AMTRAK TRAINING

Improvements Needed for Employees Who Inspect and Maintain Rail Equipment
The Honorable Barbara Boxer  
Chair, Government Activities and  
Transportation Subcommittee  
Committee on Government Operations  
House of Representatives  

Dear Madam Chair:

In response to your request, this report evaluates Amtrak's training programs for new locomotive engineers, assistant conductors, signal maintainers, and mechanics (Carmen) and foremen in the Mechanical Department. It also compares Amtrak's programs to training programs for similar positions in France, Germany, and Great Britain.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to interested congressional committees, the President of Amtrak, the Secretary of Transportation, and the Director, Office of Management and Budget. We will also make copies available to others upon request.

This work was performed under the direction of Kenneth M. Mead, Director, Transportation Issues, who can be reached on (202) 275-1000 if you or your staff have any questions. Major contributors to this report are listed in appendix I.

Sincerely yours,

J. Dexter Peach  
Assistant Comptroller General
Executive Summary

Purpose

The National Railroad Passenger Corporation (Amtrak) is responsible for safely transporting nearly 41 million rail passengers annually on its intercity and commuter rail network. In a May 1991 hearing before the Government Activities and Transportation Subcommittee, House Committee on Government Operations, Amtrak employees alleged that Amtrak trains were operating in an unsafe manner because certain personnel that inspect, repair, and operate rail equipment had not been sufficiently trained.

Concerned about the seriousness of the allegations, the Chair asked that GAO evaluate training programs for selected employees in Amtrak's Transportation, Communications and Signals, and Mechanical departments. As agreed with the Chair, GAO reviewed training programs for locomotive engineers, assistant conductors, signal maintainers, carmen, and mechanical foremen in four of Amtrak's six regional operating divisions. GAO was also asked to compare Amtrak's training to training that the French, German, and British passenger railroads provide for employees working in similar positions.

Background

Employees in 3 of Amtrak's 12 departments operate and maintain the components of the Amtrak rail system. Locomotive engineers, conductors, and assistant conductors in the Transportation Department supervise and operate the trains. Signal maintainers in the Communications and Signals Department install, inspect, maintain, and repair the signal systems that control train movements. Mechanical Department employees in four specialties, or "crafts"—carmen, machinists, electricians, and sheetmetal workers/pipfitters—inspect, repair, and maintain locomotives and cars. These employees often work in a maintenance team under a mechanical foreman who was promoted from one of the four crafts. Amtrak's training programs for these operation and maintenance employees are developed and taught by either the central training organization or the operating divisions within Amtrak. Amtrak's Human Resources Development (HRD) group, headquartered in Washington, D.C., works with Amtrak's operating departments and divisions to design and implement training programs systemwide. In addition, each division may develop its own training programs or supplement the central training programs to help meet its own staffing needs.

Results in Brief

Amtrak has established training programs for locomotive engineers and assistant conductors that are designed to ensure that these employees
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have the necessary knowledge and skills to perform their jobs effectively. The engineer training program is (1) centrally designed and managed, (2) mandatory for all new engineers, and (3) designed to be consistently delivered to all trainees in all divisions. The assistant conductor training possesses many of the same strengths. This training is also centrally developed and is mandatory for all new assistant conductors. Both programs include a complete training regimen—classroom instruction, on-the-job training, and testing—to ensure that trainees learn the skills needed to work in their specialty. Amtrak is currently assessing the engineer training program to ensure that it is being properly implemented. Also, Amtrak’s training for engineers is similar to that provided by three European railroads that GAO visited.

In contrast, training programs for signal maintainers, carmen, and mechanical foremen have weaknesses that leave Amtrak vulnerable to unevenness and shortfalls in the mix of skills represented in its work force. Because Amtrak had not assessed the programs to determine whether they effectively fulfill training needs, officials were unaware of the weaknesses that GAO found. For example, although its training for signal maintainers is mandatory under labor agreements, Amtrak has not ensured that all its maintainers complete the required classroom training. Training for most carmen is not centrally designed, is not consistent either within or among divisions, and does not contain a complete training regimen to ensure that carmen learn the skills they need. Also, Amtrak generally does not train new foremen in the technical skills that they oversee even though they are expected to ensure that mechanical problems with rail equipment are properly repaired and to decide whether carman trainees possess the necessary skills to be promoted to fully qualified carman. Amtrak officials cited staff and equipment shortages as reasons for not providing certain training. The three European rail systems that GAO visited have signal maintainer, carman, and foreman training programs that are centrally designed and managed, are mandatory for all trainees, and contain the same regimen as Amtrak’s engineer training program.

Principal Findings

Training for Engineers and Assistant Conductors Is Extensive

Amtrak’s training program for locomotive engineers, in place since 1985, is centrally designed and managed, mandatory for all new engineers, and designed to be consistently delivered throughout the organization. HRD
designed the complete training regimen—classroom instruction, on-the-job training, and testing—to ensure that trainees learn the skills needed to work effectively. Amtrak engineers must complete and pass all classroom and on-the-job training before they are allowed to operate locomotives independently. To further improve its program, Amtrak is implementing recommendations made by the National Transportation Safety Board. Amtrak’s engineer training lasts between 6 and 12 months and is similar in structure and content to engineer training programs for each of the three European countries that GAO visited.

Amtrak’s training for assistant conductors is also centrally managed and mandatory for all new assistant conductors. Trainees complete a 4- to 5-week training class that includes periodic and final examinations. In addition to this training, the divisions provide supplemental on-the-job training, ranging from 1 to 8 weeks. GAO did not compare Amtrak’s training for assistant conductors to European training because the duties of the assistant conductors are not similar.

Most Signal Maintainers Do Not Complete Required Training

Amtrak promotes trainees to positions as signal maintainers without ensuring that they complete important classroom training. HRD designed the 2-year, four-phased training program, like the training for locomotive engineers, to provide the knowledge and skills needed to become a qualified signal maintainer. The program combines classroom instruction that has written and practical testing, on-the-job training, and a qualifying examination. Although Amtrak considers the program mandatory, GAO found that 62 percent of the trainees promoted to signal maintainers between 1989 and 1991 had not completed the classroom training but had passed Amtrak’s qualifying examination. European railroads require participation in classroom training programs.

Mechanical Department Training Programs Lack Key Elements

Amtrak’s training programs for most of its carmen and mechanical foremen are not centrally designed and managed or consistently applied. From 1988 through July 1992, 89 employees were promoted to carman positions after completing division-managed programs that were independently developed by division managers. GAO found that these programs generally did not (1) identify the variety of tasks that carmen were expected to perform and ensure that the 89 employees were taught these tasks and (2) include testing to ensure that trainees had achieved minimal proficiency before being promoted to carmen. In contrast, the European rail systems
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require their carmen either to graduate from an apprentice program or to receive extensive training after they are employed.

A majority (82 percent) of Amtrak’s mechanical foremen supervise multicraft work teams and are required to ensure that their work is done properly. However, Amtrak does not routinely train its foremen in the multiple crafts they supervise. New foremen undergo a 90-day probationary period to establish their seniority in a new union, but this period is not structured to ensure that they gain technical proficiency in the different crafts. Foremen are also expected to decide whether carman trainees have the skills to become fully qualified carmen, yet the foremen may not have the technical skills to make this determination. In contrast, the French rail system does not allow foremen to supervise outside their craft knowledge and experience, while the German and British rail systems provide foremen with multicraft technical training.

Recommendations

GAO recommends that the President of Amtrak direct the appropriate Amtrak officials to assess training programs for signal maintainers, carmen, and mechanical foremen by analyzing (1) the mix of training needed for each program and the costs of providing this training, (2) the training shortfalls identified through the needs assessment, and (3) the changes that should be implemented to ensure that employees obtain the knowledge and skills needed to perform effectively. Specific recommendations appear in the body of this report.

Agency Comments

GAO discussed the contents of this report with Amtrak’s President and senior officials, who agreed with the facts; the findings concerning locomotive engineers, assistant conductors, and carmen; and the recommendation to assess Amtrak’s training programs. As noted in the report’s body, Amtrak is taking steps to improve these programs. Amtrak agreed that foremen need minimal technical training in the multiple crafts they supervise. While detailed training in all the crafts is unnecessary, officials agreed that training is needed in the safety-sensitive tasks of each craft. Amtrak also agreed that signal maintainers should receive the required classroom training. Officials stated that because maintainers are needed to fill vacant positions, Amtrak cannot ensure that maintainers complete the classroom training before they are promoted. They said that maintainers must pass a qualifying examination that screens out employees with insufficient skills. Nevertheless, Amtrak agreed to set a specific time frame for completing the...
classroom instruction as part of its assessment of the signal maintainer program.
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### Abbreviations

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<td>Amtrak</td>
<td>National Railroad Passenger Corporation</td>
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<td>FRA</td>
<td>Federal Railroad Administration</td>
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<td>HRD</td>
<td>Human Resource Development</td>
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By 1970, the intercity passenger rail system managed by private railroads in the United States was badly deteriorating and in danger of dissolving altogether. To preserve this system, the Congress in 1970 passed the Rail Passenger Service Act (P.L. 91-518, as amended), and created the National Railroad Passenger Corporation (Amtrak) to serve the public by offering fast and comfortable rail service. Today, Amtrak is the only intercity passenger rail service in the United States and transports nearly 41 million passengers annually on its intercity and commuter trains. Because so many passengers use Amtrak each day, the safety of Amtrak's operations is an important concern. Although the number of Amtrak accidents generally declined from 1980 through 1986, it rose to 117 in 1991. In several reports on Amtrak accidents, the National Transportation Safety Board (NTSB) has cited inadequate training and qualifications for workers as factors contributing to the accidents.

Employees in 3 of Amtrak's 12 departments are responsible for safely operating and maintaining the various components of the rail system. Transportation Department employees dispatch, direct, and operate the trains. Communications and Signals Department employees ensure that the signal systems controlling train movements are in good working order and are tested and inspected within Federal Railroad Administration (FRA) and Amtrak regulations. Mechanical Department employees ensure that locomotives and passenger cars meet FRA and Amtrak safety standards.

Transportation Department locomotive engineers not only operate the trains but may also test air brakes before a train leaves a station or yard. Amtrak must certify that engineers have the training and qualifications required under 1991 FRA rules. Conductors and assistant conductors, also in the Transportation Department, perform such duties as collecting tickets, coupling and uncoupling passenger cars, and testing air brakes. Communications and Signals Department employees, including signal maintainers, install, inspect, maintain, and repair the signal systems.

The Mechanical Department includes workers from four specialties, or "crafts": passenger car mechanics (carmen), locomotive mechanics (machinists), electricians, and sheetmetal workers/pipefitters. Machinists...
repair locomotive brakes, running gear, and engine components, while electricians inspect and maintain all locomotive and passenger car electrical wiring. Carmen generally inspect and repair the mechanical systems associated with moving a car (e.g., wheels, brakes, couplers, etc.). Sheetmetal workers/pipeliners work on the outside metal surface of the car as well as on the air conditioning systems and the plumbing. They may also inspect and repair passenger car brakes. These employees often work as a team under a foreman who has been promoted from one of the four crafts.

Training Responsibilities Within Amtrak

Training programs for craft-level employees are developed and taught for Amtrak by either its central training organization or its divisions. This organization, the Human Resources Development (HRD) group in Washington, D.C., designs and implements training programs systemwide. Its mission is "to provide training, development, and testing programs which enhance Amtrak's leadership/management practices and employee performance in accordance with the corporation's management philosophy and mission statement." HRD is part of Amtrak's Personnel Department and works with Amtrak's operating departments and operating divisions to provide training.

Amtrak's operating departments are responsible for the day-to-day operation and maintenance of the passenger rail system. Employees of these departments work in the six operating divisions centered in Boston, Massachusetts; New York, New York; Philadelphia, Pennsylvania; Washington, D.C.; Chicago, Illinois; and Los Angeles, California; and in various repair facilities throughout the country. Each division has Transportation, Communications and Signals, and Mechanical departments that report directly to the department managers in Philadelphia. The managers identify training needs for HRD; HRD will not design or deliver training unless it is requested. In addition, each regional division may develop its own training programs or supplement HRD training programs to help meet its own staffing needs.

Objectives, Scope, and Methodology

At a May 1991 hearing before the Government Activities and Transportation Subcommittee, House Committee on Government Operations, Amtrak mid-level managers and labor leaders stated that employees responsible for operating, inspecting, and repairing trains had not received adequate training to perform safety critical work. Concerned about the seriousness of the allegations, the Chair asked that GAO evaluate
training programs in Amtrak's Transportation, Communications and Signals, and Mechanical departments. Specifically, the Chair asked that we review training for the positions of locomotive engineer, assistant conductor, signal maintainer, carman, and mechanical foreman. As part of this review, we were also asked to contrast Amtrak's training programs to the training given similar positions in the passenger rail service operations in France, Germany, and Great Britain.

To evaluate training for the five positions in Amtrak's Transportation, Communications and Signals, and Mechanical departments, we reviewed HRD and divisional training programs. We interviewed and obtained documentation from HRD staff at training centers located in Beech Grove, Indiana; Chicago, Illinois; Los Angeles, California; New York, New York; Lancaster, Pennsylvania; Washington, D.C.; and Wilmington, Delaware. We also interviewed and obtained documentation from managers and labor representatives in four of the six Amtrak divisions: Boston, Chicago, Los Angeles, and New York. According to Amtrak, these four divisions are responsible for the majority of both Amtrak's daily intercity and commuter traffic and its revenue. The labor representatives also provided us with the views of their constituents in each division who work in the five positions about the adequacy of the training they received. We did not, however, attempt to assess (through testing or other means) the actual skills the employees possessed.

We analyzed Amtrak's selection, training, and evaluation policies and programs for locomotive engineers, assistant conductors, signal maintainers, carmen, and mechanical foremen. We identified deficiencies and strengths in the Transportation, Communications and Signals, and Mechanical departments' training policies and programs for these employees. We also interviewed officials and gathered information from Metra, a Chicago-based commuter railroad, and from instructors at a Chicago and Northwestern Railroad training center, who provide technical training to Metra's Mechanical Department employees. In addition, we reviewed NTSB accident reports to identify the safety consequences of inadequacies in selecting, training, and evaluating employees.

To compare the training for the Amtrak positions to training in France, Germany, and Great Britain, we identified similar positions in the Société Nationale des Chemins de Fer Français (the French rail system), the Deutsche Bundesbahn (the German rail system), and British Rail. We
interviewed and obtained documentation from officials in these rail systems who were responsible for developing and implementing transportation, communications and signals, and mechanical training programs, and we observed their train operations. However, because we did not evaluate whether these rail systems actually followed the training programs they discussed with us, our comparison with Amtrak relies solely upon evidence obtained from interviews and from the documents that the officials of these railroads provided.

We conducted our review between August 1991 and November 1992 in accordance with generally accepted government auditing standards. We discussed the factual information, conclusions, and recommendations with Amtrak's President, Vice President for Engineering, and Senior Mechanical Officer, as well as other officials in Amtrak's headquarters and divisions. Their comments are presented in the body of this report. As requested, we did not obtain written agency comments on a draft of the report.
Amtrak's locomotive engineer training program, in place since 1985, is centrally designed and managed, mandatory for all new engineers, and designed to be delivered consistently throughout the organization. HRD designed the training regimen—classroom instruction, on-the-job training, and testing—to ensure that trainees learn the skills needed to be qualified engineers. Amtrak engineers must complete and pass all classroom and on-the-job training before they are allowed to independently operate locomotives. To further improve its program, Amtrak is implementing recommendations made by NTSB. Amtrak's engineer training program is similar in length, structure, and content to engineer training programs for each of the three European countries we visited.

Amtrak's training for assistant conductors is also centrally managed and mandatory for all new assistant conductors. Assistant conductor trainees complete a 4- to 5-week training class that includes periodic and final examinations. In addition to this training, the divisions provide supplemental on-the-job training, ranging from 1 to 8 weeks. GAO did not compare Amtrak's training for assistant conductors to European training because the duties of the assistant conductors are not similar.

Locomotive engineers are responsible for safely operating trains. Their duties include inspecting locomotives to ensure that the locomotive is ready for service, testing the locomotive's brakes, and using the throttle, brakes, and other controls to ensure safe, smooth, and on-time train operation. Engineers traditionally learned how to operate trains by working for many years as engine crew members (firemen) under the supervision of experienced engineers.

Trainees currently acquire the same basic operating knowledge and skills as firemen but in a much shorter time. HRD, Amtrak's central training organization, designed a training regimen around the skills engineers traditionally learned as firemen that combined classroom instruction and on-the-job training with periodic testing. In place since 1985, this training is mandatory for all new Amtrak engineers.

Training for locomotive engineers consists of four phases and ranges in length from 6 months to more than a year, depending on how quickly the trainee learns and where in the Amtrak system the engineer will operate. Phase I consists of 6 to 9 weeks of classroom instruction in which trainees

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1Trainees in different operating zones within the Amtrak system may require additional training on such things as operating rules, physical characteristics of train routes, and different types of locomotives (e.g., electric vs. diesel) that may be operated.
learn railroad operating rules, track and cab signal systems, and train-handling and train-braking techniques. After completing each major unit in this phase, trainees must pass an examination or exercise. In phase II, which varies in length for each trainee, trainees learn and are tested on the physical characteristics of the territories over which they will operate. During phase II training, trainees generally ride in the locomotive and observe the route they are expected to travel.

During phase III, which lasts a minimum of 12 weeks, trainees operate trains under the supervision of experienced engineers, who serve as instructors. Amtrak’s program requires that engineer instructors evaluate and document trainees’ performance after each trip. Supervisors of these instructors also observe and document trainees’ performance weekly. In phase IV, Amtrak tests trainees’ train-handling techniques on a locomotive simulator.

In June 1991, FRA issued a final regulation requiring all railroads that train their own locomotive engineers to have an approved training program. The regulation requires engineer training programs to include classroom, skill performance, and physical characteristics training, as well as testing of knowledge and performance skills. The training must cover personal safety, railroad operating rules, mechanical condition of equipment, train-handling procedures, and compliance with federal regulations. The skill performance component must occur under the supervision of a qualified engineer instructor and allow the trainee to operate the locomotive’s controls for a significant portion of the training time. According to FRA, Amtrak’s engineer training generally meets these requirements.

Amtrak Is Improving Training for Engineers

Following an accident in Boston, NTSB reviewed Amtrak’s training program for locomotive engineers. In its 1992 report, NTSB recommended that Amtrak take measures to improve its locomotive engineer training program. Amtrak has recently implemented some of NTSB’s suggested improvements, such as developing criteria for selecting and training engineer instructors. In addition, Amtrak solicited the engineer labor union to jointly review the
entire training program. While these measures appear to address NTSB's concerns, it is too early for GAO to determine the effectiveness of such actions.

In December 1990, an Amtrak train operated by an engineer trainee, under the direction of an engineer instructor, derailed and struck a commuter train entering Boston's Back Bay Station. The engineer trainee was travelling 76 miles per hour on a 30-mile-per-hour curve as the train approached the Boston station. According to NTSB, the accident's probable cause was the failure of the engineer trainee to begin braking in time to negotiate the curve. According to the report, the trainee failed to brake in time because he was not adequately supervised by his instructor. The accident caused 446 injuries and over $12 million in property damage.

Following the accident, NTSB evaluated Amtrak's training program for locomotive engineers and found weaknesses in Amtrak's training methods and evaluation controls. Among other weaknesses, NTSB found (1) inadequate criteria for selecting and training engineer instructors, (2) inadequate documentation of trainees' progress during on-the-job training (phase III), and (3) lack of a comprehensive evaluation of the engineer training program.

To address NTSB's findings, Amtrak will select engineer instructors on the basis of their (1) discipline record, (2) personal safety record, (3) performance as engineers, and (4) supervisors' input. NTSB found that the past safety record of the engineer instructor involved in the Boston accident included two safety-critical offenses—proceeding past a stop signal and not complying with operating rules. Amtrak's System General Road Foreman, who is accountable for trainees during on-the-job training, stated that if Amtrak had used the recently developed criteria, it would not have selected the engineer to serve as an instructor.

To address NTSB's concerns, Amtrak developed a 1-day course for engineer instructors and evaluation/documentation requirements for trainees. The course, which began in August 1992, includes an overview of the engineer training program, information on the simulator, and a discussion of the engineer instructor's role during on-the-job training. As part of the 1-day course, Amtrak also teaches engineer instructors how to evaluate trainees and complete evaluation forms. According to Amtrak's System General Road Foreman, the course is designed to help engineer instructors clearly understand the purpose of the training program, as well as their roles and responsibilities when providing on-the-job training to new engineers.
Chapter 2
Training Programs for Engineers and Assistant Conductors Are Extensive

will also require evaluation data to be entered into its operating rules compliance data base for tracking purposes. In an August 12, 1992, letter to NTSB, Amtrak stated that it had trained 11 engineer instructors. Finally, Amtrak and the engineer labor organization have initiated an overall evaluation of the training program, although no completion date has been set for this effort.

Amtrak's Engineer Training Is Comparable to European Training

European railroads' engineer training programs are similar to Amtrak's, and some include a few additional features to ensure that trainees learn the needed skills. For example, the German railroad's passenger engineer training program lasts about 18 months and includes classroom and on-the-job training. In addition, engineers are periodically tested. However, unlike Amtrak, the German railroad requires its engineer trainees to work for 145 days operating yard locomotives before entering the passenger engineer training program. As recently as 1987, Amtrak similarly separated some of its engineers into rosters for yard and passenger train duty. However, Amtrak negotiated a change with the labor organizations to combine the rosters and thus reduce the number of backup engineers needed to support each roster. This allowed Amtrak to employ fewer engineers to do the same amount of work.

The British railroad's passenger engineer training program lasts about 1 year and also combines classroom and on-the-job training. As an additional control to help ensure program success, the railroad uses a rigorous set of aptitude screening examinations to test potential engineers' abilities, including their ability to cope under stress, mechanical knowledge, concentration, and reflexes. The railroad uses these tests to ensure that participants in the training program have the aptitude to succeed. FRA is currently developing similar aptitude tests, although it does not currently require railroads to use the tests to select engineer trainees. French engineer trainees also receive almost 1 year of training, which alternates weekly between classroom and on-the-job training.

We discussed training for locomotive engineers at the conclusion of our review with the President of Amtrak and other top officials. They agreed with our findings.

Assistant Conductor Training Is Also Extensive

Through a combination of classroom and practical training and written exams, Amtrak ensures that its assistant conductors have the skills to perform assigned tasks. The HRD-developed course lasts 4 to 5 weeks and is designed to consistently teach the basic knowledge and skills that new
Assistant conductors need. To tailor the training to meet their unique needs, the divisions supplement the program with their own on-the-job training. Unlike Amtrak's assistant conductors, conductors in European railroads do not work in a railroad yard, so we did not compare their training to Amtrak's.

Assistant Conductors Learn Job Responsibilities Through a Centrally Managed Training Program

Assistant conductors perform road service duties, such as collecting and selling tickets and accounting for all receipts. They also perform yard service duties, such as coupling and uncoupling passenger cars and operating switches and track safety devices. To become an Amtrak assistant conductor trainee, interested employees are tested and must achieve at least minimum scores in reading comprehension, problem solving, vocabulary, and mathematics. Amtrak requires employees with no prior experience to complete its assistant conductor training before assuming assistant conductor responsibilities. 5

Amtrak has a centrally managed training program for assistant conductors. Developed by HRD, the training lasts 4 to 5 weeks and is designed to provide inexperienced railroad employees with the basic skills and knowledge that an assistant conductor needs. The program consists of classroom and on-the-job training, covers both road and yard service duties, and includes instruction in collecting fares, testing air brakes, and connecting passenger cars. At the end of each major study area, trainees must pass a written examination. To complete the course, trainees must also pass a final examination.

Divisions Supplement Classroom Training

In the four divisions we reviewed, transportation managers and labor representatives stated that the initial HRD training program develops the basic skills that assistant conductors need for road service. However, they did not believe that enough time was spent in learning yard service duties. To mitigate these concerns, each division implemented its own on-the-job training to supplement the initial HRD training program.

In Los Angeles, where new assistant conductors constitute the majority of the conductor work force, the division added up to 60 days of yard training to the basic course. At the end of the training, assistant conductors must pass a written examination that covers yard-specific duties and safe operating procedures. Chicago and New York offer about 2 weeks of

5Conductors or assistant conductors with experience from working on other railroads may be required to take only an abbreviated training course.
supplemental training and rely on senior conductors to determine whether the new assistant conductors are qualified. In addition, a rules examiner in the New York Division orally quizzes assistant conductors on safe operating procedures within Penn Station. Boston offers supplemental training as needed. With the combination of HRD and division training, both the managers and the labor representatives in the four divisions we reviewed were generally satisfied that assistant conductors obtained the necessary skills to do their jobs.

We discussed training for assistant conductors at the conclusion of our review with the President of Amtrak and other top officials. They agreed with our findings.

Conclusions

We believe that Amtrak’s training program for locomotive engineers is strong for a number of reasons. Amtrak’s central training group designed a training regimen to ensure that the skills needed to become a qualified engineer were effectively taught and tested to ensure that trainees learned those skills. Central management and the mandatory nature of the program provide assurance that the training is given consistently to all trainees in all divisions. In addition, the training program contains the elements required by FRA’s recent locomotive engineer certification regulation. While NTSB has pointed out weaknesses in the implementation of the program, Amtrak appears to be taking steps to correct these weaknesses.

Amtrak’s training program for assistant conductors contains many of the same strengths that we identified in the engineer training program. The core training was developed centrally and designed to teach specific skills identified as necessary for the position of assistant conductor. Also mandatory, the training includes testing to ensure that trainees have learned what they have been taught. The supplemental training given by divisions appears to enhance the program’s effectiveness by giving trainees the opportunity to use their skills while learning division-specific procedures. We believe that the training for both engineers and conductors provides assurance that these employees learn the skills necessary to perform their jobs effectively.
Most Signal Maintainers Do Not Complete Required Training

Amtrak promotes trainees to positions as signal maintainers without ensuring that they have completed important classroom training. Like the training for locomotive engineers, the 2-year, four-phased training program was designed centrally by HRD to develop the skills needed to become a qualified signal maintainer. It combines on-the-job training and classroom instruction with written and practical testing and concludes with a qualifying examination. Although the program is considered mandatory under a national labor agreement, the majority of recently promoted signal maintainers in two of four Amtrak divisions had not received all four phases of training. European railroads require participation in classroom training programs, and one railroad gives maintainers certification cards attesting to their competency.

Signal Maintainer Work Is Highly Technical and Safety-Critical

Signal maintainers install, maintain, and repair the safety-critical traffic control systems—such as wayside signals, track circuits, and switches—that allow railroads to operate safely and efficiently. Just as automobile traffic lights display green, yellow, and red colored lights to control the flow of traffic, so wayside signals display lights alerting an engineer when to proceed, slow down, or stop. Track circuits help ensure safe braking distances between trains by electronically indicating to an engineer whether the section of track ahead is occupied. Switching systems allow trains to cross from one set of tracks to the next by simultaneously clearing access to one set of tracks and closing access to adjoining tracks. When wayside signals, track circuits, or switching systems fail, signal maintainers are required to quickly diagnose and correct the problem. Because they generally work alone, signal maintainers must be able to accurately read complex signal and track circuit blueprints; use electrical power measuring devices; and dismantle, assemble, adjust, and test several types of electric and pneumatic track switches.

Amtrak’s current signal maintainer training program, in place since 1987, consists of four phases of classroom and on-the-job training that should be completed over a 2-year period. HRD centrally developed the classroom portion for each 6-month phase by designing appropriate instruction for the necessary skills a signal maintainer should possess. The first two phases of training are taught in each division by divisional instructors. Classroom training for the third and fourth phases is provided by HRD instructors at a Lancaster, Pennsylvania, training facility. Training should
Chapter 3
Most Signal Maintainers Do Not Complete
Required Training

be consistent in that signal maintainer trainees in all divisions are required to have all four training phases.

The classroom training in each phase consists of 6 days of classroom instruction followed by written examinations and practical demonstrations. The trainee must pass the written examination with a minimum score of 70 percent and demonstrate hands-on understanding of the skills taught. According to Amtrak's training program documents, the classroom training and testing provide the trainees with the essential knowledge and skills to effectively and efficiently perform during the 6 months of on-the-job training completed during each phase. In other words, the classroom training provides core skills, which the trainee applies during on-the-job training. Each phase concentrates on different signal maintainer job requirements and builds on previous instruction.

Phase I concentrates on the safe and practical use of equipment. During classroom training, participants are introduced to basic railroad safety and electrical terminology and theory. Phase II introduces additional knowledge and skills by concentrating on the procedures to install, adjust, maintain, troubleshoot, and repair switch movements. Phases III and IV provide trainees with basic and advanced classroom and on-the-job experiences in installing, maintaining, diagnosing, and repairing signals, as well as track and switch circuitry.

To reach the rank of signal maintainer, Amtrak requires trainees to pass a qualifying examination consisting of two parts: an oral and a hands-on practical examination. To pass, trainees must score at least 70 percent on each part. The oral examination consists of 150 questions covering operating rules and technical categories. The practical examination consists of 10 or more specific tasks that maintainers are expected to perform. According to the examination's instructions, these tasks include testing signal systems, reading blueprints, and adjusting switches.

Although Amtrak training documents cite the importance of providing all elements of signal maintainer training, only 14 of the 37 signal maintainers promoted between 1989 and 1991 (about 38 percent) completed the required training either before or after becoming signal maintainers. To ensure a continuous supply of qualified signal maintainers, union agreements allow Amtrak to promote trainees to signal maintainer positions before they complete the required classroom training if they can pass the final qualifying examination. Although trainees promoted in this manner
are still required to complete the classroom training, only five signal maintainers in this category have done so in the four divisions we reviewed. The divisions cited different reasons for not ensuring that their maintainers completed the required training.

In the Boston Division, none of the 13 signal maintainers promoted between 1989 and 1991 completed all four phases of the required training either before or after qualifying as a maintainer. Three of Boston's maintainers received classroom training for Phase II (switch repair and trouble shooting); the remaining 10 maintainers were not eligible to take training offered in phases III and IV (track and switch circuitry) because they had not completed the phase II training.

The Boston Division instructor told us that he did not provide the required phase II classroom training to all the maintainers because the division did not have the equipment needed for the training. Although he said that he had informed his supervisor of the equipment shortages, the Division Engineer, who oversees all signal operations, stated that he was unaware of the equipment problem. The HRD official who managed the signal maintainer training program said that he knew that few Boston trainees were attending phases III and IV but did not know the reasons. After our visit, the Boston instructor was transferred to Lancaster to teach the classroom components of phases III and IV training.

In the New York Division, 3 of the 12 promoted maintainers completed the classroom training—2 before qualifying and 1 after qualifying. New York Division officials cited a shortage of workers as the reason they could not send the trainees to phases III and IV of the required training. In contrast, 11 of the 12 maintainers promoted in the Chicago Division completed all four phases of the required classroom training—7 before qualifying and 4 after qualifying. The Los Angeles Division did not hire any trainees during the 3-year period.

There has been no overall assessment of the signal maintainer training to determine whether it meets or exceeds Amtrak's training needs in its current form, according to the HRD manager of signal training. Furthermore, Amtrak's Vice President for Engineering and Assistant Chief Engineer did not know the extent to which signal maintainers were not receiving the required classroom training. Nonetheless, these officials said that this issue was insignificant because maintainers learn their skills on the job during each phase. In addition, they said that Amtrak's qualifying examination, which employees must pass to become signal maintainers,
ensures that Amtrak has a qualified work force. Without a comprehensive assessment of the extent to which the training program meets training needs, it is impossible to determine the validity of Amtrak's assertion that the lack of training is insignificant.

We discussed signal maintainer classroom training at the conclusion of our review with Amtrak's President and other top officials. They agreed that signal maintainers should receive the required classroom training. Officials stated, however, that because maintainers are needed to fill vacant positions Amtrak cannot ensure that maintainers complete the classroom training before they are promoted. They said that maintainers must pass a qualifying examination that screens out employees with insufficient skills. Nevertheless, Amtrak agreed to set a specific time frame for completing the classroom instruction as part of its assessment of the signal maintainer program.

European passenger railroads place greater emphasis on classroom training for signal maintainers than Amtrak does. The French railroad requires signal maintainers to complete a 2-year training program that includes 28 weeks of classroom training. The German railroad requires its signal maintainers to complete both a recognized electronics or telecommunications apprenticeship and an additional 18-month railroad-specific training course before allowing them to work independently as signal maintainers.

Before 1988, the British railroad did not emphasize classroom instruction, and all signal maintainers did not take a qualifying examination. Maintainers learned their skills on the job by observing more experienced employees. However, in December 1988, a British railroad train derailed, killing 35 people and injuring nearly 600. The accident investigation report showed that an improperly installed signal circuit had triggered the accident. The report indicted the entire signal maintainer program, stating that the accident was not the result of one maintainer's momentary lapse in judgment but rather was characteristic of poor work practices and inadequate supervision within the responsible signal department. The report criticized the British railroad for not appropriately training signal maintainers.

The investigation's findings spurred the British railroad to evaluate and restructure its training for signal maintainers. British Rail officials began identifying the specific job skills or competencies required for effective
performance in each signal department position. The railroad then compared the competency lists with its available training courses and developed new courses or training modules to fill any gaps identified. Since the accident, the railroad's goal has been to promote employees only after they have demonstrated proficiency in requisite core competencies. In addition, signal maintainers are given certification cards after they have completed a competency training course and demonstrated proficiency in the task. Railroad officials told us that maintainers are not allowed to perform a task on the job unless they can produce a certification card for that task.

Conclusions

Amtrak's training program for signal maintainers, like that for locomotive engineers, was developed to teach the skills needed to effectively perform a signal maintainer's work. However, the program is not being consistently implemented. A majority of the qualified maintainers in two of the four divisions we reviewed did not receive the classroom training, either before or after being promoted to that position. These maintainers typically work alone, so it is especially important that their training regimen be sufficient to ensure the safety of Amtrak's signal system.

Amtrak's top officials have stated that the lack of classroom training for signal maintainers is not significant, given the on-the-job training that these maintainers receive. Despite this assertion, Amtrak training documents clearly state that classroom instruction provides trainees with the essential knowledge and skills to perform effectively during on-the-job training in each phase. Without classroom instruction, the signal maintainer program falls short of a complete training regimen and may leave Amtrak vulnerable to gaps in the mix of skills represented among its signal maintainers. Amtrak has also not assessed whether the current training program for signal maintainers meets or exceeds its actual training needs.

Recommendations

We recommend that the President of Amtrak direct the Vice President for Engineering and the Director of HRD to (1) assess the signal maintainer training program to determine what mix of training is needed, (2) determine what resources are needed to provide the training, and (3) establish controls and time frames to ensure that all signal maintainers receive this training.
Amtrak’s training for most carmen and mechanical foremen lacks the elements of central design and management, consistent application, and mandatory completion that are present in the locomotive engineer training program. Between 1988 and July 1992, four divisions promoted 103 employees to positions as carmen—89 had completed division-managed training programs and 14 had completed the centrally managed apprentice program for carmen. Three of the four divisions’ programs did not (1) identify the variety of tasks or work processes that carmen are expected to perform and ensure that the 89 employees were consistently taught these work processes and (2) include testing to ensure that the trainees had achieved minimal proficiency before being assigned as carmen. In contrast, the European rail systems’ approach to training provides greater assurance that their carmen possess the needed skills.

A majority (82 percent) of Amtrak’s mechanical foremen supervise multicraft work teams and are required to ensure that their team’s work is done properly. However, Amtrak does not routinely train its foremen in the multiple crafts they supervise. New foremen undergo a 90-day probationary period to establish their seniority in a new union, but this period is not structured to ensure that they gain technical proficiency in the different crafts. Foremen are also expected to decide whether carmen trainees have the necessary skills to become fully qualified carmen, yet they may not have the technical skills to make this determination. In contrast, the French rail system does not allow foremen to supervise outside their craft knowledge and experience, while the British and German rail systems provide foremen with multicraft technical training.

Carmen are responsible for keeping the railroad’s passenger and baggage cars in safe operating condition by performing periodic inspections, routine maintenance, and needed repairs. Before a train is released for service, carmen visually inspect safety-critical car components—such as wheels, axles, and brakes—to ensure that the components meet both Amtrak and FRA standards. For example, carmen perform routine inspections that include examining the cars’ running gear, doors, and safety appliances. In addition, carmen ensure that trains have sufficient braking capacity by measuring air pressure and leakage from the brake lines. To properly inspect and repair defects, carmen must know FRA rules.

1In addition to the safety-critical tasks discussed in the text of this report, carmen working in some of Amtrak’s maintenance facilities upholster passenger seats, paint car exteriors, and perform general carpentry work.

2Running gear includes wheels, axles, brake shoes/pads, and suspension systems.
and regulations that cover the acceptable limits for air brake system leakage, wheel defects and safety appliances.

### Apprentice and Set-up

**Training Programs for Carmen Vary Widely**

An unskilled worker can become an Amtrak carman by completing either a 3-year, centrally managed apprentice program or a division-managed program, lasting from 1 to 26 weeks, referred to as a “set up” program. In the four divisions we reviewed, only about 14 percent of the employees promoted to carman positions from 1988 through July 1992 had completed the apprentice program. At a cost of approximately $90,000 per employee (including wages and benefits), this program combines classroom instruction, laboratory and structured on-the-job training, and testing to develop the fundamental skills needed to become a qualified carman.

In contrast, the division-managed set-up programs are designed and implemented to meet more immediate staffing needs. These programs vary widely in length and content and generally do not include testing to assess trainees’ knowledge and skills. Nevertheless, both graduated apprentices and set-up carmen are expected to perform similar work. Amtrak's Chief Mechanical Officer recognizes the set-up programs' deficiencies and inconsistencies and wants to replace these programs with a systemwide program.

### Carman Apprentice Program Includes a Complete Training Regimen

From 1988 through July 1992, 14 carmen completed Amtrak's 3-year apprentice program, which was developed and managed by HRD training personnel. The program combines classroom instruction, laboratory practice, and structured on-the-job training to develop the skills and knowledge that qualified carmen need. To be selected for the program, workers must pass examinations in reading, mathematics, and mechanical aptitude. They then spend 13 weeks at Amtrak's Beech Grove technical training facility learning the fundamental theory and practice of the carman craft, including basic principles of railroad and mechanical tool safety; procedures for using carman tools and reading mechanical blueprints; functional principles of air brakes and running gear components; and procedures for testing, inspecting, maintaining, and repairing braking systems and running gear defects. Apprentices also learn equipment safety standards established by both FRA and Amtrak. During these 13 weeks, apprentices must pass periodic examinations to ensure that they have learned what they have been taught.

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3A “set-up” is an unskilled worker (generally taken from the ranks of Amtrak’s coach cleaners) who is promoted into a carman position without going through the carman apprentice program.
After the initial 13-week period, apprentices return to their home division for structured on-the-job training and additional classroom instruction. They rotate at established intervals among the tasks or work processes that carmen are expected to perform. For example, an apprentice might work 132 days in a rail yard—where cars are inspected both before and after being placed in service—learning how to inspect for wheel, suspension system, and braking defects. Afterward, the apprentice might rotate to a running repair shop—where carmen repair defects identified during rail yard inspections—for a 40-day assignment. There, an apprentice would learn how to change or repair wheels, brake cylinders, valves, and the couplers that keep rail cars connected. To ensure that they rotate among all the necessary tasks, apprentices must maintain a monthly log documenting their assignments and the number of hours spent on each task.

In addition to receiving structured on-the-job training, apprentices work with HRD field instructors 2 days each month during the 3-year program. The instructors coach apprentices on the work processes they are learning in the rail yards and repair shops, monitor the apprentices' on-the-job training schedule, and evaluate performance. After apprentices have successfully completed 732 days in the program, Amtrak considers them qualified carmen. The apprentice program does not include a final examination.

Set-up Training for Carmen Is Inconsistent Among Divisions

In contrast to the centrally managed apprentice program, the four divisions' set-up training programs varied among divisions and generally did not have management controls to ensure that carmen learned all of the work processes that they would be expected to perform. In some cases, trainees learned only a few tasks during the short training period, some of which might not be related to the trainee's job responsibilities after promotion. Set-up training ranged from 1 week to 6 months in the four divisions, and three of the four divisions did not include testing to ensure that trainees achieved minimal proficiency before being assigned to work independently.

Most divisions' set-up programs are designed to train carmen to fill immediate staffing needs created by service expansions or carman shortages. The programs are therefore relatively short when compared to the apprentice program. For example, from 1988 to July 1992, the Boston Division promoted 24 employees from positions as coach cleaners to carmen through its set-up training program. The division provides no
classroom training. Boston trainees spend 1 to 2 weeks in on-the-job training observing a carman technician (a highly skilled carman) perform normal duties inside a division repair shop. Unlike work performed by most carmen, the technician's work involves diagnosing more complex defects and repairing equipment problems that are generally too difficult for regular carmen. The technician does not provide any classroom instruction and does not test the trainees to ensure that they have achieved a minimum proficiency. In addition, once promoted, the trainees generally work in the yard performing tasks such as car inspections; they normally do not work inside a repair shop.

The Los Angeles Division promoted nine unskilled workers to positions as carmen through its set-up program between 1988 and July 1992. This program also provides no classroom training. Trainees work for 2 to 3 weeks under the supervision of experienced carmen, rotating among various air brake, wheel, and carpentry assignments. During this period, trainees are exposed to whatever work processes the experienced carmen normally perform. They do not receive any classroom instruction and are not tested to ensure that they have correctly learned the work.

During the same period, the Chicago Division trained 36 set-up carmen. The Chicago training program is more structured than the Boston and Los Angeles programs. In Chicago, trainees rotate among three different repair areas, working under the supervision of experienced carmen, for a total of 180 days of on-the-job training. In the first 60 days, they work in the repair shop learning how to inspect and repair passenger car wheels, brakes, and air hoses. In the second 60 days, they work in the yard learning how to perform running repairs, such as changing brake shoes and repairing air brakes. Finally, they spend 60 days performing interior repairs, such as changing windows, fixing seats, and doing carpentry work. The trainees do not receive classroom instruction during the training period, and they are not tested to ensure that they have correctly learned the carman craft.

Each of the three divisions—Boston, Los Angeles, and Chicago—relies on a foreman to ascertain whether carmen trainees are qualified to be promoted.

Unlike the other three programs, New York's 10-week set-up training program combines on-the-job training with classroom instruction. Rotating among the classroom, the rail yard, and various repair shops, trainees learn fundamental carman duties, such as how to inspect and repair air brakes, passenger car couplers, bearings, and wheels. They also spend time in the classroom and in the yard learning federal safety
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Weaknesses in Amtrak's Mechanical Training

Standards for identifying wheel and braking system defects and procedures for performing federally required air brake tests.

New York trainees must also pass a series of examinations to ensure that they comprehend what they are taught. After 8 weeks in the program, set-up trainees work for 2 weeks with experienced carmen, during which time they must demonstrate their ability to assume carman responsibilities. Trainees return to their former positions if they do not pass the examinations or demonstrate proficiency on the job. From 1988 to July 1992, 20 employees successfully completed New York's set-up program.

According to Amtrak's Chief Mechanical Officer, who has held this position for the last 4 years, the corporation needs to develop a more comprehensive and systemwide set-up training program because set-up carmen are becoming an increasing proportion of Amtrak's carman workforce. He plans to work with Amtrak's HRD staff to review the divisions' set-up programs and in 1993 develop a more comprehensive systemwide program to train unskilled workers. He also stated that Amtrak needs to identify the key duties that it expects promoted carmen to perform and to give them consistent training and testing to ensure that they have developed the necessary skills to do these jobs.

European Railroads Have Specific Training Requirements for Carmen

The French, German, and British rail systems have mechanical employees whose duties are similar to those of Amtrak's carmen. Unlike Amtrak, the French railroad does not promote unskilled workers to carmen, according to railroad officials. Instead, the railroad requires that all its mechanical employees, at a minimum, graduate from one of France's technical vocational centers. The technical certificate granted by these institutions ensures that employees possess a high level of proficiency in working on mechanical equipment. If employees meet this requirement, the railroad then provides them with specific training modules covering the duties they are expected to perform.

The German railroad requires its mechanical employees, before working on the railroad, to complete a 3-1/2-year apprentice program. The British railroad either requires mechanical employees to graduate from a 4-year apprentice program or provides specific carman training to unskilled employees desiring career advancement in the mechanical department. According to British railroad officials, this training provides employees with the skills they need to perform as carmen. In all cases, the European...
railroads require employees either to pass examinations or to demonstrate their proficiency in carman skills.

Mechanical Foremen Are Not Trained Technically in All Crafts They Supervise

The majority of Amtrak's mechanical foremen (82 percent) supervise workers from four technically diverse crafts: carmen, electricians, machinists, and sheetmetal workers/pipfitters. However, Amtrak does not routinely give foremen technical training in the crafts they supervise or test foremen to ensure that they possess technical knowledge of all crafts they supervise. As a result, foremen are required to supervise work for which they may not have received technical training. Amtrak's central management officials do not believe that foremen need technical training to perform assigned tasks. However, two divisions have recognized that foremen need technical skills to be competent and have initiated limited technical training.

Mechanical Foremen Must Ensure Work Quality

Foremen in Amtrak's Mechanical Department are required to supervise skilled employees in up to four crafts to ensure that these employees properly perform their assigned tasks and are technically qualified to inspect and repair all parts of a train. Foremen also assess whether crews have repaired the trains correctly.

Under current operating practices, employees interested in becoming foremen submit applications to their divisions when projected vacancies arise. Division personnel interview the candidates. If selected, foremen must accrue 90 days of experience within a 6-month period to establish their seniority in the foremen's union. During this probationary period, applicants substitute for foremen as needed and may supervise a variety of different crafts.

No Routine Technical Training or Testing Is Required for Foremen

Amtrak's mechanical foremen generally supervise workers from any Mechanical Department craft. However, Amtrak has not established a systemwide training program to ensure that foremen have the technical knowledge to supervise workers from the multiple crafts in their work crew. Amtrak allows foremen to attend technical training courses offered to the employees working in the four crafts. However, these courses are offered intermittently.

The 90-day probationary period discussed above is not structured to ensure that foremen gain technical proficiency in the crafts they may be
required to supervise. The foreman candidates work as needed, replacing absent foremen. During these 90 days, foreman candidates do not receive on-the-job training targeted to specific foreman positions because candidates are selected only on the basis of projected vacancies and actual vacancies are not known. Instead, the candidates usually spend the probationary period in short assignments supervising whatever work groups happen to need substitute foremen, and no consideration is given to ensuring that the candidates are exposed to each of the four crafts.

During the probationary period, foreman candidates report to a general foreman, who may answer questions but does not give candidates any structured training, according to the New York Division's Mechanical Superintendent. Amtrak also does not test candidates after this period to determine whether they possess minimum technical expertise in all crafts; they simply are promoted to full-time positions as foremen when openings are available. For instance, a foreman who previously worked as a carman may be promoted to a position supervising machinists (who repair locomotives) and may not have any knowledge or skill in that area.

According to the Vice President for Engineering and the Chief Mechanical Officer of Amtrak, foremen do not need technical training because they are expected to supervise employees, not inspect, maintain, and repair equipment. These officials added that if Amtrak had unlimited financial resources, it would be beneficial (although not necessary) to provide technical training to foremen. HRD's Director of Technical Training disagreed with this position, stating that foremen supervising multiple crafts need technical training to ensure that the people they supervise can perform their assigned tasks. He said that a foreman needs some training in multiple crafts so that he or she can estimate how long a repair should take. Without some training, the foreman might not know whether a specific task should require several hours or a few minutes.

Some Divisions Recognize That Foremen Need Technical Skills

Even though there is no standard training program for foremen, two of the four divisions we reviewed took measures to help technically weak foremen perform their assigned tasks. In addition, after NTSB linked an accident to a foreman's inability to perform a routine brake test, Amtrak provided training on air brakes for Mechanical Department employees, including foremen, who work on air brake systems.

The New York Division began a 1-week orientation class in 1991 to familiarize mechanical foremen with their job responsibilities. The class
Chapter 4
Weaknesses in Amtrak's Mechanical Training

included 1 day in each of four mechanical inspection and repair areas and 1 day for learning to properly complete employee timecards. The division found that during this orientation foremen asked questions showing that they did not have even elementary knowledge of some of the repairs and inspections they were overseeing. Experienced craftsmen also complained that new foremen lacked the technical knowledge to make decisions, such as whether a problem was severe enough to warrant taking a car out of service.

In addition, the division’s quality control inspections showed that foremen did not have the technical knowledge needed to ensure that their crews accomplished routine maintenance requirements. The inspections revealed that between January and October 1992, about 18 percent of the trains inspected had undetected or unrepaired door defects and about 21 percent had heating, air conditioning, and ventilation defects.

New York officials therefore concluded that foremen needed additional training and developed a 4-week technical training program to supplement the 1-week orientation session. As of September 1992, New York had begun training all mechanical foremen for 1 week in each of four areas: (1) running repairs (passenger car repair), (2) enginehouse (locomotive repair), (3) routine planned maintenance (locomotives and cars), and (4) refrigeration/air conditioning. Managers responsible for overseeing Mechanical Department activities in each of these four areas will work one-on-one with foremen to familiarize them with the technical work that craftsmen are expected to perform. The program does not include testing in any of the four areas. New York officials expect all mechanical foremen to complete the training by the end of 1993.

The Los Angeles Division also took action after recognizing that some foremen did not have the technical ability to supervise a craft other than their own. Machinists' representatives had complained that foremen trained in the carman craft did not have enough job-specific knowledge to accurately assess their work. To mitigate labor’s concerns, the Los Angeles Mechanical Superintendent assigned a technician (highly skilled craftsman) to assist foremen with weak technical skills.

Concern about the adequacy of training for foremen was fueled by an NTSI report finding that a foreman’s error contributed to an April 1991 accident at Chase, Maryland. According to the report, an employee who usually would have connected air brake hoses of locomotives was engaged in other activities, so the foreman made the connection himself. However,
the foreman connected the hoses incorrectly, ultimately rendering the locomotive air brakes ineffective. The foreman also improperly performed federally required brake tests before the train's departure, so the hose connection error was not detected. The locomotive's brakes later failed when they were applied to stop the train at a track stop signal. As a result, the Amtrak train struck a freight train that was passing on an intersecting track, causing one serious injury, one minor injury, and $800,000 in damage. The foreman was not originally from the craft responsible for connecting locomotives.

After the accident, Amtrak required that all Mechanical Department employees responsible for supervising or performing air brake tests (including carmen and their foremen) be trained and tested before being allowed to conduct mandatory FRA train brake tests. In addition, each employee who is required to take the training must also pass a brake refresher course biennially. An Amtrak official said that, as of October 1992, 754 employees had completed the training.

We discussed technical training for foremen at the conclusion of our review with Amtrak's President and other top officials. They agreed with GAO's recommendation that foremen need minimal technical training in the multiple crafts they supervise. However, they stated that detailed training in all the crafts was unnecessary; training in the safety-sensitive tasks of each craft is needed.

European Railroads
Technically Train
Their Foremen

European passenger railroads ensure that foremen are intensively trained before they assume supervisory responsibility. According to officials of the French rail system, with rare exceptions, foremen supervise only workers within their own craft expertise. As a result, multicraft technical training is unnecessary. The German rail system requires foremen to complete and pass a 1-1/2-year training course, covering supervisory skills and the basic technical skills of the crafts the foremen supervise. Potential foremen of locomotive maintenance workers spend 360 days in training, including 120 work days learning how the repair shop functions and 120 work days learning details about locomotive technology. In addition, the British rail system requires its foremen either to have graduated from a 4-year apprentice program, which covers multiple crafts, or to have completed and passed a 6 to 8 week multicraft training course.
Conclusions

Like the locomotive engineer training program, Amtrak's carman apprentice program has the elements of a complete training regimen—classroom instruction, on-the-job training, and testing. If the apprentice program were used more extensively, we believe Amtrak would have strong assurance that its carmen possessed the necessary skills to effectively perform their duties. However, because of the length and cost of the program, it is unlikely that Amtrak will use it extensively to meet the divisions' immediate staffing needs.

Most carmen are trained through divisional set-up programs that are not effectively controlled and, in our view, provide little assurance that carmen obtain the knowledge and skills they need. The set-up training does not focus on teaching all the skills a carman needs, is not consistently applied either within a division or among the divisions, and does not routinely include testing to ensure that the trainees have acquired the knowledge and skills to do the job.

If staffing shortages continue to occur as Amtrak expands its commuter rail operations, the use of set-up instead of apprentice programs is likely to continue or increase. However, the division-managed set-up training programs are designed to address each division's short-term staffing needs and do not recognize the consequences of this long-term trend. Nevertheless, the programs have not been assessed to ensure that they fulfill divisional or Amtrak carman training needs. Without a central focus on what the training needs are and central direction to design training programs to meet those needs, we believe that the weaknesses we have identified in the set-up programs will continue. We therefore believe that Amtrak is vulnerable to having a future carman work force that may not possess the mix of skills needed to effectively carry out its responsibilities.

Amtrak's vulnerability in its carman training programs may be even more pronounced because it does not generally train mechanical foremen in the technical crafts they supervise. Foremen provide assurance that mechanical problems with rail equipment are identified and properly repaired. Yet if a new mechanical foreman is supervising people in a craft that he/she has not been trained in, we question whether he/she can effectively provide this assurance.

We find it particularly troublesome that in many cases foremen determine whether a carman trainee has developed the necessary skills to become a fully qualified carman. If the foreman has not been trained as a carman, he/she may not have the technical ability to make the qualifying
determination. We believe that the preliminary actions taken by the New York Division to provide classroom instruction for carmen and minimum technical training for foremen are good steps toward eliminating training gaps in these crafts. However, more needs to be done throughout Amtrak to correct these problems.

Recommendations

To close the gaps in training for carmen and mechanical foremen, we recommend that the President of Amtrak direct the Vice President for Engineering, the Chief Mechanical Officer, and the Director of HR to cooperate to

- identify which basic carman skills are needed throughout Amtrak's divisions, assess the current set-up training programs to determine how those needs are being met, and develop a single set-up training program that ensures that all carmen possess the knowledge and skills necessary to do the job and
- develop and provide training to ensure that all mechanical foremen possess at least minimal technical skill in the safety sensitive tasks performed by the four crafts they supervise.

As part of the effort to identify training needs and establish training programs, the Amtrak officials should determine what costs would be associated with the training. If adequate funding is not available within Amtrak, we recommend that requests for such funding be included in Amtrak's next budget request to the Congress.
## Major Contributors to This Report

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<tr>
<td>Joseph A. Christoff, Assistant Director</td>
</tr>
<tr>
<td>Enchelle D. Bolden, Evaluator-in-Charge</td>
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<tr>
<td>David I. Lichtenfeld, Site Senior</td>
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<tr>
<td>Abigail Ohl, Evaluator</td>
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</tbody>
</table>
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