

# Train Dispatcher Training Standards Inquiry



Office of Safety

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# TABLE OF CONTENTS

TITLE	<u>IGE</u>
MANDATE	1
PREAMBLE	, 2
INTRODUCTION	. 2
BACKGROUND	, 3
SCOPE	. 4
ACCIDENT DATA	, 5
TRAINING SUMMARY	. 6
FINDINGS	. 7
AGENCY PROPOSALS	. 8
OCCUPATIONAL STRESS	. 9
WORKLOADS	LO
TECHNOLOGICAL ADVANCES	12
TRAINING	13
ANALYSIS	26
Attachment I	28

# MANDATE

The Rail Safety Improvement Act of 1988 (Public Law 100-342) amended Section 202 of the Federal Railroad Safety Act of 1970 by adding at the end the following new subsection:

"(p)(1) The Secretary shall, within 180 days after the date of the enactment of the Rail Safety Improvement Act of 1988, conduct and complete an inquiry into whether training standards are necessary for those involved in dispatching trains.

"(2) Upon the completion of such inquiry, the Secretary shall report the results of such inquiry to the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate along with the Secretary's recommendations, and if the Secretary recommends that rules, regulations, orders, or standards be issued, the Secretary shall promptly initiate appropriate rulemaking proceedings.".

#### PREAMBLE

The Federal Railroad Administration's (FRA) nationwide general safety assessment of train dispatching offices, already underway, provides the basis of response to the Congressionally mandated inquiry into railroad dispatcher training standards. The assessment also addressed other issues of safety germane to train dispatching practices.

The first five pages of this report address the scope of the assessment, and FRA's findings relative to training of dispatchers. The remainder represents a detailed narrative of FRA's activities relating to occupational stress, workloads, and dispatcher training. The complete dispatching assessment report has two sections, totaling about 370 pages.

# IN RODUCTION

Since 1979, FRA has conducted a number of special safety assessments on selected railroads to complement on-going inspection programs. In 1987 FRA deviated from the traditional single railroad system safety assessment idea to conduct a nationwide study of train dispatching offices. FRA initiated this project because of:

- Application of new technology that change train control methods. These include computer assisted train dispatching and communications capabilities.
- Changes in railroad operating rules and methods of operations. These included the use of radio transmitted mandatory directives instead of traditional operator delivered train orders.
- Mergers, consolidations, line sales and other economic factors resulting in the consolidation of train dispatching offices and positions. This has resulted in expanded geographic territorial responsibilities for remaining dispatcher positions.
- Concerns that excessive dispatcher workloads and increased occupational stress could result from such industry changes.

#### BACKGROUND

A train dispatcher is responsible for safe, efficient and effective utilization of a segment of a railroad line, or lines, identified as a dispatching district. The dispatcher's first responsibility is the safe and efficient movement of trains over a district, consistent with operating rules. The dispatcher also must allow for maximum utilization of maintenance forces by optimizing time available for inspection, repair and capital improvement. The dispatcher's principal duties include:

- Scheduling train movements to provide for safe and efficient meeting and passing of other trains in a manner consistent with the mission of each train.
- Managing unexpected events and emergency situations to protect carrier interests and limit delays to affected trains.
- Arranging "track time" by engineering forces to permit timely maintenance while minimizing train delay and providing protection for such operations.

The dispatcher must maintain detailed and accurate activity records for all authorizations. This includes a record of train movements, mandatory directives for the occupancy or obstruction of track, directives for the movement of trains not otherwise authorized by the operating rules, and orders restricting the movement of trains. Individual railroads may require other additional duties and activities that need documentation as well.

#### SCOPE

During the assessment, FRA developed information regarding the following subjects:

- Initial and periodic dispatcher training including classroom and on the job training; training and testing on carrier operating rules and instructions; and training on physical characteristics of the railroad.
- The number and types of operational tests and inspections conducted on train dispatchers by each railroad. This included the number of failures recorded for each office.
- Years of experience for each train dispatcher FRA observed during the project.
- Evaluation of staffing capacities and practices of each railroad included in the assessment.

FRA inspectors also determined each railroads compliance with operating rules, Federal regulations, and record keeping requirements. FRA evaluated the operating practices of each railroad by determining what rules and procedures were in effect, and then evaluated compliance with these rules and procedures by the train dispatchers as well as other employees who interact with the dispatchers.

In all, the assessment encompassed operations on 15 freight, one passenger and four commuter railroads. FRA audited 125 dispatching offices and observed over 1,000 train dispatchers during the assignment. About 50 Operating Practices Inspectors and Specialists from all eight FRA regions participated. The Office of Safety Headquarters staff analyzed and collated data collected during the assessment.

#### ACCIDENT DATA

A review of the FRA accident database failed to disclose a statistically significant pattern of accidents caused by inadequately trained or inexperienced dispatchers. In a few cases, dispatchers didn't apply railroad operating rules properly or the rules were insufficient to prevent accidents. Still, those accidents that did occur demonstrated a potential for catastrophic consequences resulting from dispatcher error in the application of operating rules.

FRA believes that railroad operating rules training is absolutely essential for safety. However, there is no clear evidence to indicate unsafe activities have resulted from inadequate dispatcher training in other areas. These other areas include operation of automated control systems, operation of communications systems, railroad technical and administrative procedures, and qualification of dispatchers on a railroad's physical characteristics.

Training on control and communications systems is vital for efficiency, and it is likely there is an indeterminate correlation between efficiency and safety. It should be noted, however, that automated control systems are designed to fail safely, and proper communications procedures are safeguarded by railroad operating rules. If these communications procedures are followed, improper operation of the communications system would not be unsafe.

#### TRAINING SUMMARY

Dispatcher training programs consist of the following general categories:

- 1. Initial and periodic instruction on railroad operating rules, timetables and special instructions. FRA requires this training, as well as a program of operational testing and inspection.
- 2. Formal training of apprentice dispatchers on railroad technical and administrative procedures.
- 3. Formal training for apprentice and experienced dispatchers learning new technology systems and procedures.
- 4. On-the-job training with experienced dispatchers.
- 5. Training on the physical characteristics of dispatcher assigned territories.

#### Federal Requirements

Through the requirements of 49 CFR Part 217, FRA learns the condition of operating practices in the railroad industry. Part 217, which is entitled "Railroad Operating Rules," requires each railroad to:

- File with FRA their code of operating rules, timetables and special instructions.
- Conduct operational tests and inspections to determine the extent of compliance with their operating rules and timetable instructions. This program must be filed with FRA.
- Provide employees governed by the rules with initial and periodic instruction. This program must be filed with FRA.
- File an annual report with FRA to include a summary of each operational test and inspection conducted, and the results of these tests and inspections.

## FINDINGS

Train dispatchers and systems designed to assist them are essential for safe and efficient railroad operations. Because of this, the railroad industry has always recognized the importance of maintaining a prudent, well trained dispatching workforce. It was not surprising FRA found the dispatcher workforce to be competent. For the most part dispatching procedures and systems are sound and effective on virtually every railroad. FRA findings can be summarized as follows:

- The FRA assessment disclosed inconsistencies among railroads, and occasionally among different dispatching offices of the same railroad, regarding initial and periodic operating rules instruction. Although this type of instruction is required by FRA, regulations currently do not specify content of these programs of instruction.
- 2. FRA determined that operational testing and inspection of train dispatchers was inadequate on almost all railroads.
- 3. FRA noted major training differences on dispatcher control and communications systems, procedures, and physical characteristics. FRA found these variations not only on different railroads, but on different offices of the same railroad. At some offices training was exclusively on-thejob, though new technology control and communications systems were in place.

While there is no evidence that accidents have resulted from inadequate training in these areas, poor training would likely impact train dispatcher efficiency and productivity. Failure to provide adequate training of this type also could contribute to stress, fatigue, and work overload.

4. FRA attempted to develop information regarding dispatcher stress factors and workloads. After collating and evaluating the data gathered, the agency found that occupational stress and workload measurement are fields requiring substantial and unique expertise. The railroad industry has not made adequate studies of these factors.

7

#### AGENCY PROPOSALS

- 1. FRA is currently evaluating the requirements of 49 CFR Part 217 (Railroad Operating Rules). The agency intends to resolve ambiguities contained in this Part, and to closely scrutinize dispatcher operating rules instruction programs submitted by each railroad. FRA further intends to evaluate operating rules training options, and will make changes in the rule as deemed necessary to ensure safety.
- 2. Because of the diverse control and communications systems, and operating procedures currently in use, FRA does not believe regulations in these areas are now advisable. Further, several railroads have initiated comprehensive training programs since the conclusion of the initial assessment. These programs are dissimilar, but each is far more comprehensive than those evaluated during the assessment. FRA intends to conduct in-depth reviews of these new programs. The agency is also considering convening a task force consisting of FRA dispatching specialists, railroad experts, and organized labor to evaluate training procedures in areas other than operating rules. FRA would then issue guidelines to the entire industry regarding these areas.
- 3. Through the Office of Research and Development, FRA intends to contract with outside experts to help develop workload measurement models, and to study occupational stress of train dispatchers.

The remainder of this report represents a detailed narrative of FRA's activities relating to occupational stress, workloads, and dispatcher training.

# OCCUPATIONAL STRESS

Analysis of occupational stress data gathered by FRA Inspectors during the assessment disclosed that while there is evidence of occupational stress in the dispatching environment, the agency is currently without necessary expertise to measure and evaluate these forces. Factors observed that may generate stress include frequent or occasional work overloads, ambiguous operating rules and instructions, the substantial safety responsibilities inherent in these positions, and on-time train and track maintenance requirements. In addition, at some locations a real or perceived lack of job security was evident.

Computer assisted dispatching systems used by many railroads replace the safety verifications previously done by the historic human dispatcher-operator bond. Some railroads have programmed operating rules logic into new or existing computer systems, which supplants the previous human verifications. Other railroads have changed operating methods and have eliminated the operators but have not established dual confirmations to replace the earlier system. These changes have an obvious potential to create additional stress for train dispatchers.

FRA recognizes the need for additional study of the occupational stress problem area. This field is an extremely complex one and would require substantial research, with input from experts in the health and human factors communities. This research would need to be suitably combined with FRA's own distinctive expertise to develop a meaningful typical stress model. Only then could FRA adequately assess and devise appropriate recommendations for the industry regarding this subject. FRA intends to pursue this issue by contracting with outside experts, while retaining control of the process.

### WORKLOADS

As with occupational stress, FRA found that evaluation of employee workloads is a field also requiring unique expertise. Although the inspection force focused on this subject during observations of individual dispatchers, the data was inadequate.

FRA developed data by determining the number of trains handled and authorities issued by dispatchers during the work shift of each individual dispatcher observed. The agency also collected data regarding:

- The number of control points and interlockings controlled by each dispatcher;
- The number, type, and effectiveness of communication devices for which each dispatcher was responsible;
- Methods of operation and total track miles for each position;
- The amount of administrative duties assigned each dispatcher.

The intent was to collate this data and reach meaningful conclusions. Most railroads use similar procedures to estimate workloads when planning office or position consolidations. FRA found this an imprecise method of determining true dispatcher workloads. This process does not consider the varied tasks that a dispatcher must complete to move even one train across an assigned territory. Therefore, the summation of tasks a dispatcher must consider and handle in a brief time frame are not properly equated.

Time and motion studies, for the most part, do nothing more than average workloads over an eight hour period, which is the standard work shift for most dispatchers. These averages do not consider that most dispatcher workloads may occur over short but busy time spans. During such time, a dispatcher is often working at the limit of human capability. For example, a dispatcher on any of the nation's commuter railroads generally handles well over 100 train movements in less than one hour during rush periods. It is common on freight railroads to observe dispatchers issuing most of the daily track maintenance authorities in a one hour period while simultaneously directing multiple train movements.

A train dispatcher's function is to permit safe and efficient train and on-track equipment movements within an assigned territory, while also permitting track, signalling and equipment maintenance to proceed effectively. To do this properly the dispatcher must consider rules, procedures and schedules and decide how each will affect what needs to be accomplished. It is also inevitable that unexpected and emergency events will affect these duties from time to time. True workoad measurements must also include these considerations.

In order for useful data to be gathered, a system needs to be developed that could document the dispatchers' mental estimates of what is necessary to do all individual tasks involved in the dispatching district. Parameters need to be established to assure true workload measurement. These parameters must find how methods of operation, communication requirements and capabilities, control machines, computers, and extraneous duties affect workloads. The parameters must consider all technological capabilities of the dispatcher's work place. For example, control machine capabilities fluctuate from those that require a dispatcher to manipulate each signal and switch lever individually to those that automatically route train movements over substantial portions of a territory. The same is true of communication consoles.

FRA lacked the expertise to develop the necessary parameters to assess workloads before starting this assessment. And, there is little evidence the railroad industry has developed such parameters.

Due to the nature of the work of train dispatchers, a single sample would not be a consistent measure of the true workload. Resources need to be expended to develop a repetitive method of sampling (increased sample size) so that sample results do not depart from a true result for the entire population. Like occupational stress, this is a complex field. To measure workloads properly, and to consider the effects they have on safety, it would be necessary to contract with outside experts. It also would be necessary for FRA to devote selected staff resources to the project to assure all variables will be Additional time would then be necessary to formulate identified. adequate databases, and to study selected railroad dispatching FRA intends to further address this issue in the offices. future.

#### TECHNOLOGICAL ADVANCES

In recent years, the railroad industry has made significant progress in the application of new technologies in dispatching and communications. Many of these applications were implemented concurrently with the FRA assessment. During review of the data submitted by the inspection staff, it became apparent the changing technology would require modifications in techniques used by FRA during future assessments of this nature. Therefore, when CSX Transportation's, Jacksonville, Florida, Control Center was assessed, FRA decided to:

- Include staff experts in signal, communication, and computer systems in actual field work as well as in evaluation of assessment findings.
- Conduct a comprehensive review of staffing practices, operating rules and practices, training programs and procedures, and other components essential for a safe and effective operation.

The procedures employed by FRA during the CSX Jacksonville assignment resulted in the garnering of a significant amount of valuable information. As an example, devoting staff resources entirely to training resulted in more complete data. Also, the FRA gained a better understanding of what will be necessary to perform workload and occupational stress evaluations in the future. The operation, however, imposed considerable cost and staff burdens on the agency. FRA conducts such projects simultaneously with many other safety obligations. Nonetheless, because they produce valuable benefits for the railroad industry and the agency, FRA will use this approach when conducting future projects of this nature.

### TRAINING

As indicated by the following graph, the nation's train dispatcher work force is generally composed of experienced employees.



Of all dispatchers interviewed, 65 percent indicated 10 or more years of dispatching experience. Those showing 20 or more years were in the largest group and comprised 25 percent of the total. On the opposite end of the spectrum, those with less than one year through three years of experience were 12 percent. The smallest group, 6 percent, had between four and six years of train dispatching experience.

These statistics suggest that many dispatchers are in the latter stages of their careers. New technology, consolidations, mergers and abandonments will only partially mitigate the need to train replacement dispatchers. In addition, the introduction of technologically sophisticated computer assisted control systems has created the need to reassess traditional methods used to instruct dispatchers. The depth of training required by candidates for dispatcher positions has expanded in recent years. This has occurred because of both an increase in the sophistication of the technology employed and decrease in the number of employees with experience as operators. Operators conduct safety-critical duties similar to or in consort with dispatchers. Proficient operators develop relevant knowledge and skills. When railroads select employees without operator experience as dispatcher trainees, training programs must compensate for the lack of specific knowledge and skills. In recent years, some railroads have selected candidates without prior railroad experience. These candidates do not ordinarily understand the fundamentals of the industry or have any knowledge of railroad operating or safety rules and practices.

# Initial Training

Besides initial training on the physical characteristics of the railroad, carriers have historically provided initial training to dispatchers through on-the-job training, classroom instruction or a combination of the two. FRA believes the most beneficial programs have successfully integrated both on-the-job and c. ssroom training into cohesive and comprehensive programs.

# On-the-Job Training

On-the-job training with an experienced dispatcher simultaneously exposes the new dispatcher candidate to both knowledge and limited practical experience. It is not abstract. The candidate can readily perceive the impact of decisions made by the dispatcher. Because of its lack of structure, on-the-job training can result in significant logistical and financial burdens. On-the-job training also can be a tedious process for both the trainer and the trainee.

The railroad usually selects an on-the-job trainer because they have accumulated enough seniority to be awarded a regular assignment. The FRA found instruction on the methods and means to provide training is not usually furnished to the trainer. Also, the knowledge, skills, and abilities needed to provide training may not be the same as those required to function successfully as a train dispatcher. Other shortfalls include that, at a position with a heavy workload, the trainer may lack the time to provide detailed instruction; not all railroads provide monetary incentives to trainers; and rules which make the trainer responsible for the errors and omissions of the trainee may serve as disincentives to on-the-job training.

On-the-job training is situational. Events may not occur that require the application of specific functions of the traffic control equipment, operating rules, special instructions, bulletin notices, timetables or other important job elements. Also, any faults or weaknesses the trainer possesses may be acquired by the trainee.

It is difficult to assess the progress of a trainee in an on-thejob training program. For example, some railroads require a signal department employee to instruct the candidate on the functions of traffic control and communications devices, railroads seldom provide periodic evaluations, and the trainer may use subjective criteria that has limited validity.

When circumstances permitted, many railroads have initially qualified employees on the least difficult dispatching positions in an office. As candidates become more proficient they are trained and qualified on progressively more challenging positions. After being qualified, where employees work under a collective bargaining agreement, assignments are governed by seniority. This often leads to junior employees working the least desirable and most difficult assignments in an office.

It can be said that a dispatcher continues the learning process even after meeting the minimum safety threshold requirements for working a position unassisted. Proficiency and productivity usually increase over time. After a dispatcher is integrated into the work force, the carrier must decide that individual compliance with operating rules and other instructions is at an acceptable level. This quality assurance program consists of conducting operating tests and inspections. FRA noted that although supervisors are often present in dispatcher offices, formal, documented monitoring usually does not occur.

#### Classroom Training

In a formal classroom environment, instruction and training can be conducted without the interruptions that occur during on-thejob training. Conversely, any sequence of events may be interrupted by the instructor or student at appropriate times for questions or clarifications. Students learn the application of the operating rules and practices in a uniform and precise manner.

When railroads equip classrooms with simulators, control system functions can be repeated until the student fully understands them. Significant combinations of operating situations can be simulated. Emergencies or unusual occurrences that a trainee might not encounter during on-the-job training can be created, including catastrophic losses of primary traffic control or communication systems. FRA, like the Federal Aviation Administration (FAA) and many behavioral scientists, believes that human response can be conditioned.

Structured participation by representatives of the signal, maintenance of way, mechanical and other departments are facilitated by a classroom environment. These representatives can help the trainee understand the role the train dispatcher plays in the total operation of the railroad. For example, signal department representatives can provide insight into basic signal theory and logic and their practical application. In a classroom setting specific goals and objectives can be established and formal evaluations can be conducted. The trainee can be provided with formal feedback on his progress.

# <u>Simulators</u>

Several Class I railroads have initiated programs to consolidate dispatching offices at centralized locations. This consolidation often includes a capital expenditure for computer assisted dispatching systems. Computer assistance is in service for both signaled and non-signaled operations.

FRA examined the use of simulators during the assessment and commends those railroads that have integrated the use of simulators into respective training programs. It did not, however, appear that these railroads are utilizing the simulators for maximum effectiveness. For example, on some railroads the primary function of simulators was to verify system hardware and software. Their use as training tools were limited by design. FRA's findings were in many respects similar to earlier studies of FAA use of simulators.

Some obvious benefits in the use of simulators for train dispatcher training are:

- They permit experiences with traffic to be arranged in an order of increasing complexity that is optimally useful for training purposes.
- They permit immediate review and assessment of each training experience.
- They provide as much repetition of any type of dispatching problem as necessary to achieve mastery.
- They do not interfere with actual operations.
- They permit simulation of uncommon but important events or situations. Students need not wait for occurrences of such events or situations in real life.
- Scheduling is flexible and can be tailored to the total training program and for periods appropriate to the subject's importance.
- The duration of total training time can be reduced.
- Safety is not a factor during the training process.

16

Simulation is the process of representing a real task or event. It is not a complete duplication of reality, although parts of what is represented may be duplicated. Depending on the purpose to be served, the degree of simulation, portions of the system included, and fidelity of the simulation should vary.

For example, it has been found that high fidelity of simulation is not important when training a person to do tasks with fixed procedures. Precise sensory cues are important in training for tasks that require precise motor skills such as accurate feedback (or "control feel") on aileron or rudder controls in aircraft simulators. Only that part of traffic control that is a precise sensory-motor skill requires high fidelity in the simulation.

On the other hand, if critical skills mostly concern decision making and communication, completeness is probably more significant than precise display panel realism. In sum, the validity of a simulation has to be proven by research and experiment.

# FRA Survey of Corporate Training Policies

The FRA found that training varied not only among railroads but also among different divisions on the same railroad. To obtain system policies, FRA surveyed the headquarter's offices of the various railroads. Separate data was obtained for inexperienced new dispatchers, experienced new dispatchers, and skilled dispatchers training for new positions. FRA believes these three categories of employees each need unique levels of training. FRA defined these terms as follows:

Inexperienced new dispatcher- an employee who has never performed service covered by Section 3 of the Hours of Service Act for any railroad. This section of the law pertains to operators and train dispatchers. As indicated previously, operators perform safety-critical duties similar to or in consort with dispatchers. Proficient operators develop relevant knowledge and skills.

Experienced new dispatcher- an employee who has been or is being trained as a dispatcher, but who previously performed service for another railroad as a dispatcher or for the current railroad as a block operator, train director, train order or interlocking operator.

**Skilled dispatcher on a new position-** a dispatcher who is being trained for a different position because of new technological applications, office consolidations, or displacement from another dispatching position.

Based on the data obtained, FRA noted the following for the three categories of dispatchers:

## Inexperienced New Dispatchers:

- On-the-job training ranged from a low of 20 days to a high of 90 days. Of railroads surveyed, 55 percent did not respond to this question.
- Physical characteristics training ranged from a low of two days to a high of 10 days. Of railroads surveyed, 60 percent did not respond to this question.
- Total classroom training ranged from a low of eight hours to a high of 320 hours. Of railroads surveyed, 55 percent did not respond to this question.

# Experienced New Dispatchers:

- On-the-job training ranged from a low of 15 days to a high of 180 days. Of railroads surveyed, 25 percent did not respond to this question.
- Physical characteristics training ranged from a low of two days to a high of 54 days. Of railroads surveyed, 30 percent did not respond to this question.
- Total classroom training ranged from a low of five hours to a high of 304 hours. Of railroads surveyed, 35 percent did not respond to this question.

# Skilled Dispatchers on New Positions:

- On-the-job training ranged from a low of 10 days to a high of 25 days. Of railroads surveyed, 80 percent did not respond to this question.
- Physical characteristics training ranged from a low of two days to a high of six days. Of railroads surveyed, 80 percent did not respond to this question.
- Total classroom training ranged from a low of eight hours to a high of 160 hours. Of railroads surveyed, 80 percent did not respond to this question.

In addition, FRA noted the following for all categories defined in the survey:

 Only two railroads reported administering written examinations on physical characteristics.

- Although 18 railroads did not report any examinations on physical characteristics during initial training, such examinations are often administered by division officers before a dispatcher is considered fully qualified.
- Only two railroads reported providing any simulator training.
- No railroad reported a final examination using a simulator.
- No railroad reported administering a written examination on control machines/systems, communication devices, and electric traction where applicable.

Because of this survey, FRA concluded that there is very little agreement in the railroad industry regarding what should be included in a dispatcher training program. The agency further concluded that, on most railroads, system level officials did not possess adequate awareness of the railroad's dispatcher training programs. This conclusion is based on the low response rate to the questions asked during this survey.

#### Periodic Retraining

To comply with 49 CFR Part 217, railroads must periodically reinstruct their employees in the meaning and application of the railroad's operating rules. It was noted during the assessment that the quality and scope of each program varied from railroad to railroad.

Some programs instructed employees only on recent changes to the railroad operating rules while other programs provided a comprehensive review of all the railroad's operating rules. Eighty six percent of the dispatching offices examined during the assessment also had written examinations incorporated into their programs.

The graph on the following page depicts the interval between periodic rules instruction classes. FRA notes that some 88 percent of dispatchers are instructed either annually or biennially.

19

The number of questions on examinations ranged from 15 to 900. The national average was 114. The minimum passing grade ranged from 75 percent to 100 The national percent. average was 86 percent. This wide variation existed not only among railroads but also between different offices on the same railroad. The following information obtained during WF .... i terviews with chief train dispatchers or equivalent carrier officers:

o Atchison, Topeka, and Santa Fe Railway Company



(ATSF) examinations ranged from 90 questions to 200 questions. The minimum passing grade ranged from 80 percent to 90 percent. Attendance at rules classes was not mandatory at two offices.

- Burlington Northern Railroad Company (BN) examinations ranged from 100 questions to 900 questions. The minimum passing grade ranged from 80 percent to 90 percent. One office did not administer a written examination. Attendance at rules classes was not mandatory at two offices.
- Chicago and North Western Transportation Company (CNW) examinations ranged from 15 questions to 80 questions. The minimum passing grade ranged from 85 percent to 90 percent.
- CSX Transportation (CSX) examinations ranged from 25 questions to 300 questions. The minimum passing grade ranged from 75 percent to 90 percent. Two offices did not administer written examinations.
- Norfolk Southern Railway (NS) examinations ranged from 38 questions to 150 questions. The minimum passing grade ranged from 75 percent to 90 percent.

20

- Southern Pacific Transportation Company (SP) examinations ranged from 30 questions to 100 questions. The minimum passing grade ranged from 80 percent to 100 percent. Three offices did not administer written examinations.
- Union Pacific Railroad (UP) examinations ranged from 50 questions to 400 questions. The minimum passing grade ranged from 85 percent to 100 percent.

The inconsistencies that exist among different offices of the same railroad are a concern to FRA. The present and future operating environment includes interdivisional trains, trackage right agreements with connecting railroads, and system level maintenance gangs. Consistency of rules application is necessary to assure safety of operations. A railroad's operating rules training program must therefore be consistent to accomplish its objective of producing knowledgeable dispatchers.

On many railroads the initial training of dispatchers is a division level responsibility, often delegated to a chief train dispatcher. Sufficient senior staff oversight must be provided when this safety critical responsibility is delegated to the division or equivalent level. FRA noted a commendable improvement in the consistency of training on railroads that have recently begun to consolidate dispatching offices.

Many carriers limit dispatcher periodic instruction and reexamination classes to one hour because of restrictions of the Hours of Service Act and certain contractual agreements. In most offices examined during the assessment, the Hours of Service Act restricted the total time on duty for dispatchers to nine hours in any 24 hour period. If classes last longer than one hour, the employee will be unable to work a full eight hour shift. Some contracts require premium pay for classes that exceed one hour or are attended on a dispatcher's rest day. FRA believes that a one hour period is not sufficient to provide worthwhile periodic reinstruction.

# Physical Characteristics Retraining

Another area which FRA assessed was periodic familiarization trips over the railroad. These trips serve to keep dispatchers current on the physical characteristics of those portions of the railroad over which they dispatch trains. FRA believes the importance of familiarization trips is increased when consolidations, line changes, or changes in methods of operations occur. These trips are typically taken either by hi-rail car or train. Both methods have advantages and disadvantages. Advantages of hi-rail trips include the following:

- The speed of the vehicle is usually regulated to an extent that allows sufficient time for familiarization.
- Trips are often made with engineering department personnel who are intimately familiar with the territory and can provide insight into that department's interface with train dispatchers.
- Dispatchers can request that the hi-rail vehicle be stopped to allow them to study interlocking and other track structures.

Disadvantages of hi-rail trips include the following:

 Depending on traffic density there may be a loss of productive time while waiting to receive authorization to occupy tracks.

Advantages of train trips include the following:

- Dispatchers can accurately assess the ramifications of operating constraints such as curvature and grade-on-trainmovement decisions.
- Dispatchers can interface with train and engine crews and benefit from their experiences.

Disadvantage of train trips include:

o In high speed territory, train speed may be too great to allow sufficient time for familiarization.

Because these trips are intended to expose dispatchers to a view of the physical characteristics of the railroad, it is difficult to find justification for those railroads that conduct such trips during hours of darkness.

The graph on the following page contrasts the carriers' plans for familiarization trips with their actual performance.

FRA notes that almost half (45.2 percent) of all offices do not have a preestablished interval for such trips. Interviews with dispatchers showed that 78.3 percent have made at least one familiarization trip within the past three years. Included in the 78.3 percent total are 19.3 percent of all dispatchers who have made a



trip within the past two years and 46.9 percent who have done so within the past year. FRA believes that periodic familiarization trips should be an integral component of each carrier's periodic training program.

# Organized Labor Involvement

The American Train Dispatchers Association (ATDA) has training requirements stipulated in collective bargaining agreements. Specific training program requirements are not detailed in these agreements. The agreements are intended to ensure that dispatchers who are required to learn new positions or new equipment are given ample opportunity to do so. The requirements vary from railroad to railroad, but generally specify between 60 and 120 days of retraining. Apprentice dispatchers are covered by such agreements on only one railroad, the New Jersey Transit Rail Operations, Inc. (NJTR). Those railroads who do not have collective bargaining agreements with the ATDA are not bound by these standards.

# Recent Developments

The railroad industry is currently in a transitional period. This transition includes the following changes:

- 1. Changes in operating rules and methods of operations.
- 2. Application of new technology.
- 3. Consolidations and reorganizations.

Advances in communications equipment and data management techniques have resulted in massive changes in the operating rules in recent years. Railroad operating practices have changed more in the last decade than they had in the previous century.

To reduce the burden on railroad employees and efficiently address training requirements, the nation's railroads have formed two major rules associations to standardize operating rules for respective participating members. These associations are the **General Code Committee**, which is comprised of most western railroads, and the Northeast Operating Rules Advisory Committee, which is comprised of most railroads in the Northeastern United States. These organizations have developed "standard" codes of operating rules that reflect their members' regional needs and interests.

During the assessment, the organizational structures of many major railroads were being modified to coincide with technological advances and changes in the operational plans of railroads. Mergers and marketing strategies contributed to decisions to increase substantially the size and responsibilities of operating divisions. These railroads already have or are consolidating train dispatching offices. A major advantage of centralization is that work force and training needs can be managed more efficiently. Another major advantage is that operating rules and practices are more likely to be consistently applied. This serves to eliminate potential confusion among employees. Still, these advantages are not automatic. Railroads must develop good plans and implement effective programs.

The railroads involved in these reorganizations are recognizing this and taking positive action to address their needs. Following are examples of dispatcher training programs recently developed by several major freight railroads.

#### Burlington Northern (BN)

BN opened a technical training center in Overland Park, Kansas in April, 1988. This training center is responsible for development and implementation of technical training courses for many railroad employee crafts, including train dispatchers. Four such courses have been developed for train dispatchers, as follows:

- Separate one week courses for each of the following: chief train dispatchers, assistant chief train dispatchers, and experienced trick train dispatchers. These courses consist of operating rules updating, recently developed dispatching techniques, and management methods affecting dispatching offices.
- A five week course for apprentice train dispatchers. This course is designed to prepare individuals for the duties of a train dispatching position. It includes thorough instruction on operating rules, and simulation of train dispatching duties. BN has a dedicated lab with two centralized traffic control (CTC) simulators that simulates a dispatching office. The instructor can suspend real-time and discuss errors or accepted techniques. During the simulation, each student is required to maintain proper dispatcher documentation of train movements.

#### Consolidated Rail Corporation (CR)

CR began a five week course of instruction for apprentice train dispatchers in September, 1989. The course has the following:

 Ten days of formal classroom training. Five days are on operating rules. One day is on operating rules and the power brake requirements. Four days are orientation of various railroad business and operating practices.

- Five days at the students' home divisions. Specific assignments include riding through or local freight trains, and one day with a yardmaster or trainmaster for yard orientation. One day is spent in the divisional train dispatching office.
- Ten days simulation training of the Computer Assisted Train
  Dispatching (CATD) system at the Dearborn, Michigan,
  dispatching office. This includes a review of the operating
  rules during the second week.

# CSX Transportation

A synopsis of FRA's evaluation of the CSX training program is included as Attachment I of this report.

# Union Pacific (UP)

UP is consolidating all dispatching functions at a center located in Omaha, Nebraska. All dispatchers transferred to this center are given a five day training course. Four and one-half days are devoted to simulator training; the other half day has communication skills, hazardous materials review, and a health and environmental development course designed to teach shift workers how to manage better their activities both in and out of the workplace.

#### ANALYSIS

The FRA assessment disclosed two notable details. First, system level officers have often delegated dispatcher training to subordinates but have not provided adequate direction and control. Second, system level officers did not have definitive opinions regarding necessary components of a dispatcher training program.

FRA found no training deficiencies that might result in unsafe conditions. Yet, there was a noticeable pattern of inconsistency. The length and depth of initial training provided to dispatchers varied widely. FRA noted major variations even among different dispatching offices on the same railroad.

There were also inconsistencies among different dispatching offices of the same railroads regarding initial and periodic rules instruction. The inconsistencies found by FRA were often of major proportions.

FRA noted the following during the assessment:

 Despite increasing use of complex technology and a reduced number of subordinates, some carriers' initial training programs are exclusively on-the-job.

- Standards and policies for periodic retraining of dispatchers varied widely both among railroads and among different locations on the same railroad. At some locations there was no formal policy regarding periodic retraining.
- Policies concerning familiarization trips varied widely.
  The number and frequency of trips were insufficient on some railroads.
- At some locations, initial and periodic training suffered because of staff shortages. Due to the insufficient number of relief employees, dispatchers at some offices were not permitted to make familiarization trips over the railroad.

27

# Attachment I

During the assessment FRA conducted a case study of the dispatcher training programs of CSX Transportation (CSX). CSX was chosen because experienced dispatchers were being trained on a new, uniform, computer assisted dispatching system.

In 1988 CSX began to consolidate train dispatchers into the system control center in Jacksonville, Florida. The facility incorporates highly sophisticated computer assisted train dispatching technology.

Training on the functions and operations of the computer assisted dispatching system is done by the assistant manager-dispatching system. This person has been helped on a part time basis by a chief train dispatcher from a division that has not yet been transferred to the Jacksonville center. The training duties of the assistant manager-dispatching system are done collaterally with other responsibilities. These other duties include updating, refining, and loading data into the system. Training on the physical characteristics and field operations are under the jurisdiction of the Director-Manpower Control. Except for on-the-job and field training, all training is conducted in a room next to the control center.

There were no new train dispatchers hired because of the system consolidation. Some experienced train dispatchers did not choose to accept transfer to the control center. Others did not possess sufficient seniority to obtain a position. As a result, all dispatchers trained on the computer assisted dispatching system are previously qualified train dispatchers.

The original staffing plan for the control center specified 164 employee positions. During early implementation, management decided to create eight additional assistant chief train dispatcher positions and increase the extra lists by two positions. This caused many bids and bumps, and resulted in 52 permanent changes not including interim bumps. Although the process was apparently somewhat disruptive to the transition process, no safety concerns were raised. The net result was that additional dispatchers could bid on positions with jurisdiction over territory in which they were already familiar.

Train dispatchers on CSX are members of the American Train Dispatchers Association (ATDA). The collective bargaining agreement between the carrier and union provides for 60 days training for experienced train dispatchers who accept transfer to the control center. Carrier officers stated that this provision of the agreement has been liberally construed, with train dispatchers often receiving additional training. Some dispatchers received up to 90 days of training. Before the consolidation, some offices were equipped with centralized traffic control or earlier versions of the computer assisted dispatching system while other offices had neither. The assistant manager-dispatching system stated that the type and length of training provided to a dispatcher was generally uniform, despite the systems in place at a former office location. To fit the needs at Jacksonville, CSX developed a computer training program that is 15 days in length.

The first four days of the program include classroom discussions on computer assisted functions of the control system. With two exceptions, days five through ten are devoted to hands-on practice work with a computer simulator and on-the-job training with experienced dispatchers on actual consoles. The two exceptions are a two hour training session on the computer assisted centralized advanced communication system that is presented on the fifth day, and an operating rules instruction class and examination that is conducted on the ninth day.

After the tenth day dispatchers are presented with three options. If they feel they are in need of additional time to practice on the simulator, such time is allowed. If they feel they need field training time, they are sent to field locations. If they feel they need neither, they are released to return to a field assignment. About five days before cut-in of a new territory takes place, dispatchers return to the Jacksonville center for a refresher course. This refresher course constitutes days 11 through 15 of the training. It includes additional time on the computer simulator and on-the-job training.

The operating rules examination is a 50 question written test that requires a minimum passing grade of 80 percent. FRA reviewed the written test and noted the following:

- o The same test is given to dispatchers and operators.
- The test given to dispatchers at the control center is the same test given to dispatchers at field locations that have not yet been transferred.
- o The test does not include any questions unique to the computer assisted Direct Train Control (DTC) method of operation.
- The 80 percent passing grade is lower than required by some other railroads in the country.

There is no written test or practical examination given to evaluate formally the train dispatcher's knowledge of the computer assisted dispatching before release from the computer portion of training. The assistant director-dispatching system conducts an on going evaluation of the progress of a dispatcher's knowledge, skills and abilities.

Besides the rules training and computer training described above, dispatchers are also given field training. This training is targeted at employees who have not previously performed service on a specific portion of the railroad. It is intended to provide these employees with a knowledge of the physical characteristics and operations of that portion. According to the directormanpower control, carrier policy on field training is that train dispatchers will ride over main track segments on the territory to be worked before allowed to dispatch trains. Some high traffic density branch lines are also included. Train dispatchers may ride either trains or hi-rail cars. Records are kept showing the times and dates of qualification trips. FRA interviewed about 30 dispatchers working at the control center. Two dispatchers stated they had never ridden over the territory they dispatch; four stated they had not ridden over portions of the territory they dispatch.

There is no written or oral examination to decide whether a dispatcher has attained a sufficient level of competence on the field portion of training. When a dispatcher begins to dispatch trains over a territory he is provided with a "helper." This helper is a carrier employee familiar with the physical characteristics and operating patterns of the territory. The carrier employee may be another train dispatcher or a carrier officer such as a superintendent of operations or trainmaster. When the train dispatcher, the helper, the chief train dispatcher, and other carrier management employees mutually agree that a dispatcher possesses sufficient knowledge of field operations, they are permitted to work alone. According to carrier officials, the success of this method is proven because no dispatchers have required additional training after having been allowed to work alone.

During the assessment FRA inspectors interviewed train dispatchers and observed them in performance of their duties. Results of interviews suggested that train dispatchers are generally comfortable with the level of training provided on the computer system. Some train dispatchers indicated they could benefit from additional field training. FRA's evaluation of the performance of dispatchers did not suggest any undesirable patterns that could be attributed to insufficient training.

To ease the stress of transition for train dispatchers, the director-manpower control stated the carrier has extended well beyond requirements of the collective bargaining agreement. To the extent possible training was scheduled in consideration of family obligations, such as weddings and graduations. In addition train dispatchers with school age children are accommodated to prevent relocation during the school year.