance

- Describe any training or technical assistance needs identified during or prior to the review, along with the actions you and/or other RPD staff plan to take to meet these needs. Also include any training or technical assistance that has already been provided.
- Note if and when follow-up correspondence has been, or will be, sent to the recipient about these needs.

## Certification

I have conducted this review in accordance with RPD standard procedures using the appropriate monitoring checklists for the purpose of forming an opinion on the general administration and execution of the award as well as overall project performance.

_____

Reviewer Signature Date

# High Speed Intercity Passenger Rail (HSIPR) Program Award Status

| Project | | | Source | Funding Status ($M) | | Project Status | Award Prerequisites "C" = Complete "IP" = In Progress "-" = Not Applicable | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | Project Name | "PP" = Planning Project "IP" = Individual Project "SCP" = Small Corridor Program "LCP" = Large Corridor Program† | Funding Source | Estimated Total Funding Amount* | Final Obligated Funding Amount | "O & A" = Obligated and Announced "NFO" = Nearing Final Obligation "R" = Remaining | Scope/Schedule/ Budget | Financial Plan | Project Mgmt Plan | Railroad Agreement | Other Agreements | Engineering Materials | Environmental Determination |
| **California High Speed Rail** | | | | | | | | | | | | | |
| CA | CA High-Speed Rail ** | LCP | ARRA | $2,866 | $2,866 | | | | | | | | |
| | Phase 1 HSR Program - PE/NEPA/CEQAs | LCP | ARRA | $194 | $232 | O & A | C | C | C | - | - | - | IP |
| | TTC Rail-Level Train Box | LCP | ARRA | $400 | $400 | O & A | C | C | C | - | C | C | IP |
| | Phase 1 HSR - Design/Build | LCP | ARRA | $2,272 | $2,235 | O & A | C | C | C | - | - | C | IP |
| CA | Central Valley HSR: Fresno-Bakersfield or Merced Fresno | LCP | FY10 | $715 | $0 | R | IP | IP | IP | - | - | IP | IP |
| CA | San Francisco-San Jose HSR | LCP | FY10 | $16 | $0 | R | IP | IP | IP | IP | - | IP | IP |
| **California - Multiple Corridors** | | | | | | | | | | | | | |
| CA | Cab Car Bicycle Storage (Rolling Stock) | IP | ARRA | $8 | $8 | O & A | C | C | C | - | - | C | C |
| CA | Locomotive Emissions Upgrade (Rolling Stock) | IP | ARRA | $13 | $13 | O & A | C | C | C | - | - | IP | IP |
| CA | Statewide Rolling Stock Acquisition | LCP | FY10 | $100 | $0 | NFO | IP | IP | IP | - | - | - | IP |
| **California - Capitol Corridor** | | | | | | | | | | | | | |
| CA | Capitol Corridor: Yolo West Crossover | IP | ARRA | $5 | $0 | NFO | IP | IP | IP | IP | - | IP | IP |
| CA | Capitol Corridor: South Terminal Station Improvement | IP | ARRA | $19 | $18 | O & A | C | C | C | C | - | C | IP |
| CA | Capitol Corridor: Track Relocation | IP | FY09 | $6 | $6 | O & A | C | C | C | C | C | C | C |
| **California - Pacific Surfliner Corridor** | | | | | | | | | | | | | |
| CA | Pacific Surfliner Corridor: MOW Spurs | IP | ARRA | $2 | $0 | NFO | IP | IP | IP | IP | - | IP | IP |
| CA | Pacific Surfliner Corridor: Oceanside Stub Project | IP | ARRA | $3 | $0 | R | IP | IP | IP | IP | - | IP | IP |
| CA | Pacific Surfliner Corridor: Railroad Crossover Program | IP | ARRA | $8 | $0 | NFO | IP | IP | IP | IP | - | IP | IP |
| CA | Los Angeles to Fullerton Triple Track | IP | ARRA | $35 | $0 | NFO | IP | IP | IP | IP | - | IP | IP |
| CA | Pacific Surfliner Corridor: Ortega PE/NEPA | IP | ARRA | $1 | $1 | O & A | IP | IP | IP | - | - | - | - |
| CA | Moorpark-San Onofre Signal and Communications System Improvements | IP | FY09 | $14 | $0 | R | IP | IP | IP | IP | - | IP | IP |
| CA | San Onofre-San Diego PTC Implementation | IP | FY09 | $25 | $0 | R | IP | IP | IP | IP | - | IP | IP |
| CA | Pacific Surfliner: PE/NEPA for Double Track | IP | FY10 | $0.4 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | Raymer-Bernson: PE/NEPA for Double Track, Grade Crossings, New Bridges, New Platform | IP | FY10 | $2 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | Oceanside: PE/NEPA for Bridge Replacement with Double Track | IP | FY10 | $4 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | San Diego: PE/NEPA for Double Track | IP | FY10 | $10 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | Pacific Surfliner: PE/NEPA for Double Track, Curve Realignments | IP | FY10 | $4 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | Van Nuys Boulevard: PE/NEPA for Bridge Widening, New Platform, System Improvements | IP | FY10 | $1 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | Del Mar: PE/NEPA for Second Track, Bridge, Signal Improvements | IP | FY10 | $7 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | Seacliff: PE/NEPA for Track Realignment, Siding Extension | IP | FY10 | $1 | $0 | R | IP | IP | IP | - | - | - | - |
| **California - Additional ARRA Redistributed Funding** | | | | | | | | | | | | | |
| CA | Additional ARRA funding from redistribution for California's orginal ARRA funded individual projects (IP) identified above. | | ARRA | $8 | $0 | R | - | - | - | - | - | - | - |

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** The Estimated Total Funding Amounts for these projects include additional ARRA funds that have been redistributed.

## High Speed Intercity Passenger Rail (HSIPR) Program Award Status

| Project | | | Source | Funding Status ($M) | | Project Status | Award Prerequisites "C" = Complete "IP" = In Progress "-" = Not Applicable | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | Project Name | "PP" = Planning Project "IP" = Individual Project "SCP" = Small Corridor Program "LCP" = Large Corridor Program† | Funding Source | Estimated Total Funding Amount* | Final Obligated Funding Amount | "O & A" = Obligated and Announced "NFO" = Nearing Final Obligation "R" = Remaining | Scope/Schedule/ Budget | Financial Plan | Project Mgmt Plan | Railroad Agreement | Other Agreements | Engineering Materials | Environmental Determination |
| **Charlotte - Raleigh - Richmond** | | | | | | | | | | | | | |
| NC | Charlotte - Raleigh | LCP | ARRA | $520 | $520 | | | | | | | | |
| | Equipment Procurement and Rehabilitation | LCP | ARRA | $20 | $20 | O & A | C | C | C | - | - | C | C |
| | Stations and Facilities Phase One | LCP | ARRA | $17 | $17 | O & A | C | C | C | C | C | C | C |
| | Charlotte to Raleigh: Program Development and Preliminary Engineering | LCP | ARRA | $22 | $22 | O & A | IP | C | C | - | - | C | IP |
| | Charlotte to Raleigh: Piedmont Corridor Construction Program | LCP | ARRA | $461 | $461 | O & A | C | C | C | IP | - | C | C |
| NC | Congestion Mitigation ** | IP | ARRA | $27 | $0 | NFO | IP | IP | IP | IP | IP | IP | IP |
| NC | Piedmont Corridor, Phase I: Charlotte Station and Grade Separation Program | LCP | FY10 | $22 | $0 | NFO | IP | IP | IP | - | - | IP | IP |
| VA | Arkendale to Powell's Creek Third Track | IP | ARRA | $75 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| VA | Richmond-DC: PE/NEPA Completion | IP | FY10 | $44 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| VA | Appomattox River: PE/NEPA for New Bridge Signaling | IP | FY10 | $1 | $0 | R | IP | IP | IP | IP | IP | IP | - |
| DC | Long Bridge Preliminary Engineering-NEPA Study | IP | ARRA | $3 | $0 | R | IP | IP | IP | IP | IP | - | - |
| **Chicago - Detroit** | | | | | | | | | | | | | |
| IL | Englewood Flyover | IP | ARRA | $133 | $0 | NFO | C | C | C | IP | IP | C | IP |
| IN | Indiana Gateway Corridor ** | IP | ARRA | $71 | $0 | R | IP | IP | IP | IP | - | IP | IP |
| MI | Chicago to Detroit Corridor: Battle Creek, MI Station | IP | ARRA | $4 | $4 | O & A | C | C | C | - | C | C | IP |
| MI | Chicago to Detroit Corridor: Troy, MI Station | IP | ARRA | $8 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| MI | Chicago to Detroit Corridor: Dearborn, MI Station | IP | ARRA | $28 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| MI | West Detroit Rail Improvements | IP | FY09 | $8 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| MI | Kalamazoo-Dearborn Corridor Development | LCP | FY10 | $150 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| **Chicago - Milwaukee - Madison - Twin Cities** | | | | | | | | | | | | | |
| IL | Wadsworth Bridge Replacement | IP | FY09 | $4 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| MN | Union Depot Multi-Modal Transit Hub | IP | FY10 | $40 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| WI | Wisconsin | LCP | ARRA | $30 | $30 | O & A | C | C | C | C | C | C | IP |
| WI | Chicago to Milwaukee Corridor: Milwaukee Station Platform | IP | ARRA | $1 | $0 | NFO | IP | IP | IP | IP | - | IP | IP |
| WI | Chicago to Milwaukee Corridor: Truesdell Crossovers | IP | ARRA | $11 | $0 | NFO | IP | IP | IP | IP | - | IP | IP |
| WI | Additional ARRA funding from redistribution for Wisconsin's orignal ARRA funded individual projects (IP) identified above. | | ARRA | $2 | $0 | R | - | - | - | - | - | - | - |
| **Chicago - Iowa City - Des Moines - Omaha** | | | | | | | | | | | | | |
| IA | Chicago-Iowa City New Corridor Service | LCP | FY10 | $230 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| **Chicago - St. Louis** | | | | | | | | | | | | | |
| IL | Chicago - St. Louis ** | LCP | ARRA | $1,142 | $1,142 | | | | | | | | |
| | 2010 Early Construction Projects | LCP | ARRA | $100 | $100 | O & A | C | C | C | C | - | C | IP |
| | Chicago to St. Louis: Remaining Program Work | LCP | ARRA | $1,042 | $1,042 | O & A | IP | IP | IP | IP | IP | IP | IP |

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## High Speed Intercity Passenger Rail (HSIPR) Program Award Status

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| **Cleveland - Cincinnati** | | | | | | | | | | | | | |
| OH | Cleveland - Cincinnati | LCP | ARRA | $15 | $15 | O & A | C | C | C | - | - | - | IP |
| **Kansas City - St. Louis** | | | | | | | | | | | | | |
| MO | Kansas City to St Louis Corridor: Missouri Rail Crossing Safety Improvements | IP | ARRA | $2 | $2 | O & A | C | - | - | - | - | - | IP |
| MO | Kansas City to St Louis Corridor: Webster Universal Crossover | IP | ARRA | $3 | $0 | R | IP | - | - | IP | IP | IP | IP |
| MO | Kansas City to St Louis Corridor: Rail Bridge over Osage River | IP | ARRA | $21 | $0 | NFO | C | - | - | IP | - | C | IP |
| MO | Kansas City to St Louis Corridor: Hermann Universal Crossover | IP | ARRA | $1 | $0 | NFO | C | - | IP | - | - | - | - |
| MO | Kansas City to St Louis Corridor: Bonnots Mill Universal Crossover | IP | ARRA | $1 | $0 | NFO | IP | - | - | - | - | - | - |
| MO | Kansas City to St Louis Corridor: Knob Noster Passing Siding Extension | IP | ARRA | $1 | $0 | NFO | C | IP | - | - | - | - | - |
| MO | Kansas City to St Louis Corridor: Strasburg Grade Separation | IP | ARRA | $1 | $0 | NFO | C | IP | - | - | - | - | - |
| MO | Kansas City to St Louis Corridor: Kingsville Passing Siding | IP | ARRA | $1 | $0 | NFO | IP | - | - | - | - | - | - |
| MO | Kansas City to St Louis Corridor: Double Track Lee's Summit to Pleasant Hill | IP | ARRA | $1 | $1 | O & A | C | - | - | - | - | - | - |
| MO | Additional ARRA funding from redistribution for Missouri's orginal ARRA funded individual projects (IP) identified above. | | ARRA | $2 | $0 | R | - | - | - | - | - | - | - |
| MO | St. Louis Third Main Track Construction | IP | FY10 | $4 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| **Northeast Corridor** | | | | | | | | | | | | | |
| DE | Northeast Corridor Third Track Installment | IP | FY10 | $13 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| NJ | Portal Bridge | IP | ARRA | $39 | $39 | O & A | IP | - | IP | - | IP | IP | IP |
| MA | Boston South Station Expansion Project | IP | FY10 | $33 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| MD | Baltimore-Washington International Airport Station Improvements | IP | ARRA | $9 | $9 | O & A | C | - | - | - | - | - | - |
| MD | B&P Tunnel | IP | ARRA | $60 | $60 | O & A | IP | - | - | - | IP | - | - |
| RI | Kingston Capacity and Track Improvements | IP | ARRA | $1 | $0 | R | IP | - | - | - | IP | - | IP |
| DC | Union Station Access Improvements | IP | FY09 | $4 | $4 | O & A | C | C | C | - | C | C | C |
| **New Haven - Springfield - St. Albans** | | | | | | | | | | | | | |
| CT | New Haven to Hartford to Springfield Corridor | IP | ARRA | $40 | $40 | O & A | IP | IP | IP | IP | IP | IP | IP |
| CT | New Haven-Springfield | LCP | FY10 | $121 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| VT | Vermonter New England Central Railroad Route Improvements | IP | ARRA | $50 | $50 | O & A | C | C | C | C | - | C | IP |
| VT | Additional ARRA funding from redistribution for Vermont's orginal ARRA funded individual project (IP) identified above. | | ARRA | $3 | $0 | R | - | - | - | - | - | - | - |
| MA | Knowledge Corridor - Restore Vermonter ** | SCP | ARRA | $73 | $0 | NFO | IP | IP | IP | IP | - | IP | IP |

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## High Speed Intercity Passenger Rail (HSIPR) Program Award Status

| Project | | | Source | Funding Status ($M) | | Project Status | Award Prerequisites "C" = Complete "IP" = In Progress "-" = Not Applicable | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | Project Name | "PP" = Planning Project "IP" = Individual Project "SCP" = Small Corridor Program "LCP" = Large Corridor Program† | Funding Source | Estimated Total Funding Amount* | Final Obligated Funding Amount | "O & A" = Obligated and Announced "NFO" = Nearing Final Obligation "R" = Remaining | Scope/Schedule/ Budget | Financial Plan | Project Mgmt Plan | Railroad Agreement | Other Agreements | Engineering Materials | Environmental Determination |
| **New York - Albany - Buffalo** | | | | | | | | | | | | | |
| NY | Empire Corridor West: Buffalo-Depew Station Improvement | IP | ARRA | $1 | $1 | O & A | C | C | C | - | - | C | C |
| NY | Empire Corridor West: Rochester Station Improvement | IP | ARRA | $1 | $2 | O & A | C | IP | IP | - | - | IP | IP |
| NY | Empire Corridor South: Grade Crossing Improvements - CSXT Milepost 75 to 143 | IP | ARRA | $2 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| NY | Empire Corridor West - Phase 1 3rd Track Mileposts 382-393 | IP | ARRA | $55 | $0 | R | IP | IP | IP | IP | - | IP | IP |
| NY | Empire Corridor South: Albany to Schenectady 2nd Track | IP | ARRA | $87 | $0 | NFO | IP | IP | IP | IP | IP | IP | IP |
| NY | Adirondack Corridor: Ballston Spa Capacity Improvements | IP | ARRA | $3 | $3 | O & A | IP | IP | IP | IP | - | IP | IP |
| NY | Additional ARRA funding from redistribution for New York's orignal ARRA funded individual projects (IP) identified above. | | ARRA | $7 | $0 | R | - | - | - | - | - | - | - |
| NY | Livingston Avenue: PE/NEPA for Bridge Replacement | IP | FY10 | $2 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| NY | Syracuse Track Construction and Signal Improvements | IP | FY10 | $19 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| NY | Hudson Subdivision Signal Reliability | IP | FY10 | $8 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| **Philadelphia - Harrisburg** | | | | | | | | | | | | | |
| PA | Keystone Corridor: Grade Crossings | IP | ARRA | $18 | $0 | NFO | IP | IP | IP | - | - | IP | IP |
| PA | Keystone Corridor: Automatic Block Signaling/Central Control | IP | ARRA | $1 | $0 | R | IP | IP | IP | - | - | - | - |
| PA | Keystone Corridor: Interlocking Design | IP | ARRA | $6 | $0 | R | IP | IP | - | - | - | - | - |
| **Portland (ME) - Brunswick** | | | | | | | | | | | | | |
| ME | Downeaster Portland North Project | SCP | ARRA | $35 | $35 | O & A | C | C | C | C | - | C | C |
| ME | Additional ARRA funding from redistribution for Maine's orignal ARRA funded Small Corridor Project (SCP) identified above. | | ARRA | $3 | $0 | R | - | - | - | - | - | - | - |
| **Portland (OR) - Seattle - Vancouver (BC)** | | | | | | | | | | | | | |
| WA | Portland - Seattle - Vancouver | LCP | ARRA | $752 | $735 | | | | | | | | |
| | Portland - Seattle - Vancouver | LCP | ARRA | $590 | $590 | O & A | IP | IP | IP | IP | - | - | IP |
| | Portland - Seattle - Vancouver - ARRA Redistributed | | ARRA | $162 | $145 | O & A | C | - | - | - | - | - | IP |
| WA | Mount Vernon Siding Extension | IP | FY09 | $3 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| WA | Tukwila Station Construction | IP | FY09 | $9 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| WA | King Street Station Rehabilitation | IP | FY10 | $18 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| OR | Pacific Northwest Corridor: Union Station Roof | IP | ARRA | $6 | $6 | O & A | IP | IP | IP | - | IP | IP | IP |
| OR | Pacific Northwest Corridor: Willbridge | IP | ARRA | $0.4 | $0 | R | IP | IP | - | IP | - | IP | - |
| OR | Pacific Northwest Corridor: North Portland Jcts | IP | ARRA | $1 | $0 | R | IP | IP | - | IP | IP | IP | IP |
| OR | Additional ARRA funding from redistribution for Oregon's orignal ARRA funded individual projects (IP) identified above. | | ARRA | $2 | $0 | R | - | - | - | - | - | - | - |
| OR | Union Station: Structural Improvements, Track Improvements | IP | FY10 | $4 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| **Tampa - Orlando** | | | | | | | | | | | | | |
| FL | Tampa - Orlando HSR ** | LCP | ARRA | $1,592 | $67 | | | | | | | | |
| | Program Management and Preliminary Engineering | LCP | ARRA | $67 | $67 | O & A | C | C | C | - | - | - | IP |
| | Tampa to Orlando High-Speed Rail Express | LCP | ARRA | $1,526 | $0 | R | C | C | C | C | C | C | IP |
| FL | Tampa - Orlando HSR | LCP | FY10 | $800 | $0 | R | IP | IP | IP | IP | IP | IP | C |

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| **Other - Individual Projects** | | | | | | | | | | | | | |
| IA | Ottumwa Sub Crossover Improvements ** | IP | ARRA | $17 | $0 | R | IP | IP | IP | IP | - | IP | IP |
| KS | Lawrence: PE and FD for Station Improvements | IP | FY10 | $0.1 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| OK | Oklahoma City Depot Control Signaling and Power Switch Installment | IP | FY10 | $2 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| TX | Crossing Signal Timing, Burlington Northern Santa Fe Fort Worth Sub | IP | ARRA | $4 | $0 | NFO | IP | IP | IP | IP | - | IP | IP |
| TX | Valley View Double Track Project IV | IP | FY09 | $7 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| **Other - Corridor Planning Projects** | | | | | | | | | | | | | |
| AL | New Passenger Rail Service in Alabama | PP | FY09 | $0.2 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | Pacific Surfliner Corridor: Strategic Assessment | PP | FY09 | $0.2 | $0.2 | O & A | C | C | C | - | - | - | - |
| CA | Coast Daylight Corridor SDP and Environmental Documents | PP | FY10 | $0.3 | $0 | R | IP | IP | IP | - | - | IP | - |
| CA | Los Angeles-San Luis Obispo Corridor Plan | PP | FY10 | $1 | $0 | R | IP | IP | IP | - | - | - | - |
| CA | Bakersfield-Oakland-Sacramento (San Joaquin) Corridor Plan | PP | FY10 | $0.3 | $0 | R | IP | IP | IP | - | - | - | - |
| CO | Denver Interregional Connectivity Study | PP | FY09 | $1 | $0 | NFO | IP | IP | IP | - | - | - | - |
| DE | Delaware Intercity Rail Connection | PP | FY09 | $0.5 | $0.5 | O & A | C | IP | - | - | - | - | - |
| FL | Orlando-Miami Corridor Plan | PP | FY10 | $8 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| GA | Atlanta to Birmingham Feasibility Study | PP | FY09 | $0.3 | $0.3 | O & A | C | C | C | - | C | - | - |
| GA | Interstate Rail Passenger Network Compact | PP | FY09 | $0.3 | $0.3 | O & A | C | C | C | - | C | - | - |
| GA | Macon to Jacksonville Feasibility Study | PP | FY09 | $0.3 | $0.3 | O & A | C | C | C | - | - | - | - |
| GA | Charlotte-Atlanta Corridor Plan | PP | FY10 | $4 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| IA | Chicago to Omaha Passenger Rail Planning | PP | FY09 | $1 | $0 | R | IP | IP | IP | - | IP | - | - |
| IL | Chicago to St. Louis Double Track NEPA | PP | FY09 | $1 | $1 | O & A | C | C | C | - | - | - | - |
| KS | Kansas Service Development Plan (SDP) | PP | FY09 | $0.3 | $0.3 | O & A | C | C | C | - | C | - | - |
| ME | Boston-Portland Corridor Plan | PP | FY10 | $1 | $1 | O & A | IP | IP | IP | - | - | - | IP |
| MI | Chicago-Detroit HSR Corridor Plan | PP | FY10 | $3 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| MN | Wisconsin Service NEPA | PP | FY09 | $1 | $0 | NFO | IP | IP | C | - | IP | - | - |
| NH | Boston-Concord Corridor Plan | PP | FY10 | $2 | $0 | R | IP | IP | IP | IP | IP | - | IP |
| NY | Empire Corridor Planning | PP | FY09 | $1 | $1 | O & A | C | C | C | - | - | - | - |
| OK | Tulsa-Oklahoma City Corridor Plan | PP | FY10 | $2 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| OR | Eugene-Portland Corridor Plan | PP | FY10 | $4 | $0 | R | IP | IP | IP | - | - | - | IP |
| PA | Keystone Corridor: Keystone West | PP | FY09 | $1 | $1 | O & A | IP | IP | - | - | - | - | - |
| TX | Oklahoma City-South Texas Corridor Plan | PP | FY10 | $6 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| VT | NY-VT Bi-State Intercity Passenger Rail Project | PP | FY09 | $1 | $1 | O & A | C | C | - | - | - | - | - |
| WV | West Virginia HSIPR Planning | PP | FY09 | $1 | $1 | O & A | C | C | C | - | - | - | - |

† Scopes and funding amounts of specific sub-projects within Large Corridor Programs may change as FRA works with grantees to finalize a Cooperative Agreement and other elements of the corridor program.
* Estimated funding amount at time of award announcements. Obligated funding amount may vary based on subsequent negotiations.
** The Estimated Total Funding Amounts for these projects include additional ARRA funds that have been redistributed.

## High Speed Intercity Passenger Rail (HSIPR) Program Award Status

| State | Project Name | "PP" = Planning Project "IP" = Individual Project "SCP" = Small Corridor Program "LCP" = Large Corridor Program† | Source: Funding Source | Funding Status ($M): Estimated Total Funding Amount* | Funding Status ($M): Final Obligated Funding Amount | Project Status: "O & A" = Obligated and Announced "NFO" = Nearing Final Obligation "R" = Remaining | Award Prerequisites: Scope/Schedule/ Budget | Financial Plan | Project Mgmt Plan | Railroad Agreement | Other Agreements | Engineering Materials | Environmental Determination |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Other - State Rail Plans** | | | | | | | | | | | | | |
| CA | California State Rail Plan | PP | FY10 | $2 | $0 | R | IP | IP | IP | - | - | - | - |
| CO | Colorado State Rail Plan | PP | FY09 | $0.4 | $0.4 | O & A | C | C | C | - | - | - | - |
| IA | Iowa State Rail Plan | PP | FY10 | $0.4 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| ID | Idaho State Rail Plan | PP | FY10 | $0.2 | $0 | R | IP | IP | - | - | - | - | - |
| MO | Missouri State Rail Plan | PP | FY10 | $1 | $1 | O & A | C | - | - | - | - | - | IP |
| NM | New Mexico State Rail Plan | PP | FY09 | $0.1 | $0.1 | O & A | C | C | C | - | - | - | - |
| NV | Nevada State Rail Plan | PP | FY10 | $1 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| OK | Oklahoma State Rail Plan | PP | FY10 | $0.4 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| OR | Oregon State Rail Plan | PP | FY10 | $1 | $0 | R | IP | IP | - | - | - | IP | - |
| WA | Washington State Rail Plan | PP | FY10 | $0.4 | $0 | R | IP | IP | IP | IP | IP | IP | IP |
| **FY 2008 Capital Assistance to States for Intercity Passenger Rail** | | | | | | | | | | | | | |
| AZ | Phoenix-Tucson Rail Service Planning | PP | FY08 | $1 | $1 | O & A | - | - | - | - | - | - | - |
| CA | Double Track Construction, San Juaquin Corridor, Kings Park, CA | IP | FY08 | $5 | $5 | O & A | - | - | - | - | - | - | - |
| IL | Centralized Traffic Control and Cab Signals System Installation, Joliet to Mazonia, IL | IP | FY08 | $2 | $2 | O & A | - | - | - | - | - | - | - |
| ME | Portland, ME Area Track Improvements | IP | FY08 | $0.5 | $0.5 | O & A | - | - | - | - | - | - | - |
| MN | Twin Cities-Duluth High-Speed Rail Programmatic Environmental Impact Statement | IP | FY08 | $1 | $1 | O & A | - | - | - | - | - | - | - |
| MO | Passing Track Construction and Preliminary Engineering, St. Louis - Kansas City Corridor | IP | FY08 | $3 | $3 | O & A | - | - | - | - | - | - | - |
| NY | Albany Station Track and Signal Improvements Design and Engineering | IP | FY08 | $1 | $1 | O & A | - | - | - | - | - | - | - |
| OH | Cleveland-Columbus-Dayton-Cincinnati Planning and Alternatives Analysis | PP | FY08 | $0.1 | $0.1 | O & A | - | - | - | - | - | - | - |
| VT | Two-Mile Track Reconstruction, Ethan Allen Route | IP | FY08 | $0.6 | $0.6 | O & A | - | - | - | - | - | - | - |
| VT | One-Mile Rail Replcement and 4 Bridge Re-deckings, Vermonter Route | IP | FY08 | $0.5 | $0.5 | O & A | - | - | - | - | - | - | - |
| VA | Third Track Construction and Interlocking Reconfiguration, Preliminary Engineering | IP | FY08 | $2 | $2 | O & A | - | - | - | - | - | - | - |
| WA | Point Defiance Bypass Design, Engineerng, and Right-of-Way, D to M Street Tacoma | IP | FY08 | $6 | $6 | O & A | - | - | - | - | - | - | - |
| WI | Midwest Regional Rail Initiative Alternatives Analysis and Planning | PP | FY08 | $0.3 | $0.3 | O & A | - | - | - | - | - | - | - |
| WI | Welded Rail Installation, Hiawatha Route | IP | FY08 | $5 | $5 | O & A | - | - | - | - | - | - | - |

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* Estimated funding amount at time of award announcements. Obligated funding amount may vary based on subsequent negotiations.
** The Estimated Total Funding Amounts for these projects include additional ARRA funds that have been redistributed.

| | | |
|---|---|---|
| Total Awards Obligated | 62 | Awards |
| Total Funding Obligated | $5,714 | Million |

**Funded Awards (March 24th - April 19th)**

| State | Project Name | Funding Amount (M) | Funding Source |
|---|---|---|---|
| WV | West Virginia HSIPR Planning | $1.0 | FY09 |
| NY | Adirondack Corridor: Ballston Spa Capacity Improvements | $3 | ARRA |
| WA | Portland - Seattle - Vancouver - ARRA Redistributed | $145 | ARRA |
| CA | Cab Car Bicycle Storage (Rolling Stock) | $8 | ARRA |
| CA | Locomotive Emissions Upgrade (Rolling Stock) | $13 | ARRA |
| MO | Kansas City to St. Louis Corridor: Missouri Rail Crossing Safety Improvements | $2 | ARRA |
| MO | Kansas City to St. Louis Corridor: Double Track Lee's Summit to Pleasant Hill | $1 | ARRA |
| CA | Pacific Surfliner Corridor: Ortega PE/NEPA | $1 | ARRA |
| NJ | Portal Bridge | $39 | ARRA |
| MD | B&P Tunnel | $60 | ARRA |
| CT | New Haven to Hartford to Springfield Corridor | $40 | ARRA |
| CA | Pacific Surfliner Corridor: Strategic Assessment | $0.2 | FY09 |
| MO | Missouri State Rail Plan | $0.5 | FY10 |
| ME | Boston-Portland Corridor Plan | $0.6 | FY10 |

| | | | | |
|---|---|---|---|---|
| Total Funded Awards (March 24th - April 19th): | 14 | Awards for | $315 | Million |