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

National Train Dispatcher Safety Assessment 1987—1988

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07 - Human Factors

SECTION I

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CHAPTER 1- INTRODUCTION

BACKGROUND

The Federal Railroad Safety Act of 1970 vests the Secretary of Transportation with far-reaching authority--including the power to conduct special investigations--to promote safety on the nation's railroads. The Secretary has delegated authority over all areas of railroad safety to the Federal Railroad Administration (FRA). Since 1979, FRA has conducted safety assessments of selected railroads to complement its on-going inspection programs with this systematic method of examining each railroad's structural approach to safety management. Safety assessments have proven to be a valuable tool to FRA and the railroad industry because:

- They allow systematic safety problems to be dealt with in context rather than in a piecemeal, case by case manner.
- They facilitate dealing with structural issues such as corporate staffing, communications, and accountability, which are not easily addressed during normal on-site inspections.
- They ensure direct communication between senior FRA and carrier officials on all issues of significance.

In 1987 FRA deviated from the single railroad system safety assessment concept to conduct a nationwide study of train dispatching offices. FRA chose to initiate this assessment because of:

- Application of new technology which resulted in changes in train control methods. These include computer assisted train dispatching and communications capabilities.
- Changes in operating rules and methods of operations. These included the use of radio transmitted mandatory directives in lieu of traditional train orders.
- Mergers, consolidations, line spin-offs and other economic factors which have resulted in the consolidation of train dispatching offices and positions. This has resulted in expanded geographic territorial responsibility on the remaining dispatcher positions.
- Concerns that excessive work loads and increased occupational stress on train dispatchers could result from the above mentioned factors.

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.".

The nationwide safety assessment of train dispatching offices, which was already underway, addressed that subject of inquiry as well as many others.

PREVIOUS FRA ACTIVITY

In 1971, FRA commissioned the Transportation Systems Center (TSC) to analyze the responsibilities of the railroad train dispatcher. The report of this study, which was entitled **"An Analysis of the Job of Railroad Train Dispatcher"** was published in 1974. The report summarized:

> "....the train dispatcher is responsible for the safe and efficient movement of rail traffic over all of his assigned territory. To aid him in this duty, he is provided with an extensive communications network and several special-purpose devices. As techniques and devices for command and control technology have been developed over the years, they have been applied to the various functions of train dispatching a little at a time.
>
> However, regardless of the sophistication of their latest dispatching aids, most carriers still retain portions of the earlier systems, thus increasing the heterogeneity of the dispatcher's job as the state-of-art advances. Centralization and consolidation of operations have tended to add to the train dispatcher's workload and to the general noise and confusion in and about his workspace. Thus, the stress and tension identified as aspects of the dispatcher's job at least forty years ago are not notably lessened today..."

FRA commissioned TSC to prepare a second report in 1975. This report, entitled **"Proposed Qualification Standards for Selected Railroad Jobs"**, included information pertaining to train dispatchers. The report detailed both the minimum knowledge requirements and minimum performance requirements for train dispatchers. It summarized the job of train dispatcher as

> "... responsible for the safe movement of trains within the defined area of a railroad's operating territory. In this capacity the dispatcher plans operations, coordinates the movement of trains and manages the contingencies as they arise.
>
> To accomplish these tasks, the train dispatcher must be familiar with the organization of the railroad, the types of equipment employed in terms of locomotives and rolling stock, the territory over which the railroad operates, train control operations including the maintenance of records, and the railroad's rules and regulations. In the planning of operations, the dispatcher obtains information from superiors, the previous dispatcher on duty and other informational sources on the condition of trains, tracks, and the weather. Routing and scheduling decisions are made to move the traffic in the most expeditious manner."

Today, 19 years after FRA commissioned the first study, the conditions described in that summary continue to exist on most railroads. What was then state-of-the-art technology is now part of a system which a railroad may or may not decide to retain. Current technology includes computer dependent traffic control systems, computer systems which use operating rules logic to help regulate the issuance of mandatory directives, and computerized communication systems which route and store radio and telephone calls until connection with the dispatcher is accomplished.

SCOPE

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

- Initial and periodic training--including classroom and/or on the job training, training and testing on the carriers' operating rules and instructions, and training on the physical characteristics of the railroad.
- The number of operational tests and inspections conducted on train dispatchers by each railroad. This included the number of failures recorded for each office.

- The years of experience of each train dispatcher observed during the assessment.

- Evaluation of the staffing capacities and practices of each railroad included in the assessment.

In addition, FRA inspectors determined compliance with Federal regulations and recordkeeping requirements. The operating practices of each railroad were evaluated by determining what rules and procedures were in effect, and by monitoring the performance of the individual train dispatchers and other railroad employees who interact with them.

In all, the assessment encompassed 15 freight, 1 passenger and 4 commuter railroads. FRA audited 125 dispatching offices and observed over 1,000 train dispatchers during the field portion of the assignment. About 50 Operating Practices Inspectors and Specialists from the eight FRA regions participated. All data collected during the assessment was analyzed in FRA's Washington, DC, Headquarters by the Office of Safety staff.

The CSX System Control Center in Jacksonville, Florida, was the last of the dispatching offices audited. Because of many significant factors attached to this center the FRA audit team was directed by the Associate Administrator for Safety, and included experts from the Washington, D.C. Office of Safety staff. The Jacksonville audit was conducted jointly by inspectors and specialists with experience in operating practices, signal, communications and computer systems[1].

PERFORMANCE FACTORS

Occupational Stress

Analysis of the data on occupational stress gathered by FRA Inspectors during the assessment disclosed that while there is evidence that stressors exist in the dispatching environment, the agency is currently without the expertise necessary to properly measure and evaluate these forces. Factors observed which 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 maintenance requirements. At some locations, a real or presumed lack of job security was evident.

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[1] A synopsis of FRA's findings at the CSX Jacksonville Control Center was transmitted to CSX in a letter from FRA's Associate Administrator for Safety to CSX Transportation's Executive Vice-President. That letter, and the CSX response, are included in Section I of this report as Exhibits I and II.

Computer assisted dispatching systems used by many railroads replace the safety verifications previously performed 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 this potential problem area. This field, however, is an extremely complex one. Proper evaluation 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. Only then could the agency adequately assess, derive conclusions and devise appropriate recommendations regarding this subject. FRA intends to pursue this issue.

Workloads

As with occupational stress, FRA found that evaluation of employee workloads is a field which requires substantial and often unique expertise. Although the inspection force focused on this subject during observations of individual dispatchers, the data was found to be inadequate. It should be noted, however, that FRA Inspectors are capable of identifying situations when workloads are so heavy as to increase a dispatcher's potential to commit errors of omission. Specific examples of such situations are noted throughout this report.

FRA developed data by determining the number of trains handled and authorities issued by dispatchers during the work shift of each individual dispatcher observed. Data was also collected regarding the number of control points and interlockings controlled by each dispatcher, the number, type, and effectiveness of communication devices each dispatcher was responsible for, the methods of operation and the total track miles of each position. In addition, FRA evaluated the amount of administrative duties performed by each dispatcher.

The intent was to correlate this data and reach meaningful conclusions. Most railroads utilize similar procedures to determine workloads when planning office or position consolidations. FRA found this to be an imprecise method of determining dispatchers' workloads.

This process does not take into account the varied tasks which a dispatcher must complete to move even one train across his assigned territory. Therefore, the summation of all individual tasks a dispatcher must consider and deal with in relatively short time frames are not properly equated.

Many time and motion studies do nothing more than average workloads over an eight hour period, which is the standard work shift for most dispatchers. These averages do not take into account the fact that most of a dispatcher's workload may occur over short but busy time spans. During these time spans, a dispatcher is often working at the limits of human capability. For example, dispatchers on the nation's commuter railroads generally handle 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 at the same time 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 at the same time permitting track, signalling and equipment maintenance to proceed in a timely manner. To perform this function properly the dispatcher must contemplate the rules, procedures and schedules involved and decide how each will affect what he needs to accomplish. It is inevitable that these duties will also be affected by unexpected and emergency events from time to time.

True workload measurements must likewise include all these considerations. In order for useful data to be gathered, a system needs to be developed which could document the dispatchers' mental estimates of what is required to perform all individual tasks involved in the dispatching district. Parameters for measurement need to be established to assure workloads are indeed being measured. These parameters must determine how methods of operation, communication requirements and capabilities, control machines, computers, and extraneous duties affect workloads. The parameters must also conform with the technological capabilities of all components of the dispatchers work place. For example, control machine capabilities fluctuate from those which require a dispatcher to manipulate each signal and switch lever individually to those which 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 prior to starting this assessment. Likewise, 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. In order to

effectively measure workloads and the effects they have on safety, it would be necessary to contract with outside experts. It would also be necessary for FRA to devote selected staff resources to the project to assure all variables are properly identified. Additional time would then be required to formulate adequate databases, and to study selected railroad dispatching offices. FRA intends to further address this issue in the future.

Technological Advances

The railroad industry has, in recent years, made significant progress in the application of new technologies in dispatching and communications. Many of these applications were being 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 the techniques used by FRA during any future assessments of this nature. As a result, when FRA assessed the CSX Jacksonville Control Center, the decision was made to:

- Include staff experts in the specialties of signal, communication, and computer systems in the field work as well as the evaluation of the assessment.

- Conduct a more comprehensive review of the 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 this particular assignment resulted in the garnering of a significant amount of valuable information. The operation did, however, impose considerable cost and staff burdens on the agency. Projects such as these are accomplished simultaneously and in conjunction with FRA's many other safety obligations. Nonetheless, they produce valuable benefits for the railroad industry as well as the agency. As a consequence, FRA will conduct similar projects in the future.

ACKNOWLEDGEMENT

Throughout the course of the assessment, the officers and supervisors of all railroads contacted were cooperative and responded positively to all inquiries posed by FRA. The agency also wishes to acknowledge the valuable input of the American Train Dispatchers Association.

FRA is particularly appreciative of the cooperation of all individual train dispatchers contacted and observed during the course of this assessment. This project could not have been successfully completed without their contributions.

CHAPTER 2- HISTORICAL PERSPECTIVE

VISUAL RULES

Prior to the 1830's, train movements in America were exclusively controlled by verbal understandings between railroad crews. Multiple train movements at the same time on the same track were virtually unknown.

In 1830, there were 40 miles of railroad track in America. By 1867 this total had grown to 40,000 miles, and by 1880 the total reached 90,000 miles.

In 1832 the New Castle and Frenchtown Railroad, which operated between New Castle, Delaware, and Frenchtown, Maryland, dispatched the first American train by fixed signals. The original system consisted of a series of black and white flags on tall posts. These "signals" were located at stations and at other three mile intervals.

The carrier soon found, however, that signals of this type provided varying degrees of visibility depending on the prevailing force of the wind. To improve this situation, a system of peach baskets were suspended by pulleys from flag poles, replacing the flags. From a distance, these signals appeared to be balls. When the train was on time, a white "ball" was hoisted on the pole. If the train was late or disabled, a black "ball" was raised.

Flagmen with telescopes relayed the signals from station to station. The original purpose of this signal system appears to have been to notify passengers and persons who wished to cross the tracks of the progress of the train. Still, the early signalmen of the Newcastle and Frenchtown Railroad might be considered the forerunners of today's modern train dispatcher.

As traffic on other carriers increased, some railroads responded by posting flagmen at intervals on the line of road. These employees were often stationed within sight distance of one another. They relayed signals so as to ensure that there was always at least one flagman between trains. Although this system provided a reasonable degree of protection, it was extremely labor intensive, and it's effectiveness was drastically reduced by darkness and inclement weather.

With the explosive growth of the industry, these primitive traffic control systems were soon found to be unsatisfactory. As traffic increased, so did the number of accidents associated with inadequate control. In response, the railroad industry was soon searching for more effective systems.

TIMETABLE OPERATION

By the mid-19th century, many American railroads had evolved to operation by "time card" or timetable. This method of operation established published authorities for the regular movement of trains identified within a schedule. The system established a time interval method of operation which worked on the theory that if trains were separated by a sufficient time interval--and the trains maintained schedules--collisions could not occur.

The timetable method of operation developed many of the fundamental concepts of railroad operating practices that survive today. They include the concept of superiority of trains by class (i.e., priority assigned by management) and direction. Regulations were established by individual railroads setting forth the procedures for meeting opposing trains and passing preceding trains traveling in the same direction. These regulations were codified into the earliest codes of railroad operating rules.

Because the communications systems of the day were limited to face to face conversations and written instructions issued in advance, it was not feasible to issue revised or amended directions pertaining to timetable authority to trains once enroute. The timetable established a sense of security and order in railroad operations. For this reason, it quickly acquired the proportions of a "bible" in the railroad industry.

Failure to understand or strictly abide by the directions in the timetable could have the most dire consequences. Employees who used the timetable often had little formal education, and the instructions were frequently complex.

The timetable specified meeting points for opposing trains moving on the same track, and helped to keep the distance interval between trains operating in the same direction by establishing leaving and waiting times at specific locations. Timetable operation provided an improved operating environment and, together with early operating rules for flag protection of trains, allowed for safer train movements at higher train speeds. Because the timetable, and the operating rules which applied to it's use, prescribed the time that the main track was to be clear for the use of trains of designated classes, trains could now operate at speeds significantly higher than the visual breaking distance.

This method of operation was inflexible, however, and could not address breakdowns and delays on line of road. If one train were delayed on a high density line, the balance of traffic would also be delayed since other trains were not permitted to depart until the delayed train arrived.

TRAIN ORDERS

In 1837, Samuel Morse invented the telegraph, which permitted the first reliable and instantaneous transmission of language over long distances. In 1851, Superintendent Charles Minot of the New York and Erie Railroad used a recently installed telegraph line to issue the first "train order."

Minot was on board a westbound passenger train which was standing to meet an eastbound train. After a period of delay, Minot contacted the local telegraph operator where his train was standing, and inquired if the eastbound train had arrived at the preceding station--fourteen miles distant. When he learned that the opposing train had not arrived at the distant station, he telegraphed that station and ordered the station staff to hold the opposing train at that point. He then hand delivered a written instruction to the crew of the train that he was riding, authorizing the train to proceed contrary to the timetable.

Minot's message, which changed the meeting point between two trains, established a precedent. The move was safe because he first determined that the train being held at the meeting point had received the message. Still, Minot had to operate the train himself, since the engineer would have no part in disobeying the timetable.

A progressive system of train dispatching by "timetable and train order" was rapidly adopted by the industry. The timetable continued to serve as the "framework" or organizational plan for the daily movement of trains, while the train order established a system for managing previously unplanned events. The control and management of this system, however, remained a part time responsibility of senior division officers.

In 1859, the first full time train dispatcher was appointed by the Pennsylvania Railroad to provide relief for the division superintendent. The ability to immediately revise schedules, hold and reroute trains and identify delays and emergences from division headquarters offered so significant an advantage that the use of train dispatchers quickly evolved into a full time and specialized occupation which was more technical than administrative in character.

BLOCK SIGNALING

The railroad industry grew with success. As trains became more frequent and speeds increased, the timetable method of separating trains by time interval became progressively less satisfactory. Increasingly, railroads found themselves in a dilemma where the time necessary to space trains interfered with the full and financially advantageous utilization of tracks.

The solution was found by revising the method of separating trains, from the use of time, to the use of distance. The block system increased both the capacity and the safety of a railroad line by dividing it into lengths of defined limits and regulating the use of each length by signals. The concept was simple. No train was permitted to enter into a block unless that block was known to be clear. Block "offices" were established at the entrance to each block. These offices were manned during the hours of a railroad's operation. Each office had telegraphic communication with the offices on adjoining sides. Each office kept records of the passing of trains, and each "block operator" was required to obtain permission from the operator at the other end of the block prior to admitting a train.

Manual Block System

In 1865, the first manual block signal system in the United States was placed in service between Trenton, NJ, and Philadelphia, PA. The term "manual block" means that the actual signal aspect displayed by a signal is "set" by the operator, rather than automatically by track circuit.

The block signal's "aspect" (i.e., appearance) presented an "indication" (i.e., information) which would govern the crew in the handling of a train. Most often this information would be whether or not the block ahead was occupied.

The first manual block signal system was "absolute". Only one train or engine could occupy the block. Later, the system was modified to allow for "clear" or unoccupied blocks, and "permissive" or occupied blocks. Permissive blocks could be occupied by preceding trains. The operational safeguard was found in an operating rule that required a following train to proceed at "restricted speed" (i.e., prepared to stop short of a train or obstruction).

While the manual block system was another improvement in railroad safety, the system was less than perfect and relied heavily on human performance, memory and coordination. Collisions were inevitable.

With the rapid and continued growth of railroad systems, the number of new tracks and, consequently, new junction points, grew astronomically. Under the early manual block signal system there was no coordination between switches and signals to prohibit conflicting movements. Although signals at junction points were generally controlled by one man, there were often many switchtenders assigned to handle the switches.

The solution to this problem was the invention of the interlocking machine, a device for the coordinated control of switches and signals from a central location. In England, crude

interlockings, which independently interlocked switches and signals, had been perfected as early as 1843. The integrated system of switch and signal interlocking followed in 1859.

The first interlocking machine in the United States was imported from England by the Philadelphia and Trenton Railroad in 1870. It was installed at Trenton Station in Trenton, NJ. By 1874, interlocking machines of American manufacture had arrived.

Automatic Block Signal System

In 1872, the closed electric track circuit was first installed on the Philadelphia and Erie Railroad in northwestern Pennsylvania. This was the first "fail safe" automatic signal system. The circuit functioned to clear a signal to a proceed indication only when the rails were intact and unoccupied. Any break in the circuit would result in a restrictive indication. Thus, the trains themselves could "set the signals" between junctions.

In 1884, the first electro-pneumatic signaling apparatus was placed in service by the Pennsylvania Railroad at East Liberty, PA. Between 1885 and 1900, electro-pneumatic and electric interlocking systems replaced many manually powered interlocking plants. This made it possible to extend interlockings beyond the physical limitations of "man-powered" facilities.

Centralized Traffic Control

As American railroads entered the 20th century, railroad traffic control was largely a team effort. Timetables, by and large, were still used to establish schedules. Train orders modified these schedules and provided for the operation of extra trains. Train dispatchers functioned largely as "quarterbacks", arranging meets and passes through operators, monitoring train progress through recording "OS" (i.e.-train had passed the station) reports from block stations, and writing and transmitting orders for each train as necessary. Operators in the field received and delivered train orders, operated interlocking devices as directed and reported train progress and other matters of interest to the dispatcher. Train crews received and/or copied train orders and operated manual switches as directed.

With the number of employees involved, the system was often unwieldy, frequently resulting in delay and occasionally resulting in misunderstanding. The system reduced the traffic carrying capability of the line and incurred substantial labor costs.

As early as 1903, some railroads, principally the larger multiple track carriers on the eastern seaboard, began to convey more authority upon the signals. Rules providing that signal indications superceded the superiority of trains were adopted:

first for following movements, then for both following and opposing movements. This system expedited train movements to some extent, but the train dispatcher was still required to work through numerous block and interlocking stations. Operators at these locations still functioned as "middlemen" between the dispatcher and other employees in the field.

The solution to improving the traffic capacity of high density lines, and consequently in reducing the construction and maintenance costs associated with multiple track operation, was found in the centralized traffic control (CTC) system. CTC is a method of train operation whereby trains are governed by block signals, whose indications supersede the superiority of trains for both following and opposing movements. The control of signals, switches and other interlocking appliances is centralized at a remote location.

CTC makes it possible for a train dispatcher to directly control traffic, without operators and without train orders. Instructions can be generated entirely by signal indication, and the dispatcher has a direct visual or visual/audible display panel to identify the location and progress of trains.

The first CTC system in the United States was installed on the Toledo and Ohio Central Railroad at Fostoria, OH, in 1927. The CTC dispatcher controlled 40 miles of railroad.

According to some engineering formulas, a single track line equipped with CTC is considered to have about 70 percent of the traffic handling capability of a double track line equipped with ABS (Automatic Block Signals).

CTC became commercially viable because the system separates communications functions from the vital safety critical circuitry necessary to ensure fail-safe railroad operations. When the dispatcher at a remote location operates a control lever, a command message is electrically generated and transmitted to a controlled point (CP) in the field. Once interfaced in the field, the command cannot override the interlocking features of the switches and signals at the field location. The communications circuit is "non-vital" because a failure of this circuit can not produce an unsafe condition. The communications circuit can use ordinary telephone lines for command transmission, without interfering with the lines use for voice communications.

Engineering progress during the 1930's and 1940's continued to extend the range between the control center and controlled points, until, at present the range is practically unlimited.

Other operational improvements were developed during the 1950's and 1960's. These improvements included "NX" interlocking

devices which permit the dispatcher to select the entrance and exit points for an interlocking movement while the machine lines intermediate turnouts, crossovers and clears intermediate signals; and "fleet" modes of operation which permit an interlocking to automatically re-clear a predetermined route. Although such systems often reduced the time or the complexity of sequences required for a train dispatcher to accomplish a traffic control function, the same systems often enabled railroads to consolidate or increase the amount of territory under an individual train dispatcher's control.

COMPUTER ASSISTED DISPATCHING

First employed by the industry in 1966, computer assisted train dispatching (CAD) has revolutionized the industry in the 1980's. CAD has enabled even the largest of carriers to implement system wide train control functions from system headquarters.

CAD systems have enhanced existing CTC capabilities through systems such as automatic train routing subsystems. Some systems have been designed to promote a "paperless" dispatcher environment. Trains can be tracked and recorded automatically, and written movement authorities, where necessary, can be generated, recorded and filed completely within the computer system.

On light density lines where the carrier is unable to justify the capital investment to upgrade to CTC, CAD systems have proven to be a significant improvement to assist train dispatchers with the management and operation of non-signaled territory.

RAILROAD OPERATING RULES

Since the earliest days of railroading, the problem of devising rules which were precise and without loopholes to govern train operations proved to be a difficult proposition. Early rules were often ambiguous and failed to cover contingencies which investigations later disclosed to be accident causal.

The need for officers to share experiences and information contributed to the formation of the General Time Convention in the 1880's. In 1889, this organization adopted the first standard code of operating rules, entitled **"Uniform Train Rules and Rules for the Movement of Trains by Telegraphic Orders".** This organization was subsequently reformed into the present Association of American Railroads (AAR). Through a consensus of it's members, the AAR refined the Standard Code of Operating Rules and formed a standing committee which was representative of member railroads and which provided interpretations upon request about the application of these rules.

Although the opinions of this committee were extremely influential, they were advisory in nature, and each railroad could and often did vary from these standards to meet the needs of local conditions.

During the first half of the 20th-century, railroad accident investigations disclosed a number of human factors type accidents in which no rules violations were involved. When this occurred, railroads modified their rules or adopted new rules in order to prevent a recurrence. As the operating rules became more comprehensive, they also grew in complexity and volume.

In the most recent 20 years, the trend in the industry has been toward a simplification of the rules. While some limited operational flexibility may have been sacrificed, present rule book philosophy is aimed at making the rules easier for employees to locate, understand and apply.

Another trend which has significantly modified railroad operations, and the train dispatchers role in operations, is the growing diversification of the industry itself. Passenger operations have largely become a specialized segment of the industry isolated to major metropolitan areas. Correspondingly, the influence of those considerations held vital to passenger operations have declined, both in terms of administrative "efficiency/economy" equations, and in terms of operational priorities.

Railroads trafficking extensively in time sensitive commodities such as trailer and container shipments have a greater incentive to invest in technology tailored for high speeds. For railroads trafficking primarily in bulk commodities reliability and economy--rather than speed and elapsed time--are critical. Increasingly, railroads have departed from the standard code in favor of developing rules tailored to their individual needs.

Such diversification, however, resulted in a greater burden to transportation employees who regularly or intermittently operate over foreign lines. It also significantly increased the demand for operating rules instruction.

In 1974, the Federal Railroad Administration promulgated Part 217, Chapter II of Title 49 of the Code of Federal Regulations. Included in this regulation are requirements that each affected carrier must periodically instruct each employee whose activities are governed by the operating rules on the meaning and application of the rules. They must also file a program with FRA headquarters for the periodic instruction of these employees.

In order to reduce the burden on railroad employees and efficiently address training requirements, two major rules associations have been formed by the nations railroads to

standardize operating rules for their 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 northeast section of the United States. These organizations have developed "standard" codes of operating rules which are reflective of their members regional needs and interests.

RECENT DEVELOPMENTS

During the latter half of the 20th-century, operation by timetable has rapidly declined. Although a few railroads still allow timetable schedule to provide authority for movement, schedules on most railroads are now purely advisory. The timetable continues to survive, however, as a critical source of information for matters such as the locations and distances between stations, methods of operation in effect on specific line segments, maximum authorized speeds and equipment restrictions.

The traditional train order is also rapidly becoming obsolete. Over the past ten years, most major railroads have adopted a revised system wherein unused train order formats are discontinued and the train order formats which are to be retained are codified and printed in a multi-page booklet. All affected employees are issued this booklet. When the need for an "order" arises, the train dispatcher does not need to construct an entire directive from scratch. They need only to refer to the line number of the appropriate instruction and fill in the particulars (e.g., location names, mile posts, times, etc.) in blank spaces provided for this purpose. Provided that the operating rules department develops an adequate system of controls, the revised system of communicating written information increases the margin of safety, while reducing the time necessary to conduct business.

RULES DEPARTMENT STRUCTURES

Within the individual railroads, the organizational structure of the rules departments has traditionally varied considerably. On most railroads, a director or manager of operating rules is appointed. This officer may be supported by a full time or part time rules committee, or he/she may work directly with the division superintendents in the field. Organizational differences are most readily apparent in the areas of employee training, qualification and examination.

Some roads have adopted a rules staff at the division level for this purpose. These positions are full time occupations which are under the jurisdiction of the division superintendent but which must also coordinate with the director of operating rules to assure interdivisional uniformity. Other railroads prefer that these matters be handled directly by the division operating

officers themselves. Under this system, superintendents are often directly instructed by the director. They in turn instruct local officers, who in turn instruct the employees.

A director of operating rules serves as the railroad's expert advisor on all matters pertaining to the safety and efficiency of the operating rules and operating practices. They communicate directly with the carriers chief operating officer, and actively manage the railroad's rules to promote productivity and economy within a safe environment which is not prone to uncertainty or misunderstanding.

They are responsible for the formulation, presentation, education, application and examination of all facets of rule interpretation. It is not sufficient for a director to have the mere ability to quote the rules verbatim. They must be capable of explaining the derivation of the rules, and the reason for the existence of each rule. They must also be able to precisely demonstrate how the rule is to be applied under specific circumstances.

The rules director must be acquainted with the geographic and operating characteristics across the railroad. They must know that the rules and instructions are practical under all circumstances.

Because their actions have a direct impact on the lives and safety of both railroad employees and the general public, the director must have a deep moral and an ethical commitment to ensure that the rules provide for an adequate margin of safety.

CHAPTER 3- DISPATCHER FUNCTIONS AND RESPONSIBILITIES

DUTIES

Since it's earliest days, FRA has recognized human performance as a major influence in railroad operational safety. As long ago as 1971, FRA sponsored research to identify the effects of human behavior and the causes of human error in railroad operations.

Basic to any assessment of dispatching performance is a thorough understanding of the job. One objective of the National Train Dispatchers Assessment was to evaluate and quantify the duties and responsibilities of the train dispatcher.

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

- Scheduling the movement of trains to provide for safe meeting and passing with minimum delay and assigning tracks in a manner consistent with the mission of each train.

- Managing unexpected events and emergency situations to protect the best interest of the carrier and limit the delay to affected trains.

- Arranging for the use of track by engineering forces to permit the most timely maintenance and renewal feasible while minimizing train delay and providing protection for such operations.

The dispatcher, either through personal activity or electronic support, must maintain detailed and accurate records of the activity which he authorizes. This includes the train dispatchers 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, and often do, require additional duties and activities which need documentation as well.

IMPACT OF FEDERAL REGULATIONS

Specific federal regulations govern the train dispatchers activities. These include 49 CFR Parts:

- o 217-Railroad Operating Rules.
- o 218-Railroad Operating Practices.
- o 219-Control of Drug and Alcohol Use.
- o 220 Radio Standards and Procedure.
- o 221-Rear End Marking Device.
- o 228-Hours of Service.

In addition, the dispatcher must have a limited knowledge of 49 CFR 236, the signal regulations; 49 CFR 215, the freight car safety standards; 49 CFR 231, the safety appliance regulations; and 49 CFR 232, the power brake regulations.

The requirements imposed by these regulations establish one or more of three obligations, as follows:

- o They require certain actions from the carrier for activities performed by groups which include dispatchers.
- o They impose specific performance standards.
- o They require specific record keeping and retention.

In brief, the obligations conveyed by these regulations are summarized below:

49 CFR 217 imposes requirements on rail carriers to develop programs for the training and testing of employees whose activities are governed by their operating rules. This operating rules training is required for dispatchers because a detailed knowledge of essentially all elements of the operating rules is central to the train dispatchers performance. The operational testing of dispatchers is required because the performance of the dispatcher is also a central factor in determining the overall level of compliance with the operating rules.

49 CFR 218 includes the requirements of the Blue Signal Regulations. Where train dispatchers are required to provide protection for workmen on other than main tracks, the regulation provides specific task requirements (e.g., application of effective blocking devices) and specific record keeping requirements. Additional requirements include yard limits, flag

protection of trains and locomotives, protection of occupied camp cars, and prohibitions against tampering with locomotive safety devices.

49 CFR 219 imposes pre-employment alcohol and drug testing requirements and mandatory post accident testing where the dispatcher is directly and contemporaneously involved. The regulation also authorizes reasonable testing for specific qualifying events. This part also subjects train dispatchers and the crews they supervise to random drug testing.

49 CFR 220 imposes specific training requirements for employees who are authorized to use a radio in connection with railroad operations. It prescribes specific procedures for radio usage, and prohibits the use of the radio to circumvent the signal system. It also specifies procedures for writing, transmitting and receiving train orders which are conveyed by radio.

49 CFR 221 imposes performance standards for rear end markers on trains when display is required. The regulation indirectly prohibits the dispatcher from authorizing a train to enter a main track without an effective marker when display is required. It also establishes repair or replacement requirements, which must be factored into the dispatchers planning when the device becomes defective enroute.

49 CFR 228 prescribes specific recordkeeping requirements for employees who perform train dispatchers job functions. These include the hours of duty record for the employee himself, and the train dispatchers record of train movements which includes a comprehensive chronicle of events for the dispatching district. On most railroads, the train dispatcher is also the designated individual assigned to monitor train and engine crews time on duty while on line-of-road. The dispatcher must monitor the remaining time and participates with office management in determining the disposition of the train crew and the location of the crew change when necessary.

The train dispatcher must have a basic understanding of Federal mechanical regulations in order to interpret and respond to reports and inquiries from crews on line-of-road. For example, a train crew contacts the dispatcher to report the absence of a sill step and handhold on a freight car which is about to be picked up enroute. A dispatcher must be aware that this movement can only be made if repairs of the character required can not be made at this point. They must then determine if the movement is in the direction of the nearest location where repairs can be made, and must also determine that it is feasible for the car to be set out from the train at this location.

Similarly, the dispatcher must have a fundamental knowledge of the requirements of the signal and train control regulations,

particularly where cab signal operation is involved. Should the cab signal fail enroute, the dispatcher must evaluate the situation to determine the restrictions to be imposed.

CONTACTS

The train dispatcher's work environment requires him to maintain an extensive range of contacts with various employees in his own and in other railroad departments. The interpersonal relationships employed by the train dispatcher exist in essentially four planes.

1. In the first plane the dispatcher must accept and implement managerial policies and priorities as directed by his/her immediate chain of command. On this plane of communication, the dispatcher also receives instructions and priorities from the supervision of non-operating departments. The dispatcher considers these orders and instructions and then accepts, rejects, negotiates or appeals these demands based upon his/her projections of their impact on the safety and efficiency of operations.

2. The second plane of relationships involve those employees who require specific direction from the dispatcher, and who have a duty to adhere to those directions. This group of employees include train directors, block operators, train and engine crews, and maintenance of way personnel.

3. The third plane includes those employees over whom the dispatcher has no direct authority and responsibility, but with whom the dispatcher must negotiate and plan in order for the district to function as an integrated whole. These employees include yardmasters, power dispatchers, power directors, and mechanical department personnel.

4. The final plane involves personnel with a need for information for reporting and planning purposes, which includes clerical personnel, various management information systems personnel, coordination with employees of other railroads, and coordination with emergency response organizations.

DIRECT CONTROL FUNCTIONS

The duties and responsibilities discussed above might well be described as "traditional" functions. These duties are common to nearly all train dispatchers and have historically formed the framework of the dispatchers position. In addition, gradual technical evolution during the twentieth century, combined with a trend toward centralization, have added many new responsibilities to the job.

A majority of dispatchers across the nation are now assigned the responsibility for operating traffic control devices necessary to command signal systems. While the interlocking features of the vital circuitry in the field prevent the dispatcher from inadvertently committing to conflicting movements, most systems are not designed to detect an inadvertent movement through an unintended but nonconflicting route. Similarly, most systems will not detect or alert the dispatcher to an oversight to clear a signal for an intended route or movement.

While the safety protection inherent in the vital circuitry significantly diminishes the probability of conflict, the system does not relieve or diminish the degree of vigilance required from the dispatcher to prevent train delay or to eliminate the confusion inherent in the rerouting of trains.

A substantial number of train dispatchers are responsible for monitoring hazard detection devices. These devices typically include overheated journal detectors, dragging equipment detectors, loose wheel, thin flange, excessive dimension, and slide fence detectors.

The range of responsibility, and the depth of dispatcher involvement, are generally a function of the age and design of the equipment. Some designs utilize graphic printers which must be reviewed by the dispatcher and interpreted as the tape is produced. Other systems employ internal alarms which respond to readings which lie outside of pre-established norms. Still other systems communicate directly with train crews.

The response required from the dispatcher also varies with the equipment. Some systems automatically set the next absolute signal in advance of the train to stop. Other systems require the dispatcher hold the next absolute signal at stop until the detector readout is examined. Automatic wayside detectors with verbal radio transmission capability notify the crew directly but do not necessarily notify trains on adjacent tracks of the potentially unsafe condition.

COMMUNICATIONS

The train dispatcher is responsible for the effective management of a communications network. These systems usually consist of dedicated company telephone lines which may include continuously monitored open circuits; selector specific automatic telephones; one or more commercial telephone lines; and one or more radio transceivers which broadcast over one or more radio channels. While some of the more technically advanced offices integrate communications equipment into a consolidated system, the practice is far from standard.

Although the proper priority and sequence for responding to communications inputs generally follows the order in which the inputs are received, a burst of simultaneous activity may require the dispatcher to evaluate the probable nature of the calls based upon both experience and the traffic situation at hand.

LABOR ORGANIZATIONS

No discussion of the functions and responsibilities of the train dispatcher can be complete without some consideration of the role of labor organizations and the collective bargaining process. About 75 to 80 percent of railroad employees are members of the various railway labor organizations. For collective bargaining purposes, these organizations are generally divided into two categories, operating and nonoperating.

Operating unions represent those employees who are engaged in the actual physical movement of trains and cars (e.g., engineers, conductors, trainmen, hostlers). Nonoperating unions represent all other employees. This includes workers engaged in clerical, construction, maintenance activities, workers who operate and/or maintain the general railroad plant including signal and communications systems, and workers who operate yards and stations.

Train dispatchers fall within the category of nonoperating employees. On railroad properties where dispatchers are represented by a collective bargaining organization, that organization is almost invariably the American Train Dispatchers Association (ATDA). Recently, there have been a number of movements to remove train dispatchers from union representation and the collective bargaining process, particularly in the Western States.

Although the wage movements of the train dispatchers craft have closely paralleled the operating crafts, working rules covering these employees are more similar to other industrial workers than they are to the operating crafts. Train dispatchers are less immediately effected by cyclical traffic fluctuations. Craft lines between dispatchers and groups such as yardmasters and clerks have been relatively straightforward. Competition for membership has not significantly strained inter-organizational relationships.

Impact of Working Rules

Historically, work rules in the railroad industry evolved for the same general reasons which caused the development of working rules in other heavy industries: to protect the employees against unfair and unrestricted managerial discretion; to equitably allot limited opportunities for work; and to protect

the employees against the financial impact of technology. (Kaufman, 1952)

Early work rules were often simply verbal instructions from management. With the growth of the industry, the rules were published and posted for clarity and uniformity. When the rules became more numerous and complex, railroads adopted and issued books to promote consistency. As railroad labor organizations assumed greater prominence, these work rules became subject to the collective bargaining process. The result of this process are numerous collective bargaining agreements in effect on each property and at various levels of organization within each property (e.g., regional and/or divisional). In many instances the agreements have been complicated by awards and findings of public law boards and other government panels, commissions and agencies.

For many years, the railroad industry has endeavored to improve engineering, mechanical and operational procedures to enhance safety, reduce costs, and obtain competitive advantage over rival companies. One result has been a persistent long term trend toward reduced railroad employment.

In the late 1980's many railroads adopted computerized data processing to streamline office work. Subsequently, this technology was applied to traffic control functions as well. The development of automated traffic control has enabled some carriers to extend the limits of train dispatching districts and reduce the number of employees necessary to operate a dispatching office. Technology has also provided the railroads with the opportunity for consolidation of multiple field offices as well. Improved communications and control equipment has radically reduced the need for wayside block and interlocking stations and train order offices.

Revised labor agreements, together with improved planning and scheduling, including use of data base predictors, has permitted the railroads to reduce the number of classification points and major terminals necessary to meet service requirements. In many cases traffic handled at these points has been reduced to "run through" service or local industry service and switching only. Although many such service yards remain necessary from an operational standpoint, the level of traffic may not be sufficient to warrant support personnel at the yard. These cutbacks are beginning to have a significant impact on traditional craft lines, labor agreements, and dispatcher workload.

While many of these changes are the result of technological innovation and economic necessity, the results, from the perspective of the workers and their labor organizations, are

fewer employees available to provide necessary services, reduced employment stability and reduced job opportunities.

Administrative and Clerical Duties

Consolidations, modernization and reductions in the work force have significantly diminished the personnel available to provide necessary services and have blurred some traditional craft distinctions. Yardmasters, operators and clerks have all been significantly impacted during the last decade. In many cases, the functions and responsibilities of these positions have been eliminated. In other cases, the functions and responsibilities have not been eliminated but continue to exist in a diminished form. Thus the work available at some locations may not support full time positions.

Increasingly, railroads have become more conscious of unit labor costs and employee productivity. In response, work associated with smaller outlying points and satellite facilities has been reassigned to employees at centralized locations.

Some railroads have elected to shift these "clerical and administrative duties" to the train dispatcher. While FRA did not observe any trends or patterns in this direction, our inspectors did find that, on some carriers, the level and priority of these new duties was sufficient cause for concern. These findings are covered in greater detail in the individual railroad reports.

Ironically, on at least one major property, the dispatchers labor organization had refused to allow management to shift such duties away from dispatchers, even though the expansion of dispatchers districts and the complexity of control functions make such duties cumbersome and difficult for the dispatchers to handle. The organization contended that the additional functions should be assigned to a new group of employees, "assistant train dispatchers". Officers of the union contended that this system would have the added benefit of developing experienced train dispatcher candidates for future needs. The company countered that the use of ordinary clerical forces would be sufficient for the task, and assignment of the work to this craft would be cost beneficial.

An excessive administrative workload placed upon the train dispatcher is distracting and may have adverse safety implications. Unfortunately, neither party involved in this dispute demonstrated sufficient initiative or flexibility to satisfactorily address the issue. At the time of the assessment, he end result was a breakdown in negotiations and retention of the problem.

CHAPTER 4- STAFFING

ORGANIZATION

The railroad train dispatcher's office has historically been closely associated with a railroad operating division or part of a division. Offices were usually, but not always, located at the division headquarters. The office developed as an individual entity with its own particular characteristics, and adapted to match its own territory. Although each office performed essentially the same functions, the offices were often structured differently.

The basic policy, which was written in the operating rules, was that train dispatchers reported to and received directions from the division superintendent. In actual practice, the division organizational structure was usually such that dispatchers reported to a chief dispatcher or equivalent. Most railroad operating rule books now declare that dispatchers report to and receive their instructions from the chief train dispatcher.

The chief dispatcher in turn reported to the superintendent, usually through an assistant superintendent. On most railroads, the division superintendent reported to a regional general manager, who was responsible for the overall operation of two or more divisions.

Currently, the organizational structure of operating divisions and dispatching offices are being modified to coincide with technological advances, and changes in the operational structures of railroads. Mergers and marketing strategies have contributed to recent decisions to substantially increase the size and responsibilities of operating divisions. The divisional managers or superintendents may or may not report to regional managers, depending on the business philosophy of the railroad. Many major railroads have eliminated the regional management concept. Under this arrangement, the division managers or superintendents report directly to senior system level officers.

Similarly, railroads have consolidated train dispatching offices. Of the major railroads, the former SLSF (Frisco) Railroad was the first to establish a single system train dispatching center. Although the SLSF was a relatively large rail system, in total track miles it was no larger than the current operating divisions of some large freight railroads. Other medium sized carriers such as the IC and DRGW followed the SLSF lead and established single system dispatching centers.

The larger carriers, until recently, chose to limit the dispatcher consolidation process to coincide with divisional and/or regional consolidations. CSX was the first of the large carriers to make the decision to consolidate all dispatching

offices into a single control center. While some large carriers are developing similar plans, most prefer division or region level dispatching centers. Most of the consolidations which were in progress as the field assessment ended involved the relocation and re-qualification of experienced dispatchers.

The concept of dispatching centers removed from direct control of operating divisions notably changes the traditional relationship of superintendents and dispatchers. Although overall management of a division is still the responsibility of the division manager or superintendent, the main tracks are directly controlled by the train dispatchers. The concept thus requires that the organizational structure of the railroad be re-defined. Because these transitions from divisional to consolidated dispatching centers were not complete in many cases, the relationship between the operating divisions and the consolidated dispatching offices could not be effectively determined during the assessment.

Although dispatchers at centralized centers have been removed from divisional oversight, the basic concepts have not been substantially changed. Train dispatchers still report to a chief dispatcher, but there may be several chief dispatchers assigned to a center. In this case, the chief dispatchers often report to a high level dispatching center officer.

Many years ago, railroads determined that a position was needed to "bridge the gap" between the train dispatcher and the chief dispatcher. This need was fulfilled by establishment of positions commonly identified as assistant chief dispatchers. Most railroads continue to use assistant chief dispatchers to perform a substantial portion of the supervisory and administrative duties inherent in train dispatching work.

WORKLOADS

As indicated in the introductory chapter, FRA found the workload measurement data gathered during the assessment to be inconclusive. Still, there was evidence that dispatchers at many locations were required to sustain extremely heavy workloads. This was particularly true during periods of peak traffic and maintenance activity. These high workloads were evident at both existing and new dispatching centers. Following are a few of the factors which influenced these workloads:

- Increases in the size of dispatching districts by as much as 250 percent.

- Poor staffing decisions by railroads when consolidating dispatching positions. This led to transferring of support and administrative personnel, such as chief and assistant chief dispatchers, before the dispatchers themselves were transferred.

- Inadequate traffic control and communications systems. This resulted in dispatchers expending an excessive amount of time in assuring that operations were conducted in accordance with the rules.

As the new consolidated facilities started to come on line, FRA perceived a trend toward reduction of clerical and support employees at the division level. Many of the duties formerly performed by employees such as yardmasters, block operators and yard clerks were transferred to the new control centers. Train dispatchers at several recently consolidated facilities expressed concern over the proportion of time consumed by these duties. Often, facility managers indicated that solutions were planned but not yet in place.

Other major concerns expressed by the dispatchers and ATDA included proposed consolidations of multiple dispatching districts, and the potential for vastly expanded territorial districts for extra board employees.

HOURS OF SERVICE ACT

The Hours of Service Act, Title 45 United States Code Section 61-64b, limits the number of hours on duty for certain employees engaged in or connected with the movement of trains. Section 3(a) of the law states:

"No operator, train dispatcher, or other employee who by use of the telegraph, telephone, radio, or any other electrical or mechanical device dispatches, reports, transmits, receives or delivers orders pertaining to of affecting train movements--

> (1) shall be required or permitted to be or remain on duty for more than nine hours, whether consecutive or in the aggregate, in any twenty-four-hour period in any tower, office, station, or place where two or more shifts are employed; and
>
> (2) shall be required or permitted to be or remain on duty for more than twelve hours, whether consecutive or in the aggregate, in any twenty-four-hour period in any tower, office, station, or place where only one shift is employed."

Although the term "shift" is not defined by the law, the legislative history of the 1969 amendments indicates that it means a tour of duty constituting a day's work for one or more employee(s) who are scheduled to begin and end work at the same time. This principle, with examples, is included in Title 49 of the Code of Federal Regulations, Part 228, as a portion of **Appendix A-Requirements of the Hours of Service Act: Statement of Agency Policy and Interpretation.** Since almost all dispatching offices employ two or more shifts, train dispatchers can work no

more than nine hours in any twenty-four hour period except during qualified emergencies. Deviations from the law are referred to as excess service by FRA. Railroads are required to report each instance of excess service to FRA within 30 days after the calendar month in which the instance occurs.

PERSONNEL REQUIREMENTS

The sufficiency of staffing at each office was evaluated by examination of Federally required reports of excess service as defined by the Hours of Service Act. In addition, FRA examined the number of occasions that dispatchers were required or permitted to work on their assigned rest days. Train dispatchers have significant responsibilities for assuring railroad safety, and are often assigned to what may reasonably be presumed to be high stress positions. Because of this, FRA believes these employees should receive their assigned rest days whenever possible.

Although situations will occur which may create temporary staff shortages, railroads have an obligation to administratively control these situations. In addition to obvious concerns regarding fatigue, initial and periodic training can suffer from a staff shortage. FRA noted that, at some offices, an insufficient number of relief employees precluded dispatchers from making familiarization trips over the railroad. At others, the shortage resulted in inadequate rules instruction classes.

The assessment disclosed staffing inadequacies on several railroads. On some railroads, these inadequacies were only apparent at one or two locations. On others, the problems were widespread. This included railroads that had consolidated dispatching operations as well as those which had not. On one railroad, the staffing shortage was so severe that the railroad was forced to buy vacation time from several dispatchers. Those situations are discussed in the individual railroad reports in Section II.

Candidate Selection

The present method for filling dispatcher vacancies varies with each railroad and in some cases, varies with each dispatching office. Promotion of operators is still the preferred choice and was so identified by all carriers contacted during the assessment. When this personnel source is unavailable, the railroads use employees from other railroad crafts, search for experienced dispatchers furloughed by other railroads, or hire non-railroad persons. Six of the carriers surveyed had offices which had no formally established procedure for obtaining prospective candidates.

CHAPTER 5- COMMUNICATIONS

HISTORICAL PERSPECTIVE

Historically, railroads have depended heavily on hand printed authorities to convey important information to employees engaged in controlling the movement of trains. This method of conveying information was highly labor intensive. Block and train order operators were situated at various locations throughout a railroad system. These operators copied train orders transmitted by train dispatchers and hand delivered the completed orders to the engineers and conductors of affected trains.

The initial mode of transmission was by telegraph. This was replaced by dedicated railroad owned telephone lines (dispatcher lines) which linked the dispatchers with the various block operators. To complement this system, a vast number of wayside telephones were installed so that train crews could communicate with dispatchers and operators in the event of accidents and other unexpected circumstances.

The advent of traffic control and double track automatic block signal systems were the first major changes in the train order method of communication. Basically, a traffic control signal system is arranged so that strategically located automatic wayside signals are established as control points. All other automatic signals are arranged to function in conjunction with these controlled signals. Authority for train movements is dependent on the indication of (i.e. information conveyed by) each wayside signal.

These systems enabled a single railroad employee (generally a train dispatcher or control operator) to keep opposing and following trains properly spaced by entering electric signal commands to these control points from remote locations. The probability of collision is therefore greatly reduced. Traffic control signal systems allow the blocking of track sections between control points, thus providing a higher margin of safety for employees performing maintenance operations. Because such systems are expensive to install and maintain, most railroads installed them only on routes with high traffic density.

Double track automatic block signal systems can not be controlled from remote locations. For this method of operation, a designated direction of traffic is established for each track. After trains are given verbal or written permission to enter the main track, they are authorized to proceed in the established direction by signal indication. If it becomes necessary to operate against the current of traffic, train orders are issued to protect these movements. Neither traffic control nor double track automatic block signal systems provides a means of verbal communication between train crews and dispatchers. Therefore, it

is necessary to either maintain wayside telephones at strategic locations along the right of way, or to assure adequate radio communications.

RADIO COMMUNICATIONS

Another significant technological advance occurred in the mid to late 1950's, when railroads began using radios for communication between dispatchers or operators and employees engaged in actual train movements. Radios provided railroads with reliable communications which were not labor intensive, and enabled them to eliminate the thousands of wayside dispatcher telephones which then existed. The cost/benefit ratio was therefore very favorable.

When railroads began utilizing radio systems, operating divisions were generally much smaller than they are today. Train dispatching districts were also smaller and the dispatching offices spaced more closely. There were usually several train order and interlocking operators located along any given route. Although a railroad might have a few remote base stations linked to a train dispatching office, the number of remote base stations did not provide complete radio coverage.

To complement the system, train order and interlocking stations were furnished with radio base stations. If a train dispatcher needed to converse with a train crew or vice versa, operators were often used to relay the communication. As railroads began centralizing operations and closing these block and interlocking stations, they usually retained the existing radio base stations. These base stations were linked through commercial telephone or railroad owned lines to other operators or to the train dispatcher. For the past several years, additional wayside base stations have been installed by most railroads in order to provide more complete coverage.

During the early era, radios limited to two channel capability were installed on locomotives. Normally, one channel was utilized for line of road communications with operators and dispatchers, while the other was used for yard switching operations. About 1970, railroads began installing four or eight channel radios on locomotives. The industry also began purchasing pakset radios for use by conductors, trainmen, and maintenance employees. For the past several years, the recommended standard of the Association of American Railroads has been to equip new locomotives with 97 channel radios. Most railroads have not yet begun a comprehensive program of replacing radios previously installed on older locomotives. Those equipped with these 97 channel radios are still the exception rather than the rule.

Severe limitations have been placed on the radio communication system by this asymmetrical method of installing radio systems. During the past several years, some railroads have invested heavily to completely upgrade their radio communications system, but most have only partially accomplished this. To compound the problem, mergers of recent years has resulted in many railroads having relatively incompatible radio systems.

Voice Controlled Methods of Operation

Railroads have long recognized that additional cost reductions could be accomplished by instituting a formal method of communicating mandatory directives directly from the dispatchers to train crews and maintenance employees. However, for many years there was a reluctance on the part of both railroad management and labor to implement such changes. There were several reasons for this, as follows:

- The traditional train order method of communication was universally understood by employees and provided satisfactory margins of safety.
- Existing agreements with labor organizations hampered such changes.
- Early radio equipment was more prone to failure.

These previous restraints have been overcome, and for the past several years railroads have been amending their operating rules to replace the traditional train orders with voice control methods of operation. These newer methods such as Direct Train Control (DTC), Track Warrant Control (TWC) and Manual Block Systems (MBS) have resulted in an increased reliance on radios for essential communications. The radio communications used to implement these methods of operation are mandatory directives, and thus meet the Federal definition of train orders.

Although many railroads are now programming computers with operating rules logic to alert train dispatchers to potential overlaps, there is still a high potential for accidents if the radio communications between dispatchers and train crews are not fully understood.

WAYSIDE DEFECT DETECTORS

Many major railroads have installed automatic defect detectors which transmit by radio the presence of certain equipment defects. A radio transmission is automatically initiated to notify the crew that their train is approaching a detector device and whether the detecting device is operating properly. A second transmission notifies the crew of the condition of their train.

If a defect is detected, the device indicates the location in the train of the defective equipment.

Because of the nature of the detecting equipment and the importance of notification, these radio transmissions cannot be time regulated. The number of transmissions is dependent upon the density of train movements and the number of detector devices which are present. These detectors frequently broadcast on the radio channel used by train dispatchers. Because of this, these devices can disrupt radio communications between train dispatchers and other employees.

DATA COMMUNICATIONS

Railroads have been involved in data communications since the first traffic control and interlocking machines were installed in the 1920's. These machines are equipped with track schematics and levers which indicate the position of the various remotely controlled switches involved. They also have lights which indicate track section occupancy, and whether controlled wayside signals are set for stop or an indication more favorable than stop. On the older technology machines, the lights and switch schematics have direct electrical connections to the circuits of each switch and signalling device.

Computer assisted train dispatching systems work in a different manner because there are no direct electrical connections between the visual display and field circuits. Data to and from the computer hardware and software system, including display screens or boards, connects through interface devices with the track, switch and signalling circuitry. The visual images are greatly expanded and enhanced, and now include full route displays using different colors for each condition which exists. These conditions include the route selected for a particular movement, position of switches, signal indications, and actual track section occupancy by trains and on-track equipment.

There are also interfaces with the main frame computer systems, which provides the capability of uploading or downloading information to and from the various corporate databases. The dispatcher now has the ability to easily obtain information necessary for the efficient operation of the railroad. Further, since much of the planning required of the dispatcher is mathematical in nature, computer assisted systems blend well with the dispatching environment. Locomotive capabilities, train and siding lengths, duty periods of train crews and many other factors which enter into the dispatchers planning can now be calculated by the computer.

CURRENT COMMUNICATIONS

Although all dispatching offices are not equipped with current technology systems, a modern train dispatching communications network consists of the following:

- Numerous wayside base radio stations linked to the dispatching console.
- Company and public access telephone lines.
- Data communication interface links to convert software driven command inputs into electric impulses for signal and switch control.
- Links to remote printers and/or data facsimile machines.
- Direct voice communication lines with other essential carrier personnel, particularly with those frequently contacted.

The more elaborate systems consist of a computer interfaced voice communications console. This type of system routes incoming calls from any source, displays the source on a CRT in sequential order, and deletes the calls from the screen after the dispatcher has completed the conversation. These systems eliminate the need for a dispatcher to monitor several lines simultaneously. However, on one major carrier the dispatchers complained about this type of communication system. The system allows a dispatcher to engage in only one conversation at a time. The dispatchers stated they believed the system was inferior to a separate radio and telephone system because of this limitation.

ADVANCED TRAIN CONTROL SYSTEM

Currently, the Association of American Railroads and the Canadian Railway Association are involved in a joint venture to develop and implement the Advanced Train Control System (ATCS). Simply stated, this new generation system calls for trains and wayside devices to be equipped with computers and data radios. The system includes elaborate error protection and detection capabilities. The ATCS system includes several "levels" of technology. The higher levels are programmed with the capability to stop any operation which is not conducted in accordance with all applicable rules and other restrictions. FRA is currently participating in the evaluation of the ATCS system.

FRA ASSESSMENT FINDINGS

General

The absence of an adequate number of frequencies or inaction on the part of railroads to effectively utilize the available frequencies has created a high level of interfering radio transmissions. During the assessment, FRA found the following sources of interference:

- There were frequent false calls intended for dispatchers in other cities.
- Channels intended for road train use were used by yardmasters and terminal switching crews.
- Channels intended exclusively for use to communicate with dispatchers were used by road crews engaged in such duties as adding or removing cars from their trains, and calling of wayside signal indications.
- Maintenance of way employees frequently used the dispatching channel to communicate with one another, even though a separate channel is usually available for this purpose.
- Supervisors and administrative personnel frequently used the dispatching channel for purposes not related to the safety of the operation.

Radio Standards and Procedures

In order to ensure the safety of the operation, Federal regulations and railroad operating rules require that any employee who receives a safety related radio transmission must repeat it back to the transmitting party. These rules further state that train orders (and other mandatory directives) which have not been completed must not be acted upon and must be treated as though not sent. However, because of intruding transmissions on many dispatching positions, authorities must often be transmitted several times before they are clearly understood. Often, frustration over the inability to secure a clear channel for critical transmissions resulted in instances of non-compliance with Federal and railroad radio rules.

At most offices assessed, there were frequent radio rule exceptions noted. Many exceptions were extremely serious in nature. These included failure of the dispatchers and train crews to comply with 49 CFR 220.61 (transmissions of train orders by radio), and failure to assure on-track authorities are properly transmitted and repeated. These deficiencies also included occasional failure of train dispatchers to properly

identify their stations, frequent failure of other employees to properly identify their stations, failure of the train dispatchers to require employees to use proper identification, and failure to use the words "over" and "out" when required.

CASE STUDY

Because of the current and future reliance on computer assisted dispatching (CAD), FRA determined a need to conduct a thorough evaluation of such a system. The CSX System Control Center in Jacksonville, Florida was chosen for this evaluation. Although the following text is found in the CSX chapter of Section II of this report, FRA believes the findings are important to the entire industry and the public in general. For this reason, it was decided to include the text in this section as well. Following are the results of the CSX Jacksonville computer system evaluation.

BACKGROUND

The Jacksonville Dispatching Center was divided into six zones, designated zones A through F respectively. At the time of the assessment, four of the six zones had been partially phased in. For computer control purposes these six zones are linked into three zone pair sets, which were designated zones A-B, C-D, and E-F. The CAD zones were controlled by three computers each of which is backed up by a fully operating redundant machine. Each computer pair would control about one third of the total dispatching territory. This dual computer system assured that control would be maintained in the event of equipment failure. The 33 dispatching locations on CSX property were to be consolidated into 27 dispatching positions in the Jacksonville CAD building. This included 15,000 miles of railroad with 43 data lines and 144 code lines from field locations.

The power for the system had several back up modes: two independent commercial AC supplies with an uninterruptable feed to the load and standby AC generators with back up battery supply. The CAD system was connected to the CSX main frame computer through a fiber optic cable backed up by a microwave capability. To support the primary data communication links to the various field locations, there were three back up links. Current technology interface equipment was used both at Jacksonville and at all field locations. In the short time available for FRA to actually observe the CAD system in operation, there were no serious systems problems noted.

During the course of the assessment, FRA found it convenient for discussion purposes to divide the Computer Assisted Dispatching (CAD) system into it's two primary subsystems; the Traffic Control subsystem (TCS) which includes interlockings, and the Direct Traffic Control (DTC) subsystem.

Traffic Control Subsystem

The Traffic Control subsystem processes dispatcher commands to the remote signal system, and receives status indications from the field which are displayed on overhead projection screens. This information may be summoned in greater detail on the individual dispatcher's video display unit. Safety and protection of train movements is provided by the field equipment as in all other installations. Signals, track circuits, electric locks, and switches are interconnected to provide the conventional fail safe protection.

Although the clerical and administrative entries that are required from train dispatchers in order for the system to function are time consuming and cumbersome, the manual routing procedures of the subsystem are easy to understand and operate. FRA inspectors who observed operations on the floor of the center, however, noted a marked lack of confidence and/or understanding from the dispatchers about the reliability of the automatic train routing features of the subsystem.

The traffic control subsystem also uses computer logic to automate other functions involved in train control, which relieves dispatchers for more productive planning and analysis tasks. These automated functions include train identification and tracking, recordkeeping, and reports. While FRA is not yet fully satisfied with the quality and reliability of this aspect of the subsystem, we recognize that technical perfection often cannot be achieved on a rigid timetable. FRA commends CSX's efforts to reduce the nonessential workload confronting train dispatchers.

FRA did identify one aspect of the traffic control sub-system which compromised safety. Where Jacksonville based dispatching districts adjoin sections of the railroad controlled from locations other than Jacksonville, the system would permit one dispatcher to apply track blocking for track car and other on-track equipment movements while the adjoining dispatcher had the capability of operating trains onto the blocked section. In the newer computer assisted systems, this track blocking is strictly a software programming function.

The Jacksonville dispatching district for which this particular fault was identified connected to a district still controlled from Huntington, WV. The Jacksonville dispatcher could apply a track block for an on-track equipment movement but this block did not prevent the Huntington dispatcher from clearing signals for train movements onto the blocked section. Because of this condition, verbal communications between the dispatchers or control operators involved was vital to the safety of track car and other movements which may not shunt track circuits.

CSX was aware of this problem, and as a solution had instructed the dispatchers in Huntington to communicate with Jacksonville prior to clearing signals for such movements. These management instructions to the dispatchers were strictly verbal, and were not part of the dispatchers written instructions to their relief. As a consequence, these instructions could be breached by an extra list or other dispatcher not familiar with the procedure.

A preferable approach would be for the carrier to require the dispatchers involved to contact one another and arrange for blocking of the other dispatcher's control panel. This method has been utilized historically by the railroad industry, and offers a far higher degree of safety than the casual procedure being used.

Direct Traffic Control (DTC) Subsystem

The Direct Traffic Control subsystem represented a significant improvement which helps the dispatcher to identify and track trains. In addition to providing a visual status report, the computerized operating rules logic portion of this subsystem identified and often prohibited the train dispatcher from establishing many conflicting or otherwise unsafe train and on-track equipment movements. FRA has long encouraged the railroad industry to adopt this type of technology to assist dispatchers in non-traffic controlled territory.

In ABS territory, the DTC subsystem provided the facility for direct traffic control but the protection for train movements is provided by the field signal system. The DTC rules provided a substitute for the historical timetable and/or train order authorities.

In non-signaled territory, the DTC subsystem provided the authority and the protection for train operation using the DTC rules. It was in this method of operation that computer assisted dispatching system failures could lead to unsafe conditions. To minimize the possibility of unsafe failures, CSX had used the following development philosophy:

- The hardware system was duplicated with back-up capabilities. The automatic switch-over to the back-up system was still being developed at the time of the FRA audit. Since the back-up hardware would be on-line and functioning in parallel with the primary system, there would be no down time at the dispatchers' consoles due to power, computer, or individual communication mode failures. At the time of the FRA inspection, the back-up hardware was working but the automatic switch-over was not functioning. Switchover had to be performed manually.

- The installation and checkout of the CAD was being implemented by activating a small number of dispatching stations at one time. When a new area was to be activated, an inexperienced CAD dispatcher is trained with the assistance of an experienced person in an on-the-job training mode. During this training period, the area to be added to the system was given a fundamental exercise by computer simulation. Realistic scenarios were demonstrated to the CAD system and the new trainee.

- A matrix of the CSX DTC and on-track equipment (OTE) rules was developed which defined the existing rules in a language that was compatible with computer implementation. A control center supervisor assigned new trainees to check the new CAD area by inputing commands which would violate the DTC rules and result in conflicting train and OTE movements. If variances or problems were identified, a Field Observation Report Form was submitted. CSX then assigned the problem responsibility to the vendor or carrier personnel.

- When no further problems occured in the developing area of the CAD (generally a subdivision), that portion of the CAD was connected to operate in parallel with the existing dispatching center. Problem areas were again identified and reported on a Field Observation Report Form.

- When no further problem areas were identified the existing dispatcher center was closed down and all dispatching was transferred to the Jacksonville Control Center.

- Any problems that occured in the fully operational CAD were reported and reconciled by the same Field Observation Report Form.

Software Reliability and Safety Assurance

At the time of the FRA audit, CSX had not performed a formal safety analysis and had not followed a rigorous procedure for software quality assurance. Large projects of the U.S. Department of Defense, NASA, and the Federal Aviation Administration require that software be developed according to standards for quality assurance. The purpose of a systematic methodology is to organize the developmental tasks so that they can be controlled by the various specialists and managers who understand the technical details and rules that should control the logic flow.

CSX was using an informal approach to software specification and design. At this point in the development of the system, CSX worked with the vendor in configuration management to assure that changes, modifications and error corrections were compatible with all possible combinations of software logic. If an error in software design was found there did not seem to be a control that required and documented that the error be corrected in all parts of the system.

Software problems can be of two basic types--design errors and hardware defects. Design problems can show up when a previously unused path through the logic is exercised or when a seldom used or unexpected set of inputs is encountered. Hardware defects should be detected by periodic verification checks. Software faults can be minimized by design redundancy and/or by a systematic test program that searches for any unacceptable design fault. Design redundancy requires that independent software designs be prepared by separate design teams and that the two programs be run concurrently. Outputs from the two programs must agree before the answer is executed. This type of redundancy was not used in the CAD system.

Even though the software for each track segment was developed separately, the test program for those individual segments should have been integrated and complete. The assurance program should not have permitted skipping over of tests because of the similarity to previously installed software routines. FRA advised that CSX consider a formal safety and quality assurance in lieu of this informal test program.

A formal program is particularly important when vital logic is involved. An initial step in the formulation of a formal program would be to identify the vital elements of the software program.

For the most part, FRA found that the operation of the CAD facility in DTC territory increased protection and safety. A major improvement was that the DTC rules had been reduced to a matrix of logic that is programmed into the computer. As dispatchers manipulated the various requests for block occupancy, the computer logic verified whether the block could be authorized and if so under what restrictions.

During analysis, however, FRA found several potential conflicts not provided for in the rules matrix. Because the rules matrix did not search for all conflicts, the safety of the operation was still dependent on observation of the rules. FRA discovered the DTC Conflict Check Matrix (which matches the software) did not correspond with the DTC Permit Conflict Checks Table which was presumably used by the railroad and vendor in determining if the software development was complete. Following are conflicts which are not checked, and differences noted by FRA.

- The system did not identify failure of the dispatcher to provide On Track Equipment (OTE) operators with information regarding block occupancy by trains. CSX Operating Rule 704 required this information to be included on the OTE authority. Because of this software fault, dispatchers could issue authorities for OTE movements without identifying preceding trains in the limits of the authority. A conflict check was not executed.

- The system permitted OTE movements in both directions but did not provide conflict checks if subsequent OTE movements were authorized within the same blocks.

- The DTC Permit Conflict Checks Table provided for proceed block conditions (used in ABS territory) in one direction with rear flag protection, and without rear flag protection. The Conflict Checks Matrix permitted following movements only if rear flag protection was provided.

  For movements in one direction without rear flag protection, the conflict checks table had a question mark and the matrix defaulted to the "no" condition in all circumstances, including prohibiting following train and OTE movements. This conflicted with the provisions of operating rule 99.

  FRA found that special instructions of the Atlanta Division Timetable, Augusta Terminal, supported this inconsistency. These special instructions had the effect of standing the DTC rules on their head. They permitted the issuance of absolute, clear and occupied blocks within signaled territory; and also prohibited the issuance of proceed blocks within signaled territory. This portion of the railroad was not dispatched from the Jacksonville Control Center.

  The CSX rule book states "Absolute Block, Clear Block and Occupied Block authority will be granted only in non-signaled territory and may be used for movements against the current of traffic." The rule book further defines a "Proceed Block" as the only block granted in signaled territory and states that trains will be governed by signal indication.

  FRA Inspectors noted that when dispatchers authorized proceed blocks in one direction without the requirement for rear flag protection (in compliance with rule 99), and later attempted to issue following OTE movement authorities, the computer would not permit such movements. These movements conform to CSX operating

rules. Dispatchers stated they could not understand why the computer would not allow such movements. Furthermore, the dispatcher's workload was adversely influenced by this software fault.

- The system permitted authorizing of a proceed block in both directions, and the computer conflict matrix would protect such movements. The Permit Conflict Check Table indicated subsequent OTE movement authorities could be issued.

- Yard limits were identified on the CRT using the same color and track schemes as territory where yard limits are not in effect. The system did not provide conflict checking for yard limit movements. When issuing DTC and OTE directives, the dispatchers were required to remember not to include such limits in authorities.

In the DTC mode, the vital steps in controlling train and OTE movements were: data storage and retrieval, decision making, transmission and reception of authority, and execution of that authority. In each of the steps there was an interaction between the computer and the dispatcher, and thus in each step there was some potential for error. Decisions in the movement and protection of trains, on-track vehicles, and work gangs were made by a combination of dispatcher and computer logic. The transmission and execution of authorities was primarily a human function.

The displays available to the dispatcher provided visual aids to keep track of the locations and movements of the existing track authorities. FRA noted a number of CRT displays used in DTC territory that were not distinct because they are positioned too far away from the dispatcher. CSX was aware of this problem and indicated the intent to redesign the layout to accommodate the dispatcher requirements.

PRINTER

CSX demonstrated a new printer that was to be incorporated into the system. This type of printer would be used primarily for the transmission of the train bulletins and release forms (which are used in lieu of train orders and clearance forms). The printer used a short form technique to verify that the received message is the same as the transmitted message. The new printers verified the number of lines in each message and the sum of the bit values for each character. If there was a discrepancy in the number of lines or in the check sum the printer would not accept the message and the transmitting station would recognize that there was an error in the transmission. The verification process was, in effect, a handshake between the sender and the receiver machines.

Since the information was verified before it was printed there was a small potential for corruption of the message in that time interval. As an additional check the person who received the printed message was required to verify the number of lines. FRA noted that the software system neither assured the train bulletins were actually transmitted nor assured they were transmitted to the correct station.

This automation of the message verification should reduce the workload of the dispatcher significantly. At the time of the Jacksonville audit, control center management had requested authority and funds to install 50 of these printers. This should have a positive effect on safety by reducing the potential for transmission errors.

To be totally effective, however, CSX must assure that train crews and other involved employees are properly instructed on the human requirements. These requirements should be included in the CSX Program of Instruction on Operating Rules and Timetable Instructions, and the CSX Operational Testing and Inspection Program.

CHAPTER 6- RULES AND PROCEDURES

TRADITIONAL

The function of railroad operating rules and procedures is to prevent accidents by prescribing the duties of employees and specifying a predictable and consistent response to events. If employees could not rely on operating rules to govern the behavior of fellow employees, chaos would result. An example is the movement of a train against the current of traffic in automatic block signal system territory. After obtaining authorization, a locomotive engineer can operate a train against the current of traffic promptly, expeditiously and with a high degree of confidence. His knowledge of operating rules and experience in their application assures him that:

- Rules require the train dispatcher to set stop signals or issue orders which will prevent opposing movements from entering the block in which a train will be authorized to move against the current of traffic.

- Rules require other engineers and track car drivers not to pass stop signals without permission of the dispatcher.

- Rules require the train dispatcher to determine that the block ahead is clear of opposing trains before authorizing a movement against the current of traffic.

- Rules require the train dispatcher to issue appropriate instructions if the block ahead is occupied by a preceding train moving against the current of traffic.

- Rules prohibit employees operating other trains or track cars from entering the block outside of yard limits without permission of the dispatcher.

- Rules require employees operating trains on adjacent tracks to provide protection if they experience an emergency application of the automatic train air brake and may have equipment fouling.

It has been said that operating rules became necessary when railroads first operated more than one train at a time. In reality, certain basic operating rules are necessary even for railroads which have only one locomotive. Development of these rules was for the most part evolutionary, not revolutionary, reactive not proactive. After accidents, rules or procedures were developed to address the specific conditions which allowed the accident to occur.

A principal law of physics holds that two objects cannot occupy the same space at the same time. Corollary to this law are three basic constraints of railroad operations: a railroad vehicle operator's vision is limited; trains and other on track vehicles require relatively long distances in which to stop; and the fixed guideway on which railroad vehicles travel makes evasive action impossible. In order to safely address these limitations while effectively utilizing track, railroad operating rules philosophy holds that overlapping authority cannot be granted without sufficient safeguards. Existing rights must be restricted before conflicting rights can be granted.

Because a single failure on the part of a person or machine can have catastrophic consequences, safeguards including redundancy are essential. Historically, train order operators provided one such level of redundancy. Train orders were issued by the train dispatcher over an open telegraph or telephone wire. Communications over the open wire were monitored by the employees directly involved in the proceedings as well as other employees with access to the open wire.

CURRENT

As railroads have changed their methods of operation, the number of operators has been drastically reduced. 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.

FRA expects changes to continue to occur at a rapid rate. In order to retain or expand market share in an increasing competitive environment, change is inevitable. Many railroads are planning or initially implementing computer assisted dispatching systems. The Advanced Train Control System project of the Association of American Railroads and the Railway Association of Canada is well underway. Future technological advances in computer systems and data communications will provide as yet unknown opportunities. It is imperative that emerging methods of granting authority for track occupancy provide levels of safety at least equivalent to those currently provided.

Although many classes and crafts of employees are governed by the operating rules, the train dispatcher routinely deals with the most complex and safety critical of these rules.

When comprehensively designed and artfully drafted, rules and procedures provide the dispatcher with the means to perform safety-critical functions unassisted by other employees. Instruction on the meaning, intent, and application of the operating rules should be provided in writing in a concise and consistent format. The goal of this instruction should be to

assure all that employees understand and apply the rules in the same manner. Rules and instructions should be so worded that there can be no misunderstanding as to the their application.

Rules and instructions are frequently revised to reflect changes in operating conditions. Because of their accessibility and high degree of visibility dispatchers assume the role of a functional source of rules interpretations. Promoted train dispatchers comprise a significant percentage of the nation's rules examiners.

Dispatchers are expected to be thoroughly familiar with the location and contents of all additional sources of information. These include notices, bulletins, emergency procedures manuals and train profiles. Dispatchers are required to maintain the train sheet to reflect the current status of the territory under their control.

In properly designed modern systems, electronic hardware and software is designed with a two step philosophy so that safety critical commands may not be inadvertently executed. An example of this is the removal of blocking device protection from electronic control systems. This function requires two separate actions by the dispatcher in order to complete the command.

Principle high density routes are primarily electronically controlled. Other main tracks are controlled by mandatory directive systems such as track warrant control, direct traffic control, manual block system, etc. Some Class I railroads have dispatching positions which include sections of CTC, ABS, and non-signaled territory. In such cases dispatchers must be familiar with the intricacies of several different methods of operations. Different rules and procedures need to be applied to achieve the same results from different systems.

Mandatory directive systems are of two basic types: direct traffic control and track warrant control. Direct traffic control consists of a series of established sections of track (blocks), the limits of which are typically designated by signs. The dispatcher directly grants the use of one or more blocks to trains, track cars, and maintenance crews by radio. The person receiving the authority records the specifics by filling in blanks on a pre-printed form. The right to use the track, together with all movement restrictions, are transmitted simultaneously. In non-signaled territory, restrictions may include information on preceding movements. Where automatic block signal system rules apply, the mandatory directive grants right, while the condition of the block is conveyed by the signal system.

Track warrant control functions in a similar manner except that authority may be granted between any two identifiable locations,

not just between the limits of fixed blocks. Typically these locations include switches, signals, mileposts and bridges. Direct traffic control and track warrant control are known by different names on different railroads. They also exist in variations or hybrid forms.

Railroads are increasingly using computer assistance in mandatory directive territory. Computer systems are in service which provide a visual indication of the status of blocks in direct traffic control territory. Operating rules logic can be programmed and the dispatcher can be prevented by computer conflict checking from issuing overlapping authority.

Each railroad enforces it's own operating rules. An employee who violates an operating rule is subject to discipline. The severity of the discipline assessed is often commensurate with the seriousness of the violation. It can range from verbal reprimand to termination without reinstatement rights. Most collective bargaining agreements specify the rights and obligations of the parties in disciplinary proceedings.

FEDERAL ROLE

In the aviation industry, traffic control is a government function and responsibility. The rules and procedures to maintain traffic spacing and prevent accidents are promulgated by the Federal government. Air traffic controllers are employees of either the Federal Aviation Administration or the Department of Defense. In the railroad industry, traffic control is a function and responsibility of the individual railroad. The rules and procedures to maintain traffic spacing and prevent accidents are promulgated by carriers or associations of carriers. Train dispatchers are employees of the individual railroad companies. Where two or more carriers operate over a railroad line, agreements specify that one carrier's operating rules apply.

Federal regulation of operating rules and procedures is both direct and indirect. Among the direct regulations in Title 49 Code of Federal Regulations are:

- **Part 217.** This part requires carriers to file with FRA a copy of their operating rules, timetables and timetable special instructions. It also requires carriers to conduct a program of instruction on the meaning, intent and application of these rules and to conduct periodic tests and inspections to ensure compliance.

- **Part 218.** This part requires railroads to have in effect specific operating rules in the following six distinct areas:

1. Procedures for the protection of workmen who inspect, repair or maintain locomotives and cars.

2. Train operations within yard limits.

3. Flag protection of train and locomotive movements on the main track outside yard limits.

4. Hump yard protection of train and engine service employees who are required to go between rolling equipment.

5. Procedures for the protection of occupied camp cars.

6. Prohibitions against tampering with safety devices.

In most codes of operating rules, the rules governing the first three are identified are rules 26, 93, and 99 respectively.

- **Part 220.** This part governs the use of two way radios in railroad operations. It sets forth minimum federal radio standards and procedures.

- **Part 221.** This part requires that under certain conditions, the rear end of trains must be equipped with an approved rear end marking device.

Among the federal regulations with an indirect impact on rules and procedures are the following:

- **Part 213.** The Track Safety Standards govern the maximum permissible speeds for freight and passenger trains based on the condition of the track on which they operate.

- **Part 219.** This part governs the use of alcohol and drugs by employees in safety sensitive positions. Part 219 is divided into subparts as follows:

  Subpart B prohibits employees from using or possessing alcohol or any controlled substance while assigned to perform service covered by the Hours of Service Act. It also prohibits employees from reporting, going on duty, or remaining on duty while under the influence of or impaired by alcohol or any controlled substance or while having .04 percent or more alcohol in the blood.

  Subpart C requires toxicological testing following serious accidents which meets published thresholds.

Subpart D authorizes railroads to test employees for reasonable cause or under reasonable suspicion.

Subpart E governs the identification of troubled employees by requiring railroads to adopt, publish and implement a voluntary referral policy and a co-worker report policy.

Subpart F requires pre-employment drug screens for applicants for safety sensitive positions.

Subpart G requires random testing of employees in safety sensitive positions.

- **Part 236** specifies the rules, standards, and instructions governing the installation, inspection, maintenance and repair of signal and train control systems, devices and appliances.

The Hours of Service Act limits the amount of time on duty for employees performing safety sensitive tasks. In general it applies to any employee who performs the traditional functions of conductors, engineers, trainmen, hostlers, operators, train dispatchers, and signal maintainers.

FRA was granted further authority over railroad rules and procedures by the Federal Railroad Safety Authorization Act of 1980. Subject to review and appeal, FRA may issue an emergency order when it determines that an operating rule or procedure is so unsafe as to present an imminent danger. FRA uses this power judiciously, and only if all other avenues of correction have failed to resolve the safety issue. During this assessment, there were no such imminent dangers found.

Enforcement of federal safety regulations is accomplished by the imposition of civil penalties. These penalties are intended to be remedial in nature, not punitive. If FRA is able to obtain compliance with the regulations without the imposition of civil penalties, it will generally do so.

Prior to the passage of the Rail Safety Improvement Act of 1988, civil penalties (except those concerning hazardous materials) could only be imposed against railroads. Individuals, including employees and officers of railroads, were outside FRA jurisdiction. Since passage of the Act, any person who knowingly and willfully violates a federal railroad safety law or regulation is subject to civil penalty. In addition, individuals who have demonstrated unfitness to perform safety-sensitive functions are subject to disqualification from performing such functions.

CHAPTER 7- OPERATIONAL TESTS AND INSPECTIONS

BACKGROUND

In November, 1974, the Federal Railroad Administration published in the Federal Register a final rule, titled "Railroad Operating Rules". This rule was subsequently included in the Code of Federal Regulations as 49 CFR Part 217. These regulations became effective in February and March of 1975.

This Part requires railroads to periodically instruct each employee on the meaning and application of the railroad's operating rules; to file with FRA copies of the program for this periodic instruction; and to file with FRA a copy of its code of operating rules, timetables and timetable special instructions, including any amendments to these publications within 30 days after the amendments are issued.

The regulations further require railroads to periodically conduct operational tests and inspections to determine the extent of compliance with its code of operating rules, timetables and special instructions in accordance with a program filed with FRA. Each railroad's program is specifically required to provide for operational testing and inspection under the various operating conditions on the railroad. In order for a railroad to be in compliance with this regulation, it must provide for operational testing and inspections of train dispatchers. Further, the program must provide for such testing and inspection under actual operating conditions.

EFFECTIVE TESTING PROGRAMS

Test and inspection programs should include the capability of testing for all carrier rules and special instructions. Minimum testing levels should be established for safety-critical rules and instructions. Reduced emphasis should be placed on ancillary rules and instructions such as those pertaining to employee grooming and deportment.

Programs should be flexible enough to provide for special emphasis as conditions warrant. For example, when the method of operation of a portion of the railroad changes, such as from ABS to CAD, emphasis should be place on testing for CAD rules. Likewise, rules and instructions which generate abnormally high failure rates should also be a priority. Discipline cases which arise from rules violations which were not detected through the test and inspection program should be appropriately weighted. Finally, when noncompliance with rules or instructions is identified as an accident cause, specific testing should be conducted to ensure that noncompliance is not systemic. This process can be facilitated when carriers integrate their databases. Personnel, discipline, and accident/incident

databases all include information which can be used to increase the effectiveness of testing programs.

Computer programs used to maintain the test and inspection database should contain internal audits to detect exceptions from pre-established norms. Programs should detect, identify, and require justification from participants for such factors as:

- o An insufficient number of tests.
- o An unreasonably high numbers of tests, indicating the possibility of reduced quality.
- o A lack of emphasis on safety-critical rules.
- o Failure rates which are abnormally high or low.
- o A disproportionate amount of testing on the first shift.
- o Clustering of tests at the beginning or end of the month or other testing period.

In order for a program to be viewed as meaningful, participants need to perceive both short term and long term benefits. Long term benefits of a test and inspection program should be a reduction in accidents, injuries, and property damage by identification and correction of rules violations before they result in accidents. Short term benefits and program credibility can be achieved when participants detect a genuine commitment from senior management and are advised of the results of the program. One method of achieving these goals is the preparation and distribution of useful management reports on program activity. Monthly or quarterly reports showing activity presented in a meaningful manner should be an integral part of any testing and observation program.

ASSESSMENT FINDINGS

The test and inspection program of each railroad is addressed in section two of this report. General findings which apply to more than one carrier are presented here.

During the assessment, FRA determined that operational testing and inspection of train dispatchers was inadequate on almost all railroads. On some railroads the train dispatchers were non-agreement employees and were considered railroad officers. These railroads took the position that since train dispatchers were officers, operational testing was not required. FRA does not agree. Such policies are contrary to Federal regulations and impede the goal of determining rules compliance by employees in safety critical positions. On other railroads train dispatchers

were included in the program but the quality of testing was substandard. Among the general patterns of deficiencies noted were:

- Of the 125 offices assessed, at 30 offices (24 percent), the carrier stated that system or division officers did not periodically test and inspect dispatchers and record the results.

- A disproportionate ratio of tests were conducted on the first shift at locations where multiple shifts are employed.

- The assessment period bridged various carrier's test reporting periods. During the periods for which data was requested a total of 66,494 tests and inspections were conducted on dispatchers. Failures numbered 1302 or 1.95 percent. Individual railroad testing programs produced failure rates of less than 1 percent. FRA's own inspections indicate that the failure rate is often appreciably higher.

- Many railroads conduct a high percentage of observations or tests for compliance with general rules. Rules governing the issuance of mandatory directives, the use of blocking devices, and the granting of track and time authority are also critical and must be included in the testing program.

- Several railroads did not have a system which included computer audit programs or other methods of internal auditing.

- Not all railroads use the test and inspection program to generate useful management reports. The program can establish a database from which meaningful management information reports can be produced.

FRA noted that railroads reported 463 instances in which train dispatchers were disciplined for operating rules violations during the year preceding the assessment. In some cases these operating rules violations (and resulting discipline) occurred because dispatchers did not perform non-safety critical administrative tasks in a timely manner.

At many offices FRA was not able to establish a correlation between the number of cases in which discipline was assessed and the number of test and inspection failures. The statistics were skewed by individual carrier policy. Frequently, the failures were not the result of employee testing. Instead, carrier officers completed a report indicating a failure because a rules violation was documented during an accident or incident

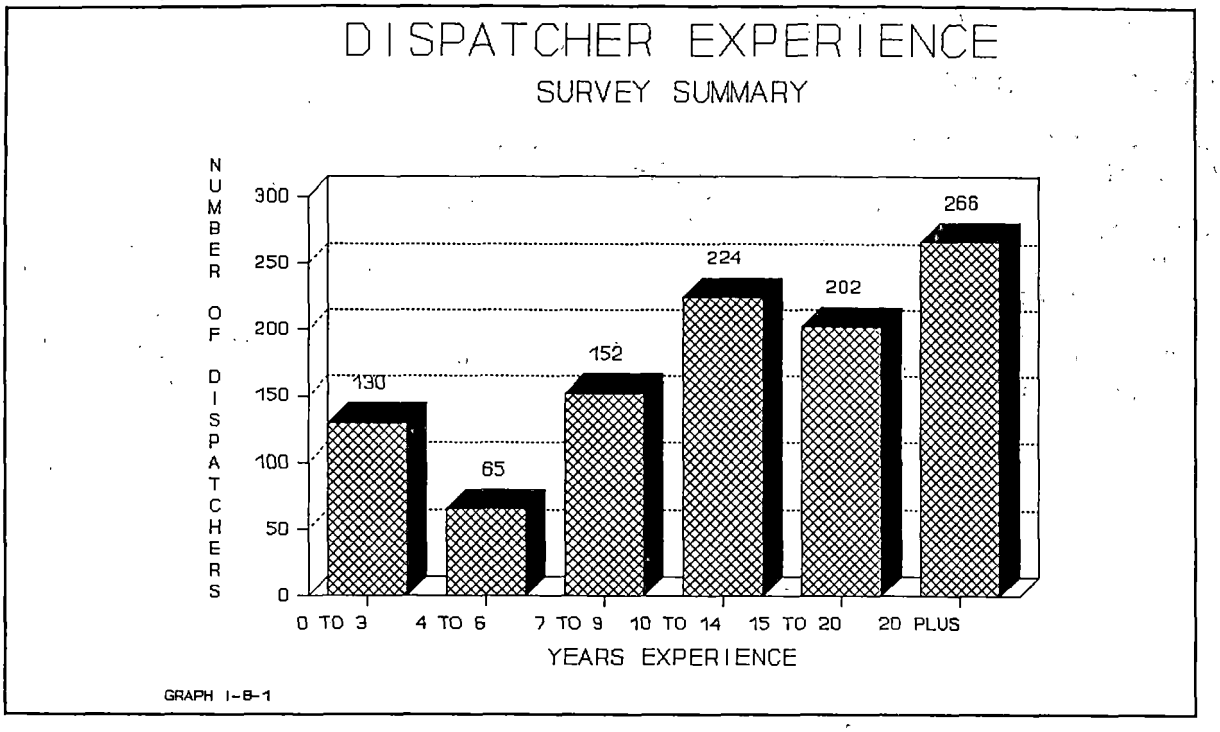
investigation. Although all rules violations should be a part of the database, such "after the fact" records distort the statistical data and prevent senior management from conducting a meaningful analysis regarding officer participation in the program. Railroads should reserve a database code for these types of violations in order that the information can be properly sorted for evaluation.

AGENCY DECLARATION

FRA intends to more closely scrutinize the programs of operational testing and inspection submitted by each railroad, particularly as the program applies to train dispatchers. Civil penalties will be issued where necessary. Further, the agency is currently evaluating the requirements of 49 CFR Part 217. The agency intends to resolve any ambiguities contained in this Part. Finally, FRA intends to thoroughly evaluate all other options, and will make any changes in the rule it deems necessary to ensure safety and compliance.

CHAPTER 8- TRAINING

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



Of the dispatchers interviewed, 65 percent indicated 10 or more years of dispatching experience. Those indicating 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 1 year through 3 years of experience were 12 percent. The smallest group, 6 percent, had between 4 and 6 years train dispatching experience.

These statistics indicate that many dispatchers are in the late 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 the 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 perform safety-critical duties similar to or in consort with dispatchers. Proficient operators develop relevant knowledge and skills. When carrier employees without operator experience are selected 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.

A search of FRA accident data did not disclose a statistically significant pattern of accidents caused by inadequately trained or inexperienced dispatchers. In some instances dispatchers failed to properly apply operating rules or the rules were insufficient to prevent accidents. Those accidents that did occur however, indicated the potential for catastrophic loss of life and property damage in the event of dispatcher error.

INITIAL TRAINING

In addition to 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 these methods. FRA believes that the most beneficial programs have successfully integrated both on-the-job and classroom training into cohesive and comprehensive programs.

On-the-Job Training

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

The trainer is usually selected because he has accumulated enough seniority to be awarded a regular assignment. Instruction on the methods and means to provide training is not usually furnished to the trainer. The knowledge, skills, and abilities needed to provide training may not be the same as those required to function successfully as a train dispatcher. 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. Rules which make the trainer responsible for the errors and omissions of the trainee may also serve as disincentives to on-the-job training.

On-the-job training is situational. Events may not occur which require the application of specific functions of the traffic control equipment, operating rules, special instructions, bulletin notices, timetables or other important job elements. 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-the-job training program. Some railroads require a signal department employee to instruct the candidate on the functions of traffic control and communications devices. Periodic evaluations are seldom provided. The trainer may use subjective criteria which may have limited validity.

When circumstances permit, many railroads have initially qualified employees on the least difficult dispatching positions in an office. As candidates became more proficient they were trained and qualified on progressively more challenging positions. Where employees worked under a collective bargaining agreement, assignments after being qualified were 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 office work force, the carrier must determine that his compliance with operating rules and other instructions continues at an acceptable level. This quality assurance program is accomplished by conducting operating tests and inspections. FRA noted that although supervisors are often present in dispatcher offices, formal, documented monitoring often does not occur.

Classroom Training

In a formal classroom environment, instruction and training can be conducted without the interruptions which occur during on-the-job 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 classrooms are equipped 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 and or communication systems. FRA, like the Federal Aviation Administration (FAA) and many behavioral scientists, believes

that human response can be conditioned. A more detailed discussion of the use of simulators, extracted from a study of FAA simulator use and modified minimally to apply to railroads, is presented elsewhere in this chapter.

Structured participation by representatives of the signal, maintenance of way, mechanical and other departments is 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.

Simulators

Several Class I railroads have initiated programs to consolidate dispatching offices at centralized locations. This consolidation is often accompanied by a capitol expenditure for computer assisted dispatching systems. As noted elsewhere in this section of the report, 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 which have integrated the use of simulators into their training programs. It did not appear, however, that all simulators were utilized to their maximum effectiveness. On some railroads the primary function of simulators was to verify system hardware and software. Their use as training tools was limited by design. FRA's findings were in many respects similar to earlier studies of FAA use of simulators (Henry et al, 1975 pp 34-35).

Some of the 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 is required to achieve mastery.
- They need not interfere with actual operations.

- o They permit students to experience uncommon but important events or situations without having to wait for their occurrence in real life.

- o Scheduling is flexible and can be tailored to the overall training program and for periods appropriate to the subject's importance.

- o The duration of overall training time can be reduced.

- o Safety is not a factor during the training process.

Simulation is the process of representing a real task or event. It is not a complete duplication of reality, although parts of what is being 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 perform tasks with fixed procedures (Prophet, 1966, and Cox et al, 1965). Precise sensory cues are important in training for tasks which 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 are mostly in the areas of decision making and communication, completeness rather than precise realism on the display panel will probably be most significant. In the final analysis, the validity of a simulation has to be proven by research and experiment.

MINIMUM TRAINING LEVELS

The following are the recommended minimum initial training requirements for train dispatchers from previous research in the field (Devoe, 1974, pp 63-66).

A. Classroom training (160 hours)

1. Review of railroad objectives and organization (4 hours):

   a. Roles of safety and efficiency in railroad operations;
   b. Organization of the operating departments;
   c. Duties and authorities of a dispatcher;
   d. Duties and authority of supervisors to whom the dispatcher reports and other railroad personnel who work with and under the authority of the dispatcher.

2. Railroad terminology required for reliable communications (4 hours).

3. Locomotives, rolling stock and lading (8 hours):

   a. Types of trains in service in the assigned territory;
   b. Locomotives in service and their power/tonnage ratings, capabilities, limitations and restrictions on operation;
   c. Nomenclature and functions of types of cars in service; restrictions on the movement of high and wide loads and hazardous materials.

4. Railroad rules and regulations (80 hours).

   a. Operating rules, e.g:
      . General rules;
      . Rules and instructions governing dispatchers and operators;
      . Rules governing signals, switches, and interlockings;
      . Rules governing movement of trains and engines;
      . Rules for movement by train orders;
      . Rules for movement by automatic block signals;
      . Rules for movement by manual block signals;
      . Rules for movement by automatic cab signals;
      . Rules for movement with automatic train control and automatic train stop;
      . Rules for movement by centralized traffic control and traffic control systems;
      . Rules governing the issuance of clearances;
      . Rules governing radio and telephone communications.

   b. Federal regulations governing safety appliances and the handling of hazardous materials.

   c. Hours of service regulations and labor agreements.

5. Basic signal and train order operations (24 hours).

   a. Operational characteristics of each train control system in service, e.g.:
      . Train order;
      . Centralized Traffice Control (CTC) or Traffic Control System (TCS);
      . cab signals and automatic and manual block systems;
      . Automatic Train Control (ATC) or Automatic Cab Signal (ACS);
      . Verbal train control.

   b. Operating features of each communication system in service, e.g.:
      . Telephone (railroad and commercial);
      . Radio (Including Federal Communications Commission rules);
      . Printer systems (where applicable).

c. Functions and locations of all controls and displays associated with the dispatching work station with special emphasis on the environmental effects of operating the CTC console.

6. Documentation (8 hours):

a. General requirements for maintaining complete, accurate, concise, and legible records.

b. Format entry requirements and use of each document employed by the train dispatcher (e.g., train order book, transfer book, train dispatcher's record of movement of trains).

7. General operating procedures (20 hours):

a. Relieving dispatcher prior to going on duty.

b. Obtaining information (e.g., condition of power and load consists, weather and track information, special handling information, traffic and equipment advisories.

c. Formulating routing and scheduling plans in accordance with operating rules, timetable, and existing traffic situation.

d. Monitoring and predicting the movements of trains.

e. Generating track permits and train clearances.

f. Monitoring and annotating hot box detector recordings.

g. Coordinating movements initiated or extending beyond own territory.

h. Arranging for pick up and set off of cars.

i. Issuing train schedule information to work crews and track cars.

j. Expediting enroute train crew changes.

k. Briefing of relief dispatcher prior to going off duty.

8. Management of contingencies (8 hours):

a. Unplanned events and emergencies requiring action by the dispatcher.

b. Available resources and countermeasures for dealing with unplanned events and emergencies.

9. Techniques for clear and concise telephone and radio communication (1 hour).

10. Effective job performance (3 hours):

    a. General fitness requirements.

    b. Sources of performance decrements (e.g., alcohol, drugs, fatigue).

B. Physical characteristics training (16 hours)

C. On the job qualification (160 hours)

In the opinion of the authors of the 1974 report, the minimum training hours needed to train a dispatcher were 336. During the assessment, FRA noted that training modifications would be necessary due to the following operational changes since the report was issued:

- Expansion of dispatching territories.
- Introduction of Direct Train Control (DTC) and Track Warrent Control (TWC) mandatory directives resulting in increased interaction between dispatchers and train crews.
- Reduction in the number of operators.
- Introduction of computer assisted train dispatching.
- Expansion of the use of computers for data transmission.
- Introduction of computer assisted or other high technology communication systems.
- Introduction of automated defect detector monitoring.
- Assumption of clerical, ancillary, and communications relay functions previously performed by operators, yardmasters and clerks.
- Expansion of the number of individual signal appliances under each dispatcher's control, resulting in increased time consumed participating in periodic signal tests.
- Additional Federal regulations regarding track safety standards, rear end marking devices, radio standards and procedures, training and testing of employees, tampering with safety devices and control of alcohol and drug use.

FRA SURVEY OF CORPORATE TRAINING POLICIES

As indicated in the individual railroad chapters of Section II of this report, training varied not only among railroads but also among different divisions on the same railroad. In order to obtain system policies, FRA surveyed the headquarters offices of the carriers listed in Section II of this report. 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 as a result 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. 55 percent of the railroads surveyed did not respond to this question.

- Physical characteristics training ranged from a low of 2 days to a high of 10 days. 60 percent of the railroads surveyed did not respond to this question.

- Total classroom training ranged from a low of 8 hours to a high of 320 hours. 55 percent of the railroads surveyed 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. 25 percent of the railroads surveyed did not respond to this question.

- Physical characteristics training ranged from a low of 2 days to a high of 54 days. 30 percent of the railroads surveyed did not respond to this question.

- Total classroom training ranged from a low of 5 hours to a high of 304 hours. 35 percent of the railroads surveyed 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. 80 percent of the railroads surveyed did not respond to this question.

- Physical characteristics training ranged from a low of 2 days to a high of 6 days. 80 percent of the railroads surveyed did not respond to this question.

- Total classroom training ranged from a low of 8 hours to a high of 160 hours. 80 percent of the railroads surveyed 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.

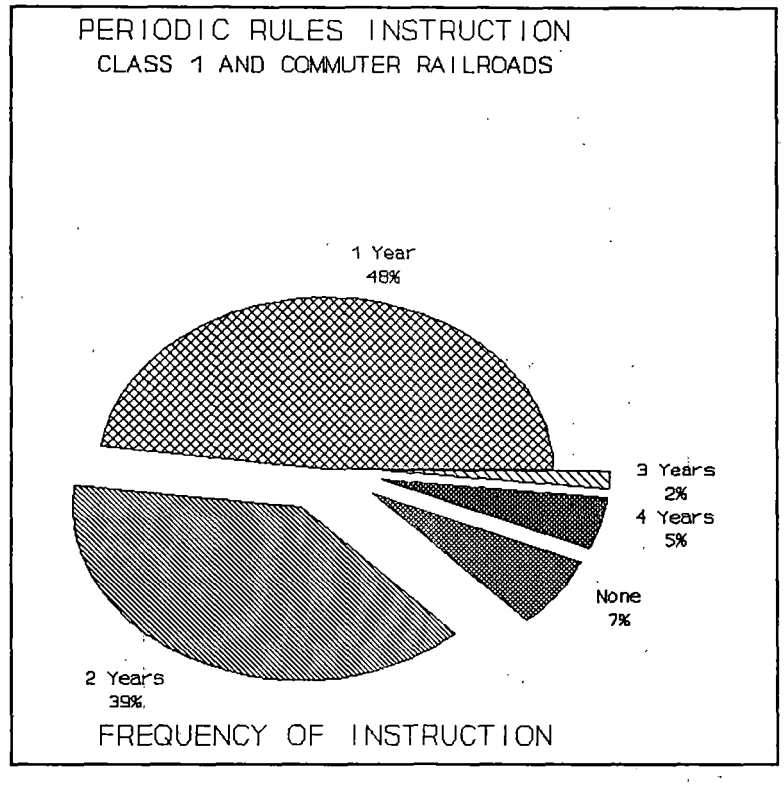
As a result of this survey, FRA concluded that there is very little agreement in the railroad industry as to what should be included in a dispatcher training program. The agency further concluded that--on most railroads--system level officials do not possess adequate awareness of the railroad's dispatcher training programs.

PERIODIC RETRAINING

In order 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 varies 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 carrier operating rules. Eighty six percent of the dispatching offices examined during the assessment also had written examinations incorporated into their programs.

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



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 percent. The national average was 86 percent. This wide variation existed not only among railroads but also between different offices on the same railroad. The information beginning on the following page was obtained during interviews with chief train dispatchers or equivalent carrier officers:

- The 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.

- The 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.

- The Chicago and Northwestern Transportation Company (CNW) examinations ranged from 15 questions to 80 questions. The minimum passing grade ranged from 85 percent to 90 percent.

- The 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.

- The Norfolk Southern Railway (NS) examinations ranged from 38 questions to 150 questions. The minimum passing grade ranged from 75 percent to 90 percent.

- The 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.

- The 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 consist of interdivisional trains, trackage right agreements with connecting railroads, and system level maintenance gangs. Clearly, consistency of rules application is necessary to assure safety of operations. Therefore, a railroad's training program must be consistent to accomplish its objective of producing knowledgable dispatchers.

On many railroads the initial training of dispatchers is a division level responsibility, often delegated to the 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 which have recently begun to consolidate dispatching offices.

Many carriers limit dispatcher periodic reinstruction and reexamination classes to one hour because of restrictions of the Hours of Service Law and certain contractual agreements. In most offices examined during the assessment, the Hours of Service Law

restricted the total time on duty for dispatchers to 9 hours in any 24 hour period. If classes last longer than one hour, the employee will be unable to work a full 8-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 re-instruction.

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. 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 are often able to 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:

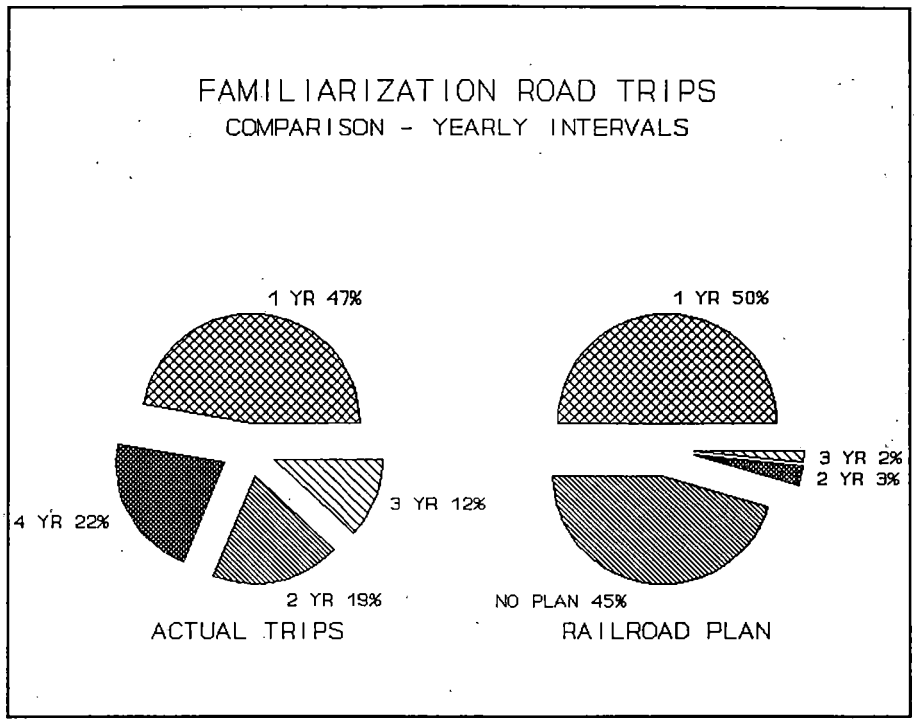
- Dispatchers are able to accurately assess the ramifications of operating constraints such as curvature and grade-on-train-movement decisions.
- Dispatchers are able to interface with train and engine crews and benefit from their experiences.

Disadvantage of train trips include:

- 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 which conduct such trips during hours of darkness.

The following graph 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 indicate 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.

ANALYSIS

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

FRA found no training deficiencies which might result in unsafe conditions. However, there was a noticeable pattern of inconsistency. The length and depth of initial training provided to dispatchers varied widely. Major variations were noted 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.

Following are conditions noted during the assessment:

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

- Standards and policies for periodic re-training of dispatchers varied widely both among railroads and among different locations on the same railroad. At some locations there was no formal policy in place regarding periodic re-training.

- Policies concerning familiarization trips varied widely. The number and frequency of such 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.

ORGANIZED LABOR INVOLVEMENT

The American Train Dispatchers Association (ATDA) has training requirements stipulated in collective bargaining agreements. The requirements vary from railroad to railroad, but generally specify between 60 and 120 days of training. Specific training program requirements are not detailed in these agreements. The agreements are basically intended to ensure that dispatchers who are required to learn new positions or new equipment are given an adequate opportunity to do so. Apprentice dispatchers are

covered by such agreements on only one railroad, the New Jersey Transit Rail Operations, Inc. (NJT). 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. As indicated in Chapter 6, railroad operating practices have changed more in the last decade than they had in the previous century.

During the assessment, the organizational structures of many major railroads were being modified to coincide with technological advances, and changes in their operational plans. One of the major advantages 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, which serves to eliminate the potential for confusion among employees. The railroads involved in these reorganizations are beginning to recognize the need for better control of dispatcher training programs, and are beginning to take positive action to address these 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 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 which simulates a dispatching office. The instructor has the ability to 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 consists of the following:

- Two weeks (10 days) of formal classroom training. Five of the 10 days are on operating rules. One of 10 days is on operating rules and the power brake requirements. Four of the 10 days are orientation of various railroad business and operating practices.

- One week (5 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.

- Two weeks (10 days) simulation training of the Computer Assisted Train Dispatching (CATD) system at the Dearborn, MI, 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 a case study, beginning on the following page of this chapter.

Union Pacific (UP)

UP is in the process of 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 consists of communication skills, hazardous materials review, and a health and environmental development course designed to teach shift workers how to better manage their activities both in and out of the workplace.

CASE STUDY

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, and computer assisted dispatching system.

In 1988 CSX began to implement the consolidation of all train dispatchers into the System Control Center in Jacksonville, FL. The facility at Jacksonville incorporates highly sophisticated computer assisted dispatching technology.

Training on the functions and operations of the computer assisted dispatching system is performed by the Assistant Manager-Dispatching System. He has been assisted on a part time basis by a Chief Train Dispatcher from a division which has not yet been transferred to the Jacksonville Control Center. The training duties of the Assistant Manager-Dispatching System are performed collaterally with other responsibilities regarding the dispatching system. These other duties include updating, refining, and loading data into the system. Training on the physical characteristics and field operations is under the jurisdiction of the Director-Manpower Control. Except for on-the-job and field training, all training is conducted in a room adjacent to the control center.

There were no new train dispatchers hired as a result of the system consolidation. Some experienced train dispatchers did not elect to accept transfer to the control center. Others did not possess sufficient seniority to obtain a position. As a result, all dispatchers to be 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 the early implementation, management decided to create eight additional assistant chief train dispatcher positions and to increase the spareboards by two positions. This resulted in a large number of bids and bumps. It resulted in a total of 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 were able to bid on positions with jurisdiction over territory already familiar to the train dispatcher.

Train dispatchers on CSX are members of the American Train Dispatchers Association. The collective bargaining agreement between the carrier and the union provides for 60 days of 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 have received up to 90 days of training.

Prior to the consolidation, some offices were equipped with centralized traffic control and/or earlier versions of the computer assisted dispatching system. Some offices had neither. The Assistant Manager-Dispatching System stated that the type and length of training provided to a dispatcher were generally uniform, regardless of the systems in place at his former office location. The computer portion of the training program is 15 eight-hour days in length.

Day 1 of the training program is a classroom type discussion. The subject is a description of the traffic control system functions of the computer. The course textbook used contains a 39 page chapter on this subject. There are 95 separate items for discussion in the chapter.

Day 2 of the training program is a classroom type discussion. The subject is the computer aided control system. The course textbook contains a 21 page chapter on the subject. There are 23 items and examples for discussion in this chapter.

On days 3 and 4, the lecture and discussion is on the computer information system interface. The textbook chapter on this subject is 128 pages in length and covers such subjects as the train sheet, (DTC) functions, train messages and train bulletins. As described in detail elsewhere in this report, train messages and train bulletins are communications used in train operations which are similar in form and function to traditional train orders.

With two exceptions, days 5 through 10 are devoted to hands-on practice work with a computer simulator and on-the-job training with experienced dispatchers on the actual system in service. The two exceptions are a 2 hour training session on the carrier's computer assisted centralized advanced communication system which is presented during day 5 and a rules instruction class and examination which is conducted during day 9.

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 5 days before a cut-in of additional territory takes place the dispatchers return to the center for a refresher course. This refresher course constitutes days 11 through 15 of the training. It consists of additional time on the computer simulator and on-the-job training.

The rules examination administered on day 9 is a 50 question written test which requires a minimum passing grade of 80 percent. FRA reviewed the written test and noted the following:

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

There is no written test or practical examination given to formally evaluate the train dispatcher's knowledge of the computer assisted dispatching system before he is released from the computer portion of the training program. The Assistant Director-Dispatching System conducts an on going evaluation of the progress of the dispatcher's knowledge, skills and abilities.

In addition to the rules training and computer training described above, dispatchers are also provided with field training. This training is targeted to 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 Director-Manpower Control, the carrier's policy on field training is that train dispatchers will ride over the main lines on the territory to be dispatched before they are allowed to dispatch trains. Some high traffic density branch lines are also ridden. Train dispatchers may ride either trains or hi-rail cars. Records are kept indicating the times and dates of such qualification trips. FRA interviewed about 30 of the dispatchers working at the control center. Two dispatchers stated that they had never ridden over the territory they dispatch; four stated that they had not ridden over portions of the territory they dispatch.

There is no written or oral examination to determine whether the dispatcher has attained a sufficient level of competence on the field portion of the 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-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 the field operations, he/she is permitted to work alone. According to the carrier, the success of this method is indicated by the fact that 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 the performance of their duties. Results of the interviews indicate that the train dispatchers were generally comfortable with the level of training provided on the computer system. Some train dispatchers however, indicated that they could benefit from additional field training. FRA's evaluation of the performance of the dispatchers did not indicate any patterns of exceptions which could be attributed to insufficient training.

In order to ease the stress of the transition for train dispatchers, the Director-Manpower Control stated that the carrier has extended itself well beyond the 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 were accommodated to prevent relocation during the school year.

As a result of the case study conducted at the CSX Jacksonville System Control Center, the following concerns and recommendations were formulated:

Concerns and Recommendations

Concern 1: The operating rules test given to train dispatchers at the control center is not unique to that office. It is the same test given to train dispatchers and operators throughout the CSX system. The 80 percent passing grade may be too low to ensure that all train dispatchers possess a sufficient knowledge of the rules to perform their duties as intended by the carrier's operating rules. The Jacksonville Control Center provides a radically different environment for train dispatchers. The application of many operating rules, especially those regarding DTC operations, are unique to the centralized office.

Recommendation: The carrier should devise a rules examination which addresses the unique aspects of the centralized control center. The carrier should review the 80 percent passing grade and determine if it is sufficient.

Concern 2: Train dispatchers are not given a practical test of their proficiency on the computer prior to being released for service.

Recommendation: In order to ensure that train dispatcher possess a sufficient level of knowledge, skills and abilities on the computer assisted portion of their duties, the carrier should adopt some type of formal evaluation. If a written test can be devised to address these areas, it should be implemented. An alternative would be a formal practical demonstration on the computer by the train dispatchers. In this method the examiner would present the train dispatchers with realistic simulated conditions which they could be expected to encounter while dispatching trains. A structured and formal simulation would ensure that each dispatcher is proficient in the newly acquired skills. It would simultaneously provide the carrier with information on those aspects, if any, where training should be adjusted to ensure proper understanding.

Concern 3: The CSX policy is that all train dispatchers ride each mainline and high traffic density branch before dispatching trains. During interviews, FRA noted that 6 dispatchers stated that they had not ridden over all the territory under their jurisdiction.

Recommendation: The carrier should review its records and conduct appropriate interviews to determine the extent of compliance with the company policy. Any deviations, errors, or omissions should be promptly corrected.

Concern 4: There is no formal evaluation or test conducted to determine the effectiveness of the field portion of a dispatcher's training before he is placed in service with a helper. There is also no standard, formal, documented method of evaluating when the helper's services are no longer required.

Recommendation: The carrier should establish a uniform, comprehensive, standardized and documented means of establishing a train dispatcher's familiarity with that portion of the railroad over which he will dispatch trains.

CHAPTER 9- CONCLUSIONS

Train dispatchers and the systems designed to assist them are essential for two fundamental reasons--safety and efficiency. As a consequence, the railroad industry has always recognized the importance of having a prudent, well trained dispatching staff. It was not surprising that during the assessment FRA found the dispatching staff to be competent. It was further determined that for the most part the dispatching procedures and systems are sound and effective.

In recent years, the railroad industry has been changing in many ways. These changes have generally resulted in larger operating divisions and consolidation of dispatching offices. During the consolidation process, the railroads usually install new technology equipment in modern workspaces. As a result, the dispatcher's work environment is improving. Even at many older offices, railroads are making improvements in order to provide a better working atmosphere for dispatchers.

One of the major advantages of centralization is that staffing needs can be managed more efficiently. Generally, the larger dispatching centers have a management staff which is better suited to evaluate and regulate such needs. Another major advantage is that operating rules and practices are more likely to be consistently applied, which serves to eliminate the potential for confusion among employees. These advantages are not automatic, however. The railroad must still develop and implement good plans.

Overall, the industry is beginning to develop and upgrade communications and control systems. There were, however, problem areas that need to be addressed by the railroads in order to assure safety. Safety related concerns and recommendations are shown for each railroad in Section II, as are the conditions found which led to these concerns. The following briefly summarizes findings which were common to more than one railroad or are considered especially noteworthy.

STAFFING

The assessment disclosed that staffing inadequacies existed on several railroads. On some railroads, these inadequacies were only apparent at one or two locations. On others, these problems were widespread. This included railroads that had consolidated dispatching operations. On one railroad, the staffing shortage was so severe that the railroad was forced to buy vacation time from several dispatchers.

An insufficient number of employees assigned to offices leads to several problems, as follows:

- o A shortage of relief employees results in dispatchers working on their normal rest days. While this may not be of concern in a short term situation, FRA believes problems can result if this situation continues.

- o In some instances, railroads were so understaffed that employees were required to work for periods in excess of that permitted by the Hours of Service Act.

- o Initial and periodic training can suffer from staff shortages. Due to the insufficient number of relief employees, dispatchers at some offices were not permitted to make familiarization trips over the railroad.

TRAINING

There was a noticeable pattern of inconsistency. The length and depth of initial training provided to dispatchers varied widely. Major variations were noted even among different dispatching offices on the same railroad. Following are conditions evident during the assessment:

- o There were inconsistencies among railroads, and among different dispatching offices of the same railroads, regarding initial and periodic operating rules instruction. Although this type of instruction is required by FRA, the regulations currently do not specify content of these programs of instruction.

- o FRA noted major differences regarding training on dispatcher control and communications systems, technical and administrative procedures, and physical characteristics. Again, these variations were disclosed not only on different railroads, but on different offices of the same railroad. At some offices training was exclusively on-the-job, even 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 could also contribute to stress, fatigue, and work overload.

- o Policies concerning familiarization trips varied widely. Such trips should be a component of both initial training and periodic re-training. The number and frequency of such trips was insufficient on some carriers.

OPERATIONAL TESTING

A prime area of concern noted during the assessment was that the required program of operational tests and inspections was seriously inadequate on most railroads. The purpose, as stated in 49 CFR Part 217, is that this program be a primary tool for determining dispatcher knowledge of and compliance with the carrier's operating rules and special instructions. It was apparent to FRA that this program was not given the necessary emphasis as it relates to train dispatchers. Following is a brief synopsis of conditions noted:

- The programs often did not include all safety critical rules and instructions which pertain to dispatchers.
- The level of program activity at certain offices was so minimal as to render the program meaningless.
- Changes in operating rules and the application of new technology have not been incorporated into all testing programs.
- Low failure rates at some offices were questionable. FRA observation of operations at these offices often produced failure rates which were appreciably higher than those recorded by carrier officers.

To illustrate the problem, following is a summary of occasions noted by FRA in which dispatchers or the employees they direct failed to comply with carrier operating rules and/or Federal regulations:

- At several locations, dispatchers failed to include all federally required information on their records of train movements.
- Mandatory directives were improperly annulled.
- Authorities for employees to occupy the main track were issued before required blocking devices were applied.
- Mandatory directives issued by procedures other than that authorized by the carrier. The repetition of mandatory directives was not always properly verified.
- Track and time authority was not recorded. On one railroad the times the signals are blocked are logged by the computer, but the computer does not identify the employee granted track authority.
- Track car movements were authorized in DTC territory under rules which apply only to trains.

- Train orders were underscored in the train order book prior to the repetition of the order by an operator.
- Train order books contained illegible train orders, train orders with erasures, alterations and other deficiencies.
- DTC block forms were not used to record DTC train movements. At some locations, there was no space on the train sheet for that purpose.
- An operator was instructed to misrepresent the time when a blocking device was applied in order to create the appearance of compliance with the operating rules.
- Employees receiving mandatory directives failed to properly repeat the names of stations and numerals in train orders.
- The release of a DTC block was approved despite the fact that the train crew member failed to properly repeat the release.
- A dispatcher did not confirm that an operator was in possession of orders which had been issued to that station.
- An employee who had been granted joint occupancy authority used improper procedure to release that authority.

COMMUNICATIONS SYSTEMS

Congestion of radio frequencies was a concern in many areas of the country. This was particularly true at locations where major railroad terminals were located. Sources of this congestion include employees of foreign railroads in joint operating territory and non-essential transmissions by a variety of employees. In addition, it was noted that inadequate radio equipment was in use on several railroads.

Finally, FRA determined that on numerous occasions train dispatchers did not comply with required radio standards and procedures. These deficiencies included transmissions of mandatory directives in accordance with Federal requirements.

ENVIRONMENT AND WORKLOAD

It was apparent that most railroads are providing better working environments for train dispatchers. There were also some indications the railroads are attempting to adjust workloads to reasonable levels. FRA continued to note some inadequacies in these areas, however. Following are examples:

- o High noise levels were noted at several dispatchers offices. Sustained high levels of noise are generally accepted as negatively impacting employee performance. At some offices the noise could be mitigated by sound absorbing partitions. At other locations the source of the noise was obsolete broadcast type loud speakers.

- o At some locations multiple dispatchers work within a single room. This environment can create distractions unless the room is properly designed and acceptable levels of decorum are required from employees.

- o Not all offices were secure against entry by unauthorized persons. FRA Inspectors noted occasions when unauthorized persons were in dispatchers offices and served as a source of disruption or distraction.

- o At offices noted in Section II of this report, some dispatchers appeared to be working at or near the limits of their abilities due to a heavy work load. Most offices had no formal and uniform method to measure, analyze and equalize workload.

- o At several locations the devices used to block track sections were ineffective, compromising safety.

- o Several offices either lacked recall systems or used systems which did not adequately identify locations of on-track movement in voice control territory.

- o Many railroads have not adopted or have not fully implemented the latest technology available for voice controlled block systems.

AGENCY PROPOSALS

As a result of evaluation of data received during this assessment, FRA is taking the following actions:

1. FRA intends to more closely scrutinize the programs of operational testing and inspection, and the programs of initial and periodic rules training submitted by each railroad. Civil penalties will be issued where necessary.

Further, the agency is currently evaluating the all requirements of 49 CFR Part 217. The agency intends to resolve any ambiguities contained in this Part. Finally, FRA intends to thoroughly evaluate all other options, and will make any changes in the rule it deems necessary to ensure safety and compliance.

2. Because of the diverse control and communications systems, and operating procedures currently in use, FRA does not believe training regulations in these areas are prudent at the present time. Further, several railroads have initiated comprehensive training programs since the conclusion of the assessment. These programs are diverse, but each is far more comprehensive than those evaluated during the assessment. FRA intends to conduct in-depth reviews of these new programs.

3. FRA anticipates, through the Office of Research and Development, contracting with outside experts to assist in the development of workload measurement models, and to study occupational stress of train dispatchers.

CHAPTER 10- SUMMARY OF CONCERNS AND RECOMMENDATIONS

Section II of this report contains about 60 pages of concerns and related recommendations developed by FRA during the assessment. These concerns and recommendations are arranged at the end of each individual railroad chapter. The following is a summary of concerns and recommendations based on conditions found either to be relatively consistent throughout the industry, or to be of sufficient importance to merit special emplasis.

Concern I-01: Dispatching staff shortages existed on several railroads. While these shortages were apparent at one or two locations on most railroads, they were widespread on others. This included railroads that had consolidated dispatching operations.

Recommendation: Each railroad should thoroughly evaluate current and future staffing needs and develop plans to assure an adequate number of dispatching employees are available to meet these needs.

Concern I-02: The length and depth of initial training provided to dispatchers varied widely. Major variations were noted even among different dispatching offices on the same railroad. While FRA found no training deficiencies which might result in unsafe conditions, the pattern of inconsistency creates a potential for problems. This is of particular concern considering the current changes in technology and operating practices.

Recommendation: Initial training programs should be developed by each railroad on a system wide basis. Once developed, the individual offices should be required to fully implement these plans. System level officers should conduct audits to assure compliance with initial training standards.

Concern I-03: There were 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. Clearly, consistency is a prerequisite for a training program to accomplish its objective of producing qualified dispatchers. 49 CFR Part 217 requires each railroad to submit to FRA a program of instruction on railroad operating rules and special instructions.

Recommendation: System level officers of each railroad must make the program of instruction submitted to FRA available to those supervisors responsible for initial and periodic rules instruction of train dispatchers. An audit procedure should be implemented to assure compliance with this program.

Concern I-04: Many carriers limit dispatcher periodic reinstruction and reexamination classes of operating rules to one hour because of restrictions of the Hours of Service Law and certain contractual agreements. FRA believes that a one hour period is not sufficient to provide worthwhile periodic re-instruction.

Recommendation: Those railroads that impose such strict limitations on periodic rules instructions classes should restructure their current program of instruction. Changes should be made to assure dispatchers receive proper periodic rules instruction. Labor organizations should cooperate in the development and execution of that restructuring.

Concern I-05: A prime area of concern noted during the assessment was that the Federally required program of operational tests and inspections was seriously deficient on most railroads. The stated purpose of this program should be a primary management tool for determining dispatcher knowledge of and compliance with the carrier's operating rules and special instructions. It was apparent to FRA that this program was not given the necessary emphasis as it relates to train dispatchers.

On some railroads the train dispatchers were non-agreement employees and were considered railroad officers. These railroads at times took the position that since train dispatchers were officers, operational testing was not required. FRA does not agree. Such policies are contrary to federal regulations and impede the goal of determining rules compliance by employees in safety critical positions. On other railroads train dispatchers were included in the program but the quality of testing was substandard. Many railroads conducted a high percentage of observations or tests for compliance with general rules.

Recommendation: Each railroad should thoroughly review it's operational testing program as it relates to train dispatchers. Each program must include provision for operational testing and inspection of dispatchers. Each program must provide for such testing and inspecting under the various operating conditions of the railroad. Included must be provision to conduct such tests at night and on weekends, and provision to test on all rules and special instructions which apply to train dispatchers. Rules governing the issuance of mandatory directives, the use of blocking devices, and the granting of track and time authority are critical and must be included in the testing program.

FRA intends to conduct a more thorough review of each railroads programs as they apply to train dispatchers. The agency will then take appropriate action to ensure the intent of the regulations is achieved.

Concern I-06: At many offices FRA was not able to establish a correlation between the number of cases in which discipline was assessed and the number of operational test and inspection failures. The statistics were skewed by individual carrier policy. Frequently, the failures were not the result of employee testing. Instead, carrier officers completed a report indicating a failure because a rules violation was documented during an accident or incident investigation.

Recommendation: Although all rules violations should be a part of the database, such "after the fact" records distort the statistical data and prevent senior management from conducting a meaningful analysis regarding officer participation in the program. Railroads should reserve a database code for these types of violations in order that the information can be properly sorted for evaluation.

Concern I-07: Several railroads did not have an operational testing program system with computer generated audits or other methods of internal audit. As a result, not all railroads use the test and inspection program to generate useful management reports.

Recommendation: This program can establish a database from which meaningful management information reports can be produced. Each railroad should thoroughly evaluate the outputs being generated by program inputs and determine ways to make the data meaningful.

Concern I-08: On numerous occasions, FRA found that dispatchers did not comply with required radio standards and procedures. FRA also noted numerous occasions in which dispatchers did not require others with whom they were communicating to comply with radio standards and procedures. Among the deficiencies noted were instances in which mandatory directives were not communicated by radio in accordance with federal regulations. There is a high potential for accidents if the radio communications between dispatchers and train crews are not fully understood.

Recommendation: Each railroad must assure compliance with FRA's radio standards and procedures regulations. Since these regulations are incorporated into each railroad's operating rules, the programs of operational tests and inspections, and programs of initial and periodic operating rules instruction should be used to accomplish this compliance.

Concern I-09: Congestion of radio frequencies was a concern in many areas of the country. This was particularly true at locations where major railroad terminals were located. Sources of this congestion include employees of foreign railroads in joint operating territory and non-essential transmissions by a variety of employees.

Recommendation: Each railroad should evaluate radio congestion and develop plans to relieve the congestion. As a start, non-essential transmissions should be eliminated.

Concern I-10: The assessment disclosed that high noise levels existed at some dispatchers' offices. Sustained high levels of noise are generally accepted as negatively impacting employee performance.

Recommendation: Those railroads that have dispatching offices with high noise levels should take action to reduce the noise. At some offices the noise could be mitigated by sound absorbing partitions. At other locations the source of the noise was obsolete broadcast type loud speakers, and correction could be accomplished by replacing these speakers.

Concern I-11: FRA found that not all train dispatching offices were secure against entry by unauthorized persons. FRA noted occasions when unauthorized persons were in dispatchers offices and served as a source of disruption or distraction.

Recommendation: Those dispatching offices which are not secure against unauthorized entry should be made secure.

Concern I-12: There was evidence that dispatchers at many locations were required to sustain extremely heavy workloads. Further, there was evidence that high stress factors exist in the dispatching environment. This was particularly true during periods of peak traffic and maintenance activity. These heavy workloads and stress factors were evident at both existing and new dispatching centers.

Recommendation: Adequate methods for evaluation of dispatcher workloads and stress factors must be developed. FRA believes this endeavor will require contracting with experts in the health and human factors fields.

Concern I-13: During the assessment, FRA conducted a thorough evaluation of the computer assisted dispatching system used by CSX at Jacksonville, Florida. This evaluation disclosed the process used by the railroad and suppliers to verify computer software was not complete.

Recommendation: FRA strongly supports the use of new technological applications in the railroad industry. The agency firmly believes, however, that the hardware, software, and data communications involved in such systems must be completely verified to assure the system functions as intended. Each railroad using or considering such systems should analyze the verification process and, if necessary, make changes to assure the verification is complete.

EXHIBIT I

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

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

SEP 22 1988

Mr. Kenneth C. Dufford
Executive Vice-President
CSX Transportation, Inc.
500 Water Street
Jacksonville, Florida 32202

Dear Mr. Dufford:

This refers to our recent conversation concerning the findings and conclusions derived from the FRA safety review of the CSX Control Center located at Jacksonville, Florida. We have completed our initial review of this facility. This review included examination of procedures used to issue and implement safety sensitive written instructions, programs and procedures for computer assisted dispatching, computer hardware, interface devices, data communication lines, software development and quality assurance, verbal communications systems, methods of operation, training, staffing, and operational testing programs. This project was conducted during the week of August 15-19, and involved a total of nineteen specialists and inspectors from the Office of Safety's Operating Practices and Standards Branches. Further analysis was subsequently performed by the Office of Safety staff at the Washington, DC, headquarters.

Overall, FRA found that the Jacksonville center represents significant progress toward utilizing state of the art technology to improve railroad safety, and to assist train dispatchers with the organization and management of the railroad's operational affairs. Our inspectors found that the physical facility has been carefully planned and soundly constructed with ample attention devoted to a wide spectrum of operating contingencies.

This includes sufficient emergency back up capacity for power interruptions, and an exceptional data communications system which provides up to four communication paths to each of the remote controlled locations. Our inspectors also noted that the master computer system utilizes dual equipment so that control will be maintained in the event of equipment failure.

During the course of our examination, our inspectors found it convenient for discussion purposes to divide the Computer Assisted Dispatching (CAD) system into it's two primary subsystems; the Traffic Control subsystem (TCS) which includes interlockings, and the Direct Traffic Control (DTC) subsystem.

The Traffic Control subsystem processes dispatcher commands to the remote signal system, and receives status indications from the field which are displayed on overhead projection screens. This information may be summoned in greater detail on the individual dispatchers video display unit. Safety and protection of train movements is provided by the field equipment as in all other installations. Signals, track circuits, electric locks, and switches are interconnected to provide the conventional fail safe protection.

Although the clerical and administrative entries that are required from train dispatchers in order for the system to function are time consuming and cumbersome, the manual routing procedures of the subsystem are easy to understand and operate. FRA inspectors who observed operations on the floor of the center, however, noted a marked lack of confidence and/or understanding from the dispatchers about the reliability of the automatic routing features of the subsystem.

The traffic control subsystem also uses computer logic to automate other functions involved in train control, which relieves dispatchers for more productive planning and analysis tasks. These automated functions include train identification and tracking, recordkeeping, and reports. While FRA is concerned about the quality and reliability of this aspect of the subsystem at present, FRA commends CSX's efforts to reduce the nonessential workload confronting your train dispatchers. We realize that technical perfection often cannot be achieved on a rigid timetable.

The Direct Traffic Control subsystem represents a significant improvement which helps the dispatcher to identify and track trains. In addition to providing a visual status report, the computerized operating rules logic portion of this subsystem identifies and often prohibits the train dispatcher from establishing many conflicting or otherwise unsafe train and on-track equipment movements. FRA has long encouraged the railroad industry to adopt this type of technology to assist dispatchers in non-traffic controlled territory.

In ABS territory, the DTC subsystem provides the facility for direct traffic control but the protection for train movements is provided by the field signal system. The DTC rules provide a substitute for the historical timetable and/or train order authorities.

In non-signaled territory, the DTC subsystem provides the authority and the protection for train operation using the DTC rules. It is in this method of operation that computer assisted dispatching system failures could lead to unsafe conditions. To

minimize the possibility of unsafe failures, CSX has used the following development philosophy:

- The hardware system is duplicated with back-up capabilities. The automatic switch-over to the back-up system is still being developed. Since the back-up hardware will be on-line and functioning in parallel with the primary system, there will be no down time at the dispatchers' consoles due to power, computer, or individual communication mode failures. At the present time, the back-up hardware is working but the automatic switch-over is not functioning. Switchover must be done manually.

- The installation and checkout of the CAD is being implemented by activating a small number of dispatching stations at one time. When a new area is to be activated, an inexperienced CAD dispatcher is trained with the assistance of an experienced person in an on-the-job training mode. During this training period, the area to be added to the system is given a fundamental exercise by computer simulation. Realistic scenarios are demonstrated to the CAD system and the new trainee.

- A matrix of the CSX DTC and on-track equipment (OTE) rules was developed which defines the existing rules in a language that is compatible with computer implementation. A control center supervisor assigns new trainees to check the new CAD area by inputing commands which would violate the DTC rules and result in conflicting train and OTE movements. If variances or problems are identified, a Field Observation Report Form is submitted. CSX then assigns the problem responsibility to the vendor or carrier personnel.

- When no further problems occur in the developing area of the CAD (generally a subdivision), that portion of the CAD is connected to operate in parallel with the existing dispatching center. Problem areas are again identified and reported on the Field Observation Report Form.

- When no further problem areas are identified the existing dispatcher center is closed down and all dispatching is transferred to the Jacksonville Control Center.

- Any problems that occur in the fully operational CAD are reported and reconciled by the same Field Observation Report Form.

As I have previously explained, the purpose of our visit to Jacksonville was twofold:

(1) to compare the safety sensitive functions of the computerized system against the traditional error detection and protection schemes historically employed by railroads under the Standard Code of Operating Rules and it's derivatives and;

(2) to broaden FRA's own knowledge of technological applications to train dispatching functions.

During the past eighteen months inspectors participating in FRA's National Train Dispatching Assessment have visited every major train dispatching office throughout the United States. Our inspectors have had the opportunity to observe a multiplicity of innovative solutions to a variety of problems which are common throughout the railroad industry.

The substantial railroad experience of our headquarters and field personnel has proven to be a useful oversight tool for other railroads that have been reviewed. It is with this thought in mind that I share the views and concerns identified below, and it is my hope that this information will prove helpful to you in your efforts to develop the most error free train dispatching system possible.

I. COMPUTER ASSISTED DISPATCHING

The evaluation of the technical aspects of the computer and related systems was conducted primarily by the FRA Office of Safety's Standards Division Staff, with input from the Operating Practices Division. In the short time available for FRA to actually observe the CAD system in operation, there were no serious systems problems noted. Following is a brief synopsis of our analysis of this system:

Software Reliability and Safety Assurance

CSX has not performed a formal safety analysis and has not followed a rigorous procedure for software quality assurance. Large projects of the U.S. Department of Defense, NASA, and the Federal Aviation Administration require that software be developed according to standards for quality assurance. The purpose of a systematic methodology is to organize the developmental tasks so that they can be controlled by the various specialists and managers who understand the technical details and rules that should control the logic flow.

CSX is using an informal approach to software specification and design. At this point in the development of the system, CSX works with the vendor in configuration management to assure that

changes, modifications and error corrections are compatible with all possible combinations of software logic. If an error in software design is found there does not seem to be a control that requires and documents that the error be corrected in all parts of the system.

Software problems can be of two basic types--design errors and hardware defects. Design problems can show up when a previously unused path through the logic is exercised or when a seldom used or unexpected set of inputs is encountered. Hardware defects should be detected by periodic verification checks. Software faults can be minimized by design redundancy and/or by a systematic test program that searches for any unacceptable design fault. Design redundancy requires that independent software designs be prepared by separate design teams and that the two programs be run concurrently. Outputs from the two programs must agree before the answer is executed. This type of redundancy has not been used in the CAD system.

Even though the software for each track segment is developed separately, the test program for these individual segments should be complete. The assurance program should not permit skipping over of tests because of the similarity to previously installed software routines. CSX should consider a formal safety and quality assurance in lieu of the current informal test program.

A formal program is particularly important when vital logic is involved. An initial step in the formulation of a formal program would be to identify the vital elements of the software program.

For the most part, FRA found that the operation of the CAD facility in DTC territory increases protection and safety. A major improvement is that the DTC rules have been reduced to a matrix of logic that is programmed into the computer. As dispatchers manipulate the various requests for block occupancy, the computer logic verifies whether the block can be authorized and if so under what restrictions.

During analysis, FRA found several potential conflicts not provided for in the rules matrix. Because the rules matrix does not search for all conflicts, the safety of the operation is still dependent on observation of the rules. FRA discovered the DTC Conflict Check Matrix identified to us on Table 1 does not correspond with the DTC Permit Conflict Checks identified to us on Table 2. Following are conflicts which are not checked, and differences noted between Tables 1 and 2.

- The system does not identify failure of the dispatcher to provide OTE operators with information regarding block occupancy by trains. Rule 704 requires this information to be included on the OTE authority.

Because of this software fault, dispatchers can issue authorities for OTE movements without identifying preceding trains in the limits of the authority. A conflict check is not executed.

- The system will permit OTE movements in both directions but will not provide conflict checks if subsequent OTE movements are authorized within the same blocks.

- The DTC Table 2 permit check provides for proceed block conditions in one direction with rear flag protection, and without rear flag protection. The Table 1 conflict matrix permits following movements only if rear flag protection is provided.

  For movements in one direction without rear flag protection, Table 2 has a question mark and Table 1 defaults to the "no" condition in all circumstances, including prohibiting OTE movements from following trains. This conflicts with the provisions of rule 99.

  FRA found that special instructions of the Atlanta Division Timetable, Augusta Terminal, support this inconsistency. These special instructions have the effect of standing the DTC rules on their head. They permit the issuance of absolute, clear and occupied blocks within signaled territory; and also prohibit the issuance of proceed blocks within signaled territory.

  FRA Inspectors noted that when dispatchers authorized proceed blocks in one direction without the requirement for rear flag protection (in compliance with rule 99), and later attempted to issue following OTE movement authorities, the computer would not permit such movements. These movements conform to your operating rules. Dispatchers stated they could not understand why the computer would not allow such movements. Furthermore, the dispatcher's workload was adversely influenced by this software fault.

- The system permits authorizing of a proceed block in both directions, and the Table 1 computer conflict matrix will protect such movements. The Table 2 permit conflict check indicates subsequent OTE movement authorities may be issued.

- Yard limits are identified on the CRT using the same color and track schemes as territory where yard limits are not in effect. The system does not provide conflict checking for yard limit movements. When issuing DTC and OTE directives, the dispatchers must

remember not to include such limits in these authorities.

In the DTC mode, the vital steps in controlling train and OTE movements are: data storage and retrieval, decision making, transmission and reception of authority, and execution of that authority. In each of the steps there is an interaction between the computer and the dispatcher, and in each step there is some probability of error. Decisions in the movement and protection of trains, on-track vehicles, and work gangs are made by a combination of dispatcher and computer logic. The transmission and execution of authorities is primarily a human function.

The displays available to the dispatcher provide visual aids to keep track of the locations and movements of the existing track authorities. FRA noted a number of CRT displays used in DTC territory that are not distinct because they are positioned too far away from the dispatcher. CSX is aware of this problem and indicated the intent to redesign the layout to accommodate the dispatcher requirements.

Printer

CSX demonstrated a new printer that will be incorporated into the system, primarily for the transmission of train bulletins and release forms. The printer uses a short form technique to verify that the received message is the same as the transmitted message. The new printers verify the number of lines in each message and the sum of the bit values for each character. If there is a discrepancy in the number of lines or in the check sum the printer will not accept the message and the transmitting station will recognize that there was an error in the transmission. The verification process is in effect a handshake between the sender and the receiver machines.

Since the information is verified before it is printed there is a small probability that the message could be corrupted in that time interval. As an additional check the person who receives the printed message must verify the number of lines. CSX must assure that train crews and other involved employees are properly instructed on the human requirements. These requirements should be included in the CSX Operational Testing and Inspection Program.

This automation of the message verification will reduce the workload of the dispatcher significantly. It is our understanding authority has been requested to install 50 of these printers. This should have a positive effect on safety by reducing the probability of transmission errors. FRA noted that the software system neither assures the train bulletins are actually transmitted nor assures they are transmitted to the correct station.

II. RULES AND PROCEDURES

In order to effectively evaluate the relationship of the center to field operations, and in order to review the impact of the facility on those operations, FRA found that it was necessary to review the procedures and practices adopted at the center, and then to look and the systems in place to govern train and OTE movements at the division level.

This included a review of the methods used to provide employees with the information necessary to conduct safe movements of trains and on-track equipment. FRA found the CSX uses the following documents and publications to provide this information:

1. Operating Rule Book.
2. Division Timetables.
3. Division (District) Bulletins.
4. General Superintendent Circulars.
5. Train Bulletins and Release Forms.
6. Train Orders and Clearance Forms.
7. Direct Train Control (DTC) Movement Authorities.
8. On-Track Equipment (OTE) Movement Authorities.
9. Notices issued by Jacksonville Control Center Management to Jacksonville based train dispatchers.

FRA reviewed the progressive flow of these informational texts, and concluded the burden they place on employees involved in operations is overwhelming. Employees are required to have in their possession and be familiar with a rule book of about 250 pages, one or more divisional timetables each about 200 pages in length, divisional/district re-issue bulletins which are issued quarterly and are often 30 or more pages in length, each periodic bulletin issued after the re-issue bulletins become effective, and train bulletins with release forms which contain as many as 50 items. In addition, they must receive and review train orders, messages and clearance forms where applicable.

The notices issued to Jacksonville based dispatchers contain safety sensitive information including operating rules interpretations. These notices to dispatchers are not defined in the CSX rule book. They are issued and retained in an unsystematic manner.

This burden could be greatly reduced by more effective planning. CSX has adopted a loose leaf type operating rule book, which readily permits the insertion of revised rules. Yet FRA found that permanent changes in the operating rules are often carried on divisional bulletins for long periods of time.

Timetables are currently printed in a soft bound format. A change to loose leaf timetables would permit many informational items to be inserted directly into this publication. This would permit a reduction of the amount of information now included in superintendent's bulletins.

By increasing the frequency of issue for superintendents summary bulletins from a quarterly to a monthly summary, the number of bulletins in effect at any given time would be substantially reduced. This would also provide CSX with an opportunity to consolidate and sequentially categorize the required information.

The system of issuing notices to Jacksonville dispatchers should be reviewed. At present, two sets of files are maintained at each dispatcher's console. One set is identified as the operations file, while the other is entitled a general file.

FRA inspectors found operational items incorporated into the general file, and general items incorporated into the operations file. These notices are not identified by a numbering system to make it possible to verify that the file is complete. Many are not signed or otherwise equated with established authority. Some are not even dated. They are often non-specific and some are ambiguous. The following example is reprinted from a "train bulletin procedures" document found in the operational file.

> "TOBI- Resending a Train Bulletin to an Alternate Printer or Omnifax.
>
> "If a particular designated printer is out of service and the need arises to resend a Train Bulletin to another alternate printer or omnifax and there is one available (check the "TOAD" for that subdivision to find out). The dispatcher can enter the bulletin number only on the Train Operations Menu under 'Recall Message' recalling the Train Bulletin itself. At this point the train dispatcher in the 'UPDT' mode can change the 'PRT' field to the alternate printer/omnifax number. Then type in the "COMP" in the 'OPT' field and depress 'Enter" key."

This document was not signed or otherwise identified, and there was no date of issue or effective date. CSX should establish a control and review system for these documents to assure they are orderly, credible, and easy to understand.

During the simulator session conducted by your training staff, our inspectors became troubled by the application of yard limits as these limits related to train and on-track equipment movements. During our individual desk audits, your dispatching workforce expressed concerns similar to those of our inspectors.

FRA therefore conducted a review of the correlation between rule 93 and the other primary methods of operation used by CSX, including DTC, TCS and interlockings.

We also reviewed the section of the rule book covering definitions, and specific operating rules 5, 704 and 710 were reviewed. Rules 704 and 710 involve on-track equipment movement authorities, and are critical to the dispatching environment.

We found that these rules, when combined with the informational flow mentioned above, are puzzling. A brief synopsis of this analysis is as follows:

- CSX has devised an elaborate set of operating rules (120 to 132) to provide for Direct Train Control (DTC) movements. In addition, CSX has invested heavily to provide the Jacksonville dispatchers with computerized visual displays and automatic conflict checking.

  Even with these useful tools the primary requirement to assure safe train operations under this operational method depends entirely on a complete understanding between train crews and dispatchers. Radios are normally used for these essential communications. Radio communications problems are posed not only by climatic conditions and interference from third party transmitters, but train dispatchers at the Jacksonville center could be confronted with the additional problem of understanding regional dialects from distant employees.

  FRA is concerned that CSX has not devised a standard form, and that CSX does not require that standard verbiage be used for these vital communications. Since both the dispatchers and train crews would need identical forms, CSX should consider amending the present CRT format to provide the exact verbiage, and distributing pre-printed documents based upon that format to the field.

- FRA has identical concerns regarding on-track equipment (OTE) movements. While CSX rule 704 requires authority for such movements to be written, there is no provision for communication of standard verbiage between train dispatchers and on-track equipment operators.

  Such a form is included in the center's Dispatcher Information System as a Train Message Entry, but because there is no easy way to correlate this form to the screen displayed form which drives the DTC conflict

checking capability, it is not being used by the dispatchers. CSX should consider amending the present programming to require use of this form, and to assure the information is integrated into the conflict checking scheme.

- The CSX yard limit rule (93) is ambiguous. It is our perception the rule requires trains to comply with the FRA rule (49 CFR 218.35) except within signaled territory, as indicated by the second note of your rule. This note states movements on such tracks will be made in accordance with the signal system rules that are in effect. This note apparently applies to interlockings and main tracks governed by a traffic control signal system, and it is FRA's judgement, after discussion with your rules committee, that this rule has no practical application where interlocking rules and traffic control signal system rules are in effect. The rule is therefore likely to confuse employees.

  To compound the problem, many divisional timetables contain special instructions which modify this rule in various manners. FRA has on several occasions contacted CSX rules department officers to determine the basis for this rule, but an adequate explanation has not been secured. FRA therefore deduces that the CSX rule functions primarily to circumvent the requirements of 49 CFR 221 (Rear End Marking Devices).

  The consolidation of train dispatchers' positions at Jacksonville is likely to further confuse employees. This is particularly true when accompanied by the elimination of yardmasters and combining those duties into train dispatching positions. In some cases, the consolidations have resulted in areas where two dispatchers share common authority for train and OTE movements within yard limits.

  A high potential for collision could be the end result. It is our understanding the Jacksonville Control Center Management has petitioned your rules department for a change in rule 710. There is apparently concern within CSX that on-track equipment cannot be adequately protected within yard limits. FRA shares that concern.

- The divisional bulletins are not well organized. The Corbin Division, Kentucky District bulletins issued to become effective at 12:01 a.m., July 1, 1988 will be used to illustrate our concern.

Bulletin No. 101 was a re-issue bulletin, which is required to be issued quarterly in accordance with CSX policy. This bulletin consisted of 22 pages and was divided into a general section which pertains to all sub-divisions, followed by specific information applicable only to each of the eight sub-divisions.

However, because this bulletin did not include all the required information, Bulletin No. 101-A was issued to become effective at the same time. This bulletin consisted of an additional eight pages.

The Kentucky District consists of eight subdivisions. Three of the eight sub-divisions are the Cincinnati, Corbin, and Louisville Terminals. With the exception of these terminal sub-divisions, the entire Kentucky District is dispatched from the Jacksonville Control Center. Logically, most trains operating within this district originate or terminate within these major terminals.

The train bulletin and release form method of information interchange is therefore in effect throughout this district, other than within the terminal limits. Of the 30 total pages of these two bulletins, 10 were devoted to instructions implementing the train bulletins and release forms. This occurred because the division issued these instructions separately for each of the five line of road subdivisions instead of issuing the instructions once in the general section of the bulletin.

Although the division issued the instructions separately for each sub-division within the Kentucky District, two subsequent bulletins pertaining to these train bulletins and release forms were issued to all sub-divisions and simply addressed "to: all concerned." One of these subsequent bulletins had sample copies of these documents with explanations, and the other amended the train bulletin by adding a new item. It would appear the bulletin transmittal system is aimless and could therefore be confusing to employees.

- Our investigations have disclosed that within the Cincinnati and Louisville Terminal Sub-divisions, mandatory directives including temporary speed restrictions are not issued in accordance with Federal regulations, carrier rules, or sound operating practices. Crews enroute to Cincinnati from Corbin and Louisville are required to radio the terminal train order operators in order to receive such restrictions.

These mandatory directives are not issued over the radio in train order format. An identical situation exists at Louisville for crews enroute from Cincinnati and Corbin.

- The division instructions and general superintendents circular which implement the train bulletin and release form method of information interchange are unclear. The division instructions state that trains must receive these documents, and that train crews must contact the train dispatcher in the event they do not receive them. Action to be taken by the train dispatcher in this event is not specified.

  The general superintendent's circular states "where required, the conductor and engineer must each obtain a legible copy of a train bulletin with a release form and must ascertain (with each other, if feasible) that the information thereon corresponds." Our question is: where is it not required that each obtain a copy, and why would it not be feasible that they compare the information?

  Further, the instructions state that only one release form and train bulletin will be issued to a designated train at any one station. This would not appear to provide for interdivisional operations where more than one dispatching district is involved. How are train crews assured they have the appropriate bulletins in such an event? What instructions, if any, have been implemented to provide for such contingencies?

- During examination of the divisional timetables, it was noted CSX uses other methods of operation as well, including rules S-97, 105, S-145, S-146, and D-151. Timetable special instructions also provide for at least one additional method of operation; Industrial Spur Operations. Within the timetable special instructions there are numerous variations which modify these rules. For example, at least four subdivisions on the Atlanta and Corbin divisions arbitrarily suspend carrier requirements for written work authorities and reduce the protection requirements to a verbal understanding. FRA believes it is unnecessary to utilize all these operating methods. Further, such use can lead to confusion by employees engaged in train operations.

  Based on discussions with Jacksonville Control Center Management, it is our understanding some of these methods of operation will be changed to DTC as the various line segments involved come under the control

of the Jacksonville Center. Apparently, CSX recognizes the considerable time, expense, and training problems which would be encountered if it were necessary to develop a rules logic matrix required to make these operating method compatible with the computer system implementation. The same wisdom should be applied to the present operating environment.

- The train bulletins issued by the Jacksonville Control Center do not arrange messages in an order that is in the sequence required by the train crews. These bulletins are often lengthy and the failure to sort the information in orderly sequence creates an unnecessary burden on crew members. It is our understanding this situation will be corrected in the near future.

III. TRAINING

FRA's examination of Jacksonville train dispatcher training program indicated that training procedures are substantially improved over previous practices employed by CSX. The training staff at the center consists of a part-time effort by two employees; the Assistant Manager-Dispatching Systems, and a chief train dispatcher from a division which is not presently dispatched from Jacksonville.

Labor agreements between CSX and the American Train Dispatchers Association (ATDA) provide for a 60-day training period for train dispatchers who are transferred to the Jacksonville center. Training personnel have developed a formal training program which accounts for 15 days of this time. This program prescribes about five days of formal lecture and classroom discussion, five days of on-the-job training (with practice at a train dispatching console simulator), and about five days of line-of-road orientation to qualify each dispatcher on the physical characteristics of his awarded territory. A course textbook and an elementary train simulator constitute the principal training aids. Our staff identified the following items of concern:

- Although the "students" who arrive at the center are all journeymen train dispatchers, those portions of the operating rules which applied on the employees former districts often vary substantially from the rules in effect on their newly awarded positions. Since instruction on the operating rules is a one day event, it is important to measure the strengths and weaknesses of each "student" so as to teach to the needs of the individuals within the class. CSX does not have a pre-admission evaluation test with which to measure these needs.

An example which illustrates such a need is the use of the various Rule 707 authorities. Because of confusion, authority 707(c) is not being used at the Jacksonville center, even though this authority provides a higher level of protection to work forces than other types of authorities. Further, it is our understanding that because of dispatcher confusion, the only 707 authority being used on the Atlanta, Corbin and Tampa Divisions is 707(f),(Example 3).

- According to responsible officers, the operating rules class and test is administered to all new control center train dispatchers. Interviews with train dispatchers on the control center floor indicated that this practice has not always been followed.

- The operating rules test program permits train dispatchers to incorrectly answer up to 20% of all questions and still successfully complete the course. CSX does not prioritize those rules which are critical to safety (and which, if misapplied, could result in serious accident) into a "must pass" category.

- Train dispatcher "students" are not required to perform a practical demonstration of their acquired skills using the computer console prior to being released for service. CSX is commended for incorporating a train movement simulator into the training program, but the potential advantages of this system have barely been explored.

  With enhancement the system could be programmed to simulate many actual field conditions. The instructor would then have the opportunity to observe a student's reactions and responses to actual field conditions and objectively evaluate the employee's readiness to assume responsibility. Such a device would have substantial ongoing value as a tool to enhance the dispatcher's emergency response preparedness, and would improve the dispatcher's reaction time and skills for practical management of situations such as derailments and collisions.

- CSX has established a policy which requires all train dispatchers to ride each main line and those branch lines where high traffic density exists. Interviews with dispatchers at the center disclosed that not all dispatchers were given this exposure. While these dispatchers did not express this as a condition of concern, it still violates CSX policy.

- Although CSX requires each train dispatcher to ride the major rail lines within his district, the carriers goals and objectives are unclear. CSX should evaluate the purpose for which this activity is conducted and inform participating train dispatchers. The carrier would then have a standard from which to measure and evaluate the "students" achievements.

IV. OPERATIONAL TESTS AND INSPECTIONS

FRA inspectors conducted a limited review of CSX operational testing procedures as they apply to the train dispatchers at the Jacksonville center. Instructions for performing these tests are contained in a detailed publication entitled "Efficiency Tests Form 120 ROP".

Testing for all classes of CSX employees, except Jacksonville center train dispatchers, is a division level responsibility. Testing responsibility for Jacksonville dispatchers has been assigned to the management staff of the Jacksonville facility. According to "Efficiency Tests", the officer responsible for the execution of the testing program is the Superintendent of Operations, a position which does not exist within the Jacksonville center management structure.

According to "Efficiency Tests", the only designated officer at the center participating in the program is the chief train dispatcher, a first line supervisor. At present, there are five chief train dispatchers positions at the Jacksonville center. All of these officers are assigned specific managerial responsibilities at a designated console within the center during the daylight shift. These consoles are manned by non-contract assistant chief train dispatchers on second and third shifts.

The Jacksonville Control Center opened on May 5, 1988. FRA reviewed carrier furnished computer generated test records for tests conducted from May 5 through August 13, 1988. A total of 122 tests were recorded. There were 6 failures for a failure rate of 4.9 %. The following items were noted regarding the tests at the control center:

- The total of 122 tests conducted is substantially below the minimum level of testing specified in the "ROP 120".

- Of the 122 tests recorded, 31 or 25.4 % were recorded as casual observations and 91 or 74.6 % were recorded as surprise tests.

- There were 10 Rule G tests with no failures recorded.

For a random check, FRA selected certain critical operating rules and noted the number of tests conducted for these rules. The rules selected were among those with which a compliance failure by a train dispatcher could have serious or catastrophic consequences.

Rule 125 establishes procedures for canceling DTC authority after such authority has been granted to a train.
1987 tests/failures/rate:6/0/0
1988 tests/failures/rate:4/1/25 %
Control center tests/failures/rate:0/0/0

Rule 126 establishes procedures for changing the type of DTC block granted to a train.
1987 tests/failures/rate:9/0/0
1988 tests/failures/rate:3/0/0
Control center tests/failures/rate:0/0/0

Rule 129B limits the conditions under which a following movement can be authorized when a leading movement has been relieved from providing rear end protection in DTC territory.
1987 tests/failures/rate:3/0/0
1988 tests/failures/rate:1/1/100 %
Control center tests/failures/rate:0/0/0

Rule 129C establishes procedures for canceling relief from rear end protection.
1987 tests/failures/rate:2/0/0
1988 tests/failures/rate:1/0/0
Control center tests/failures/rate:0/0/0

Rule 131 governs the train dispatcher's actions in allowing a relief engine into an occupied DTC block to assist a standing train.
1987 tests/failures/rate:3/0/0
1988 tests/failures/rate:1/0/0
Control center tests/failures/rate:0/0/0

Rule 271 specifies information which the train dispatcher must communicate when two trains are authorized to work within the same limits in TCS territory.
1987 tests/failures/rate:1/0/0
1988 tests/failures/rate:2/0/0
Control center tests/failures/rate:0/0/0

Rule 275 specifies the action which a train dispatcher must take in TCS territory when authorizing movements over power-operated switches.
1987 tests/failures/rate:37/0/0
1988 tests/failures/rate:34/0/0
Control center tests/failures/rate:2/0/0

Each chief train dispatcher is required to conduct 30 tests per month of which 10 are to be casual observations and 20 are to be surprise tests. Review of carrier furnished computer generated records indicate the following:

- During the month of May 1988 a total of 60 tests were conducted on train dispatchers at the Jacksonville Control Center.

- During the month of June 1988 a total of 7 tests were conducted on train dispatchers at the Jacksonville Control Center.

- During the month of July 1988 there are no records of tests conducted on train dispatchers at the Jacksonville Control Center.

- During the month of August 1988 a total of 55 tests were conducted on train dispatchers at the Jacksonville Control Center. Of the total 55 tests, 49 or 89 % were conducted on August 11 and 12.

The carrier officer assigned to oversee the testing program of train dispatchers at the control center has not been furnished with summary reports of testing activity. The CSX computer system allows any type of sorted and selected report to be furnished either periodically or on request. FRA believes the low level of interest in the statistical results of the program demonstrated by CSX is not consistent with the goals of senior management.

The Chief Train Dispatchers conducting tests at the control center do not receive written instructions on which rules to select for testing. Rules selected for testing are discussed verbally during the biweekly Chiefs meetings held at the center.

V. STAFFING

The Jacksonville Control Center is among the first new generation dispatching offices in the country. New generation offices rely on computer assistance to aid train dispatchers in the performance of their duties. The environment in which train dispatchers work is changing dramatically. Historically the train dispatcher's man/machine interface was unique to the railroad industry.

New installations closely parallel air traffic control facilities in their use of computer screens and advanced communication systems. They also result in larger dispatching districts and may result in proportional increases in workload and job related stress. FRA believes that designers and implementors of new generation installations should consider the staffing and

workload management policies at air traffic control facilities when establishing analogous policies.

Among the considerations should be a provision for periodic employee relief during a tour of duty. Sufficient personnel should be in place to allow train dispatchers to leave the work station to take meal and other periodic breaks or use the rest room. CSX is not in a position to address this consideration due to a system wide shortage of train dispatchers. Evidence of this shortage is the fact that since the control center opened in May, 1988, train dispatchers at the center have worked on their normal relief days on 196 occasions. This total does not include those occasions when assistant chief dispatchers have worked on normal relief days.

This problem affects not only the Jacksonville Control Center but other CSX dispatching offices as well. Employees have been awarded positions at Jacksonville only to be moved temporarily to field locations which have not yet been consolidated into the control center.

Implementation of the control center is being accomplished in phases. With the amount of territory currently assigned to the center, the staffing plan calls for 10 first trick positions, nine second trick positions, and nine third trick positions. The workload at this point in the implementation has apparently exceeded projections to the extent that 10 positions are required for each trick. This has resulted in an ongoing depletion of the spare boards by about 3.2 positions. CSX did not identify to FRA any mechanisms to address this significant and long term staffing shortage.

VI. WORKLOAD

FRA Inspectors noted that the workload of several train dispatchers districts is so heavy that these dispatchers are working at or near their functional capacity. Some train dispatchers functioned at a rate which did not allow them adequate time to plan before making critical decisions. Sound operating practices require carriers to ensure that train dispatchers working at or near their functional capacity are not burdened with non safety-critical duties.

At the Jacksonville Control Center FRA identified certain non safety-critical duties being performed by dispatchers, as follows:

- The workload of train dispatchers is increased because they are required to enter train crew and train consist data into the computer. This data is available to other employees and should be entered by them.

- Special station locations numbers are used on the display screens. These numbers do not correspond to station names and mileposts, which requires the dispatcher to refer to divisional timetables for the proper correlation.

- The automatic feature of the CAD is not always reliable. FRA noted dispatchers requesting automatic routing which was granted according to indications on the display screens. Later, without apparent reason, the CAD deleted the request and defaulted to manual routing. It is our understanding this condition could be the result of various command inputs by the dispatcher, and could therefore be a deficiency in the training program.

- Train identification numbers frequently vanish from the display screens. When this condition occurs the dispatcher must manually re-enter the identification.

The Jacksonville Control Center utilizes a computer-assisted advanced communications system. Nonetheless, FRA staff noted communications problems encountered by dispatchers. On several occasions dispatchers were observed having difficulties communicating with employees via the radio system. These problems were the result of interference due to overlapping radio coverage and insufficient volume. In order to eliminate interference it is imperative that CSX expedite the proposed upgrading of its radio system. Segregated frequencies for operations which do not involve the train dispatcher and increased frequency capabilities for locomotive radios should be provided.

On two occasions FRA staff noted that communications failures resulted in a two-second blank on the dispatcher communication screen. It was necessary for the dispatcher to call up each channel separately and reset it to the monitor mode. This process occupied about two minutes of the dispatcher's time.

VII. FEDERAL RECORDKEEPING

Dispatchers Records of Movements of Trains

Random inspection carrier records for May, June, July and August 1988 reflect a considerable number of incomplete Dispatchers Records of Train Movements Uncompleted train sheets are not listed on the microfiche, therefore, the records failed to show the movements of many trains. Examples of missing data include names of crew members, on and off duty times of crew members, distances between stations and times trains arrived, departed or passed reporting stations. Instances were noted where the train

dispatchers entered fictitious names of crew members into the computer in order to complete a train sheet.

Blue Signal Protection

The Jacksonville Control Center does not, at present, have a procedure or a form (screen) for recording Federally required information for blue signal protection of workmen at remotely controlled switches as required by 49 CFR 218.30 (C) (1),(2),(3) and (4).

Sincerely,

J.W. Walsh
Associate Administrator
Office of Safety

EXHIBIT II

CSX TRANSPORTATION

CSX RAIL TRANSPORT
K. C. Dufford
Executive Vice President

500 Water Street
Jacksonville, FL 32202
(904) 359-1195

September 30, 1988

Mr. J. W. Walsh
Associate Administrator
Office of Safety
Federal Railroad Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

Dear Mr. Walsh:

Thank you for your letter regarding the FRA's review of operations at CSX Transportation's System Control Center here in Jacksonville. We appreciate the level of detail you and your associates maintained, and I agree with your finding that our System Control Center does represent significant progress toward utilizing state of the art technology in order to improve railroad safety.

Your comments and suggestions have been thoroughly reviewed by my staff and me. As a result we have classified various enhancements into three different implementation categories. The first category pertains to items that were identified as beneficial to our operation and have already been implemented (see Attachment I).

The second category involves items that are currently being designed and developed, and are expected to be completed within the very proximate future (see Attachment II).

The final category relates to items that are more intricate and involved than items in the first two categories. It is anticipated these items will take some time to design, develop and implement (see Attachment III). We will proceed on these items, however, in a timely fashion.

The end result of these enhancements will be a more efficient railroad, bringing CSX that much closer to our corporate goal as the premier international transportation company. Your assistance in our ultimate attainment of this goal through your recent review of our operations is duly noted and appreciated.

We now expect to resume territory cut over from field locations to our System Control Center during the week of October 10, 1988.

As we go forward with categories II and III, we will furnish you status reports of our progress. If in the interim you have other thoughts or suggestions, please let us know.

Thank you for your assistance thus far.

Sincerely,

K. C. Dufford
Executive Vice President

Attachments

ATTACHMENT I
FRA REVIEW OF OPERATIONS

CATEGORY 1: Items Implemented

	ITEM
1	Supplemental auto route training for dispatchers. Page 2, paragraph 2, "FRA inspectors who observed operations.." Page 20, paragraph 2, "FRA noted dispatchers requesting..." - During our review in Kansas City the example was presented of dispatchers going to manual on an entire subdivision when a move was being made some 30 miles away. This is such an example of a lack of confidence by a dispatcher. CSXT has established a training session devoted entirely to auto route and has also implemented a mandatory refresher course on auto route for dispatchers.
2	Site specific software changes be expanded so any changes also be made on a system basis. Page 5, paragraph 1, "If an error in software design..." - CSXT has written a letter to US&S outlining this policy and US&S has replied that this policy is in place.
3	Reevaluate and verify conflict checks in DTC rules matrix, and reevaluate DTC permit conflict check. Page 5, paragraph 6, "During analysis, FRA found several..." - Several potential conflicts were identified, and CSXT and US&S have thoroughly reviewed and revised the DTC rules matrix to correspond with the DTC permit conflict checks in table 1.
4	DTC dispatcher boards physically too far from dispatchers. Page 7, paragraph 2, "FRA noted a number of CRT displays..." - On September 13, 1988, DTC computer displays were moved two feet closer to the dispatcher desks.
5	CTDS field training for train & engine employees. Page 7, paragraph 4, "CSX must assure that train crews..." - CSXT has issued Circular 1C which outlines the requirements and responsibilities of train and engine service employees when CTDS is implemented. During the first week of CTDS, each T&E employee will meet with an officer of the company to review Circular 1C, go over printer functions and answer any questions the employee may have. We will also include this in our efficiency testing in the future.
6	Establishment of a control system to better organize dispatcher operating and general files. Page 9, paragraph 5, "CSX should establish a control..." - CSXT has established a control system that seperates the operating files from the general files, numbers them, and insures all are signed and dated.

7 Realignment of signal system at North Etowah, Tennessee.
Page 11, paragraph 4, "In some cases, the consolidations..."
- CSXT has realigned the signal system and revised the timetable instructions at North Etowah to eliminate common authority between Corbin and Atlanta Division dispatchers. As future territories are brought into the system, CSXT will insure that this matter is addressed.

8 Clarification of Circular 1C.
Page 13, paragraph 2, "The division instructions and..."
- CSX dispatchers have been instructed just what to do if a train crew does not receive a train bulletin and release form. This circumstance has already presented itself and the dispatchers involved handled it readily and without hesitation. Regarding "where required", each time additional territory is brought on line with CTDS, the division management will put in place instructions which outline where the crews must obtain their train bulletin and release form when going on duty. There are many circumstances where crews will go on duty at a point that may have multiple routings which it may or may not require that the train crews obtain a train bulletin and release form, or if they are to be routed another way out of this same location, they may receive a Clearence Form A and possibly train orders. This is why the instructions read "where required." Furthermore, CSX has issued instructions that there will be times where more than one train bulletin and release form will be required for interdivisional runs. Finally, Circular 1C will be revised as detailed in Item 33.

9 Dispatcher pre-admission test evaluation test.
Page 14, paragraph 5, "CSX does not have a pre-admission..."
- CSX has established a dispatcher pre-admission evaluation test.

10 Operating rules test administration.
Page 15, paragraph 2, "According to the responsible officers.."
- CSXT will insure that operating rules tests are given to all new control center train dispatchers.

11 Dispatcher qualification testing of operational/training items.
Page 15, paragraph 3, "The operating rules test program..."
- CSXT has set up a testing procedure that incorporates a mandatory 80% proficiency in the operating rules as well a dispatcher-specific training test, which must be 100% successfully completed, to be used as a tool to determine individual weaknesses to the operating rules.

12 Dispatcher practical skills demonstration.
Page 15, paragraph 4, "train dispatcher 'students' are not..."
- Prior to being released for service, each dispatcher is now required to demonstrate their aquired skills on the simulator before their instructors.

13 Field exposure for dispatchers in training.
Page 15, paragraph 6, "CSX has established a policy..."
- All dispatchers will ride each of their territories during their training period.

14 Clarification of field exposure purpose.
Page 16, paragraph 1, "Although CSX requires each train..."
- CSX has evaluated the purpose of field exposure and will insure each participating train dispatcher is informed of that purpose.

15 Around-the-clock dispatcher efficiency test coverage.
Pages 16, paragraph 2, "FRA inspectors conducted a limited..."
- Additional officers of the company have been assigned efficiency test responsibility on September 20, 1988, to maintain 24-hour, 7-day coverage.

16 Receival of summary testing reports by CSXT officer.
Page 18, paragraph 6, "The carrier officer assigned to..."
- Summary testing reports will be furnished to the overseeing officer.

17 Dispatcher workload.
Pages 19, paragraph 4 "CSX did not identify to FRA..."
- CSXT recognizes the staffing problems that were created when we stopped cutovers in early July. This situation will be corrected as we procede with implementation and bring additional dispatchers to Jacksonville. Additionally, staffing problems were created because our labor organization required that all positions be bulletined in seniority order which left us with very little flexibility to match office closings with implementation.

18 Train crew and consist entry workload.
Page 19, paragraph 7, "The workload of train dispatchers..."
- CSXT has been successful in negotiating an agreement that would permit us to establish an Assistant Dispatcher position at the Center to perform this work.

19 Historical recordkeeping of blue flag protection.
Page 21, paragraph 2, "The Jacksonville Control System does..."
- On September 5, 1988, instructions were given to provide a historical record of 15 days for providing blue flag protection to operating personnel.

ATTACHMENT II
FRA REVIEW OF OPERATIONS

CATEGORY 2: Items To Be Implemented Within The Short Term

ITEM

20 Automatic hardware switchover to backup system (hot standby).
Page 3, paragraph 1, "At the present time, the back-up..."
- US&S is finalizing development of the automatic hot standby configuration for the computers, and programming should be in use by December 1, 1988.

21 All DTC territory tested and documented from a quality assurance standpoint.
Page 5, paragraph 3, "CSX should consider a formal safety..."
- CSXT has requested US&S to advise if electronic verification of the revised DTC data tables prior to installation could be accomplished.

22 Revision of operating rules 704, 707, and 710 to establish a systemwide standard operation.
Page 10, paragraph 2, "We also reviewed the section of the..."
Page 11, paragraph 5, "It is our understanding the..."
- Operating rules 704, 707, and 710 are being rewritten to provide a simpler method of moving on-track equipment and allow work forces to work on or foul the main or signalled track.

23 Issuance of temporary speed restrictions in terminals.
Page 12, paragraph 6, "Our investigations have disclosed..."
- CSXT is investigating the comment. CSXT does not allow random verbal speed restrictions.

24 Corresponding dispatcher board and field sketch.
Page 20, paragraph 1, "These numbers do not correspond..."
- CSXT is currently preparing field sketches to correspond with the dispatchers boards in Jacksonville.

25 Dissappearence of train ID from screen.
Page 20, paragraph 3, "Train identification numbers..."
- A proposal has been written to US&S for development of software logic to insure all train IDs remain on the screen.

26 Incompleted train sheets.
Page 20, paragraph 6, "Random inspection carrier records..."
- Train sheet completion will require on-going training of personnel. While the problem has been significantly improved, one Assistant Dispatcher position has been added at the System Control Center to insure train sheet information is accurate and up to date. CSXT will not tolerate any deviation from federal recordkeeping requirements.

ATTACHMENT III
FRA REVIEW OF OPERATIONS

CATEGORY 3: Items Requiring Longer Term Implementation

ITEM

27 System identification of possible dispatcher failure to provide OTE operators with block occupancy information.
Page 5, paragraph 7, "The system does not identify failure..."
- The current DTC screen is being redesigned with a field added for protection of OTE equipment when a block is initiated for a following movement. In the interim, CSXT has established a system by which the dispatcher protects these movements.

28 Conflict elimination between timetables, operating rules, and superintendent bulletins.
Page 6, paragraph 5, "FRA found that special instructions..."
- CSXT is taking corrective action to remove inconsistencies between these documents.

29 Color display of yard limits in DTC territory.
Page 6, paragraph 8, "Yard limits are identified..."
Page 9, paragraph 8, "During the simulator session..."
- CSXT has completed a request to US&S to display yard limits in the DTC computer screen with a special color.

30 Establishment of DTC/OTE forms with standard verbiage.
Page 10, paragraph 6, "CSX should consider amending..."
- DTC and OTE authority movement forms are being written and will become mandatory. CRT formats will be revised to provide the exact verbiage as the forms.

31 Train bulletin sort by milepost.
Page 14, paragraph 2, "The train bulletins issued by the..."
- CSXT train control engineers are currently working with US&S on feasible software logic to accomplish train bulletin sorts by milepost.

32 Enhancements to CSXT's communications systems.
Page 20, paragraph 4, "FRA staff noted communications..."
- CSXT has initiated a three phase plan to 1) upgrade dispatcher radio base stations, 2) upgrade locomotive radio fleet, and 3) improve outside communications plant.

33 Voluminous operating documents (operating rules, bulletins, timetables, circulars).
- Several comments throughout the report were made regarding this topic. This issue will be resolved when the new operating rule book, timetables, and various circulars and bulletins are rewritten. As has been mentioned, we will keep the FRA periodically advised as we proceed.

EXHIBIT II

CSX TRANSPORTATION

CSX RAIL TRANSPORT

K. C. Dufford
Executive Vice President

500 Water Street
Jacksonville, FL 32202
(904) 359-1195

December 1, 1988

Mr. J. W. Walsh
Associate Administrator
Office of Safety
Federal Railroad Administration
400 Seventh Street, S. W.
Washington, D. C. 20590

Dear Mr. Walsh:

Please refer to my September 30, 1988 letter to you regarding the FRA's review of operations at CSX Transportation's System Control Center here in Jacksonville.

Attached you will find a status report of our progress since that last letter to you.

If you have any thoughts, comments or suggestions, please let us know. Thank you for your assistance thus far.

Sincerely,

K. C. Dufford

ATTACHMENT II
FRA REVIEW OF OPERATIONS

CATEGORY 2: Items To Be Implemented Within The Short Term

ITEM	
20	Automatic hardware switchover to backup system (hot standby). Page 3, paragraph 1, "At the present time, the back-up..." CURRENTLY BEING PROGRESSED
21	All DTC territory tested and documented from a quality assurance standpoint. Page 5, paragraph 3, "CSX should consider a formal safety..." CURRENTLY BEING PROGRESSED
22	Revision of operating rules 704, 707, and 710 to establish a systemwide standard operation. Page 10, paragraph 2, "We also reviewed the section of the..." Page 11, paragraph 5, "It is our understanding the..." COMPLETED
23	Issuance of temporary speed restrictions in terminals. Page 12, paragraph 6, "Our investigations have disclosed..." COMPLETED
24	Corresponding dispatcher board and field sketch. Page 20, paragraph 1, "These numbers do not correspond..." COMPLETED
25	Dissappearence of train ID from screen. Page 20, paragraph 3, "Train identification numbers..." COMPLETED
26	Incompleted train sheets. Page 20, paragraph 6. "Random inspection carrier records..." CURRENTLY BEING PROGRESSED

ATTACHMENT III
FRA REVIEW OF OPERATIONS

CATEGORY 3: Items Requiring Longer Term Implementation

ITEM	
27	System identification of possible dispatcher failure to provide OTE operators with block occupancy information. Page 5, paragraph 7, "The system does not identify failure..." CURRENTLY BEING PROGRESSED
28	Conflict elimination between timetables, operating rules, and superintendent bulletins. Page 6, paragraph 5, "FRA found that special instructions..." CURRENTLY BEING PROGRESSED
29	Color display of yard limits in DTC territory. Page 6, paragraph 8, "Yard limits are identified..." Page 9, paragraph 8, "During the simulator session..." COMPLETED
30	Establishment of DTC/OTE forms with standard verbiage. Page 10, paragraph 6, "CSX should consider amending..." COMPLETED
31	Train bulletin sort by milepost. Page 14, paragraph 2, "The train bullentins issued by the..." CURRENTLY BEING PROGRESSED
32	Enhancements to CSXT's communications systems. Page 20, paragraph 4, "FRA staff noted communications..." CURRENTLY BEING PROGRESSED
33	Voluminous operating documents (operating rules, bulletins, timetables, circulars). CURRENTLY BEING PROGRESSED

SECTION II

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CHAPTER 1- INTRODUCTION TO INDIVIDUAL RAILROAD ASSESSMENT REPORTS

In the course of the assessment, FRA conducted independent field audits, on site office inspections, and detailed interviews on 20 major freight, passenger and commuter railroads. Field facility audits were conducted at 125 train dispatching offices from coast to coast. About 1200 train dispatchers were observed during the performance of their duties. The vast majority of these train dispatchers were interviewed in an effort to improve FRA's insight into needs, concerns and perceptions of the train dispatching community as a whole.

FRA further discussed practices, procedures, problems and proposed solutions with both immediate supervisors and senior officers charged with overall dispatching management.

The review began with an evaluation of the basic operational data on hand in FRA files for each of the subject railroads. The geographic boundaries, office locations, total number of miles of main track, freight train miles, and, where applicable, passenger train miles were examined. Accident reports and related records which indicated dispatcher involvement were studied. Regional and district field staffs were contacted to consider FRA's train dispatcher compliance history and to provide input from FRA's actual field experience.

Assessment specific channels of communication were established with the train dispatchers collective bargaining organization, the American Train Dispatchers Association (ATDA). Long term contacts with the association were fixed.

Based upon the composite picture presented by this information, FRA management selected over 50 individual operating practices inspectors and specialists to participate in the field inspection and research aspects of the project. Owing to the magnitude of the project and the demands imposed upon FRA's resources, it was decided to incorporate the project as an extension of FRA's other inspection, investigation, and assessment obligations.

Through on site inspections, FRA inspectors developed pertinent information about the number of dispatcher districts assigned to each office, including those tours of duty where districts were combined. The management structure of the office and it's relationship with upper management were identified.
The sufficiency of staffing at each office was evaluated by examination of Federally required reports of excess service as defined by the Hours of Service Act. Further, in response to concerns expressed by representatives of designated collective bargaining organizations, inspectors examined the frequency of

overtime accrued as a result of dispatchers being permitted or required to work their assigned rest days.

Field research included discussions with managers whose responsibilities include selection and promotion of dispatcher trainees. FRA examined the criteria employed for candidate selection and/or promotion, the procedures through which dispatching "students" are initially trained, the length of initial training, and the controls, safeguards and procedures in place to certify a "student" for journeyman status.

FRA further examined requirements in place on the individual railroads to educate train dispatchers on revisions in the operating rules and/or official interpretations of those rules. Inspectors considered the frequency and intensity of "refresher" courses to periodically instruct train dispatchers, and the standards of performance required to retain qualification.

Desk audits of each train dispatching position were conducted to evaluate the dispatchers level of compliance with the rules and procedures in effect on the individual properties. To a lesser extent, inspectors also searched for internal inconsistencies in the rules themselves and for rules which, through ambiguity, posed a reasonable possibility for misinterpretation or misapplication.

FRA also considered the operational testing program in effect on each carrier. Each facility was studied to determine if train dispatchers are included in the program, the level of participation at each facility, the overall results of the program in terms of inspections and failures, and how the carrier manages the data created by the program.

Inspectors surveyed the working environment at the dispatchers individual work stations. Although this activity was not intended to be an all inclusive ergonomic review, it did include a "common sense" evaluation of the basic environmental considerations of noise, lighting, ventilation and temperature control. FRA also considered apparent failures of the equipment to function as intended, and extremely inconvenient or disruptive placement of equipment.

FRA approached the question of workloads with considerably greater apprehension. While the agency believes that a significant level of practical expertise exists "within house," this knowledge is almost exclusively based upon practical railroad experience. FRA found that the agency--and most railroad carriers--lack the necessary tools with which to qualitatively and qualitatively address this subject. Although the agency is not satisfied with this approach, FRA believes that it had an obligation to attempt to address this subject with what

has traditionally been the industry standard, a good faith determination.

Finally, FRA inspectors examined radio and telephone communications equipment and procedures.

CHAPTER 2- NATIONAL RAILROAD PASSENGER CORPORATION (AMTRAK)

I. INTRODUCTION

The National Railroad Passenger Corporation, also known as Amtrak (ATK), is the nation's Federally chartered intercity passenger railroad. ATK is headquartered at Washington, DC, and operates passenger trains from coast to coast.

At the time of FRA's assessment, ATK's responsibility for dispatching trains was limited to the Northeast Corridor, which extends from Boston, MA, to Washington, DC. The corridor includes a main line extending from Philadelphia, PA, to Harrisburg, PA, and another main line extending from New Haven, CT, to Springfield, MA.

"Off corridor" (all train operations across the country other than on the Northeast Corridor) train dispatching functions are performed, under contract, by the host carrier. In addition, a fifty-mile segment of the corridor between New Rochelle, NY, and New Haven, CT is dispatched by the Metro North Commuter Railroad.

The northeast corridor is headquartered at Philadelphia, PA. Prior to 1985, it consisted of four operating divisions located at Boston, MA, New York City, NY, Philadelphia, PA, and Baltimore, MD. In 1985, the Baltimore Division was merged into the Philadelphia Division. Later, the Baltimore train dispatchers office was moved to Philadelphia, PA.

During 1988, the carrier implemented a **Centralized Electrification and Traffic Control** (CETC) System on that portion of the former Baltimore Division extending between New York Avenue, Washington, DC, and Landlith Interlocking just north of Wilmington, DE. CETC combines the functions of a computer aided train dispatching system with a computer aided electric power distribution system. The system provides for a common control center, which is located at Philadelphia. ATK presently has active plans for extending this system north to Philadelphia.

At the time FRA first inspected the Boston Division, intercity operations between New Haven, CT, and Boston, MA, and between New Haven and Springfield, MA, were dispatched from an Amtrak office near South Station by ATK dispatchers. Boston area commuter operations on the former Boston and Maine Corporation were dispatched by Amtrak dispatchers stationed at the Gilford Transportation Industries (GTI) general offices located at North Billerica, MA. Since the assessment, the commuter dispatchers have been relocated to ATK North Station, Boston, MA. Within the next two years the carrier anticipates adopting a computer aided dispatching system for the Boston Division.

In 1987, ATK reported to FRA a total of 29,067,510 locomotive train miles, 3,274,218 motor train miles, and 281,940 yard switching miles, for a grand total of 32,623,668 train miles. During 1987, the carrier transported a total of 31,865,087 passengers and reported a total of 5,566,796,486 total passenger miles.

ATK also dispatches numerous foreign line trains over its' lines and into its' terminals. Commuter operations partially dispatched by ATK include Maryland Area Rail Commuter (MARC), Southeastern Pennsylvania Transportation Authority (SEPTA), New Jersey Transit Rail Operations (NJTR), and the Long Island Rail Road (LI). Freight carriers with extensive train operations on the corridor include Conrail (CR), Delaware and Hudson (DH), Providence and Worcester (PW) and the Springfield Terminal Railway (ST).

The following table illustrates the locations of the ATK train dispatching offices and the number of dispatchers on each shift:

TABLE ATK-I
TRAIN DISPATCHING OFFICES AND
DISPATCHER POSITIONS PER SHIFT

LOCATION	FIRST	SECOND	THIRD	TOTAL
Philadelphia, PA	8	8	7	23
New York City, NY	2	2	2[1]	6
Boston, MA (South Sta)	4	4	4	12
Boston, MA (North Sta)	2[2]	2	1	5
TOTALS	16	16	14	46

[1] An additional third shift train dispatching position may be assigned on a temporary basis when management determines that conditions such as major track projects, substantial service disruptions, or derailments so warrant.

[2] At the time of the assessment the ATK dispatching office responsible for commuter operations was located in the Gilford Transportation Industries (GTI) general offices at North Billerica, MA. Shortly after the assessment the facility was moved to ATKs' North Station, Boston, MA. For clarity, this office is identified as the North Boston or the commuter facility throughout the report.

II. STAFFING AND TRAINING

STAFFING

ATK utilizes a train dispatching organizational structure wherein train dispatchers report through a chief train dispatcher (identified on some divisions as a movement director) to an assistant superintendent. This officer is assigned the primary duties of managing traffic control functions. The assistant superintendent reports to the general superintendent who has responsibility for and is in control of daily operations.

The majority of ATK dispatchers work through block operators. Under this system, the dispatcher plans, organizes and "manages" train operations within his territory. He directs block operators at control stations on line-of-road to execute his instructions. The operators manipulate switches, signals and other interlocking appliances as may be necessary to implement these instructions. The operators also report train/track related information to the dispatcher and receive other operational instructions from the train dispatcher as appropriate.

The implementation of CETC has significantly altered this traditional structure on the Philadelphia Division. The block operators functions in the field are now remotely controlled by the dispatcher himself. The elimination of wayside block and interlocking stations has inevitably resulted in an increase in the duties and workload of CETC train dispatchers. Prior to implementation of the system, a total of nine block operators controlled a total of thirty interlockings. Following the CETC changeover, four dispatchers have been assigned line segments of this same territory. These segments vary between two and four main tracks and sidings. Each train dispatcher continues to plan and organize activities within his territory, but now also remotely controls the interlocking appliances at seven to eight interlocking locations as well.

The "north end" of the Philadelphia office, the New York office and three of the four positions in the South Boston office utilize the traditional manned block and interlocking station method of operation. One desk in the South Boston office, and both desks at the North Boston office, control traffic directly, without block stations, from a traffic control console.

There is a chief train dispatcher (movement director) at each of the four offices on the daylight weekday shift. This position is appointed. Assistant chief dispatchers and train dispatchers are represented by a designated collective bargaining organization, the American Train Dispatchers Association (ATDA).

In the Philadelphia office there are two assistant chief dispatchers on each shift. Although they have some degree of latitude in working the assignment, one assistant is generally assigned to the CETC portion of the railroad, and one assistant handles non-CETC affairs. In the New York office there is an assistant chief dispatcher on each shift. In the Boston offices, there is one assistant chief dispatcher to cover each office on the second and third shifts. Assistant chiefs also cover the chief dispatchers rest days.

Hours of Service

In 1987, ATK reported to FRA 63 cases in which train dispatchers performed service in excess of that provided by statute. This included 31 cases which were related to a shortage of qualified dispatchers.

All ATK train dispatchers offices are protected by a guaranteed extra board. An auxiliary extra board is also available at Philadelphia. Guaranteed extra board employees are assigned to perform service only within the office. Non-guaranteed employees cover dispatchers positions when assigned. They may also be assigned to cover other jobs outside the office such as block operator, train director, yardmaster, etc.

The chiefs and assistant chiefs are not assigned to, and do not regularly perform covered service. However, on one occasion, FRA observed an assistant chief dispatcher in the New York office who "sat in" while the assigned shift train dispatcher was away from his desk. The assistant chief accepted a train report via telephone from an operator. On the day of observation, this employee worked two shifts and was on duty sixteen hours continuously. Although this situation was well intentioned and voluntary, FRA believes that this practice can easily lead to confusion and result in violations of the Act.

While observing CETC operations at the Philadelphia office, FRA found that the duties of two clerical positions included service covered by the Hours of Service Act.

Within the Philadelphia dispatchers office, engineering restrictions pertaining to the Philadelphia to Washington segment of the corridor are received by the Section "D" train dispatcher. The Section "D" desk issues the necessary train orders to Penn Block and Interlocking Station for delivery to southbound trains. He then notifies one of the CETC clerks that there is a train order to be processed. The clerk accepts the order from the Section "D" dispatcher, prepares photocopies, and returns the original document to the dispatcher. The dispatcher attaches the order to his train order book and has fulfilled his obligation.

The clerk then delivers the order to the CETC train dispatchers. The CETC 1 dispatcher is then required to issue the order to "K" Tower at Washington Terminal for delivery to northbound trains. The clerk then electronically transmits the order via telecopier to up to sixteen delivery points, and awaits confirmation of delivery.

FRA concludes that this employee does, by the use of an electronic device, transmit orders pertaining to or affecting train movements. Clerical employees interviewed by FRA stated that they are frequently required or permitted to work double shifts (for periods in excess of that permitted by statute). Carrier officials interviewed by FRA stated that they did not consider the duties of these clerks to be covered by the Act.

Examination of the CETC train dispatchers hours of duty records disclosed that the records were not signed. The carrier agreed to revise procedures to require the use of an hours of service form in train order books to be completed by dispatchers on a daily basis. This form (i.e. rubber stamp) will contain all necessary information and will be signed by the employee. Train order books will be retained on file and made available for inspection for two years.

Overtime

During the first six months of 1988, dispatchers in the Philadelphia office worked a total of 136 rest days. In 1987, dispatchers in the New York office worked 5 rest days. The dispatchers at South Boston worked 16 rest days, and the Boston commuter dispatchers worked a total of 59 rest days during the first seven months of 1987. ATK is in the process of training additional extra train dispatchers for the Philadelphia and Boston offices. Based upon the number of overtime days worked by the Philadelphia office dispatchers it appears that one additional guaranteed extra dispatcher position might be justified.

FRA observations at the Philadelphia and New York offices disclosed a consistent undercurrent of dissatisfaction and low morale. During interviews with dispatchers, it was suggested that absenteeism was one of the manifestations of these problems.

In an effort to address this situation in Philadelphia, the carrier has issued **Policies and Procedures Notice No. 2.** This document imposes a monthly review of employees attendance records. Employees who are absent on two occasions within thirty days or on four occasions in six months are "counseled." If four days of absence occur in the following six month period a warning is issued. If any absence occurs for six months after the written warning, discipline may be imposed, depending on the circumstances surrounding the absence.

Several dispatchers expressed their view that the amount of overtime in the Philadelphia office is excessive.

Candidate Selection

Due to the nature of ATK's high speed multiple track operation, the close spacing of interlockings, and the large number of block and interlocking stations, ATK was confronted with a capital improvement task of enormous proportions to modernize and centralize traffic control. Because of this, ATK was one of the last major railroads to adopt centralized dispatching. For this same reason, ATK is also one of the last railroads to have access to a substantial pool of trained and experienced block operators to fill train dispatcher vacancies.

Train dispatcher candidates are selected almost exclusively from the ranks of experienced block operators at the discretion of management. Factors such as candidate service and attendance records may be considered in the selection process. While FRA does not take exception to selection of candidates primarily based upon managerial prerogative, FRA believes that there is a need to formally evaluate the skills of candidates at the onset of the initial dispatcher training program.

TRAINING

The training of ATK train dispatchers is a division level responsibility addressed by the assistant superintendent and chief train dispatcher at each office. Training is not centralized, nor, for the most part, is training formalized into a classroom and lecture format.

Prior to the transition to CETC operations, the carrier selected qualified train dispatchers from within the office to work with the CETC equipment and become familiar with it's capabilities. These employees served as instructors to orientate other train dispatchers to the machine.

Supervisors do not participate as instructors. Except for the chief dispatcher, supervisors are not required to hold dispatcher qualifications on the CETC operation.

Train dispatcher "students" are not required to demonstrate their acquired skills using the computer console prior to being qualified for service.

Initial Training

Train dispatcher candidates are granted a thirty day training period on each dispatchers district. This includes on-the-job training on various shifts, and qualification field trips over the railroad. Near the conclusion of the training period, the

candidate is orally examined by the a member of the division rules staff or other designated officer. When this officer is satisfied that the candidate is qualified on the physical characteristics of the territory, and the candidate agrees that he has completed sufficient training, he is considered to be qualified to work the position. If the candidate requests additional time on the job, the request may be granted, at the discretion of management, if progress is satisfactory.

All recently selected train dispatcher candidates are block operators who carry their rules qualifications from their previous jobs. The rules which pertain to both positions are the same. However, FRA perceives that there are significant differences between following instructions and formulating them.

FRA believes that it is important to evaluate each student's knowledge, and to identify the training needs of each individual. ATK does not have a pre-admission evaluation test with which to measure these needs.

Periodic Training

ATK requires all train dispatchers to attend an annual operating rules class. A closed book written test is conducted at the conclusion of the class, and a passing score of 85% is required. Dispatchers who do not pass are reinstructed and reexamined. The rules test in effect at the time of the assessment consisted of 66 questions.

The operating rules test program permits train dispatchers to incorrectly answer up to 15% of all questions and still successfully complete the course. ATK does not prioritize those rules which are critical to safety (and which, if misapplied, could result in serious accident) into a "must pass" category.

Under the collective bargaining agreement in place between ATK and the ATDA, each dispatcher is granted four days per year to ride trains and familiarize himself with changes in the physical characteristics. The carrier applies one of these days to the required annual operating rules class. Each train dispatcher contacted had been given at least one day of road qualification time.

Several extra dispatchers also commented that the three day allowance is not sufficient for extra men who may be qualified on up to eight districts.

Promoted train dispatchers who bid and are awarded another dispatching position within the office are required to qualify on the position after ten days of training (five days on the road and five days on-the-job).

Operating rule 913 states that a train dispatcher who has not performed service on a dispatching district during the previous twelve months must not accept assignment to such a position without approval of the designated division officer. Although the rule appears to require consent between management and the employee, several dispatchers stated that they felt "pressured" to work such districts when labor shortages have occurred.

III. OPERATING RULES AND PRACTICES

At the time of the assessment, ATK had it's own set of operating rules, entitled the **Amtrak Book of Operating Rules.** Also at the time of the assessment, the Boston commuter dispatchers worked under the Guilford Transportation Industries (GTI) operating rules. The South Boston dispatchers used the ATK rule book on the main lines, but also used a revised form of the former Penn Central Transportation Company rules for certain branch operations. The carrier is a participant in the **Northeast Operating Rules Advisory Committee** (NORAC) and planned to adopt the NORAC operating rules in late 1988.

On the Philadelphia division, the chief dispatcher developed a handbook entitled the **Amtrak Dispatchers Manual, Philadelphia Division** dated March 9, 1987. This manual contains interpretations of the operating rules, provides safety sensitive procedural instructions, establishes train movement priorities, provides suggestions for responding to locomotive and equipment failures, and includes instructions for handling emergencies.

The manual provides a substantial volume of pertinent information to train dispatchers and is a significant organizational improvement over the individual memorandum system previously used. A similar document is on file at Boston, and the New York office is in the process of developing a manual. A review of this document, however, disclosed that it was last supplemented in August of 1987. Procedural changes which have invariably occurred since the transfer to CETC have not been incorporated into the manual to date.

Examples of out of date instructions include the following:

- Instructions covering the method of operation on the SEPTA Ivy Ridge and Chestnut Hill West lines are no longer in effect. These lines are no longer dispatched by ATK.

- Instructions governing movements of baggage and mail tractors and carts across station tracks at Baltimore Station refer to operators duties. The CETC dispatcher has controlled this territory since the CETC transition. Similarly, instructions covering the

jurisdiction and control of Baltimore Station tracks do not reflect present practice.

- Instructions for handling of MARC local trains at Bowie Station refer to the protection of passengers crossing main tracks. According to dispatchers assigned to this desk, since the transfer of control to CETC, the train dispatcher involved has no practical means to assure that passengers are clear.

- Instructions covering broken rails, pull aparts, rough track and repairing block joints require that a Format "J" train order must be issued. According to CETC dispatchers, these instructions no longer apply. However, verbal instructions for application of electronic blocking devices are in effect. These instructions are not incorporated into the manual.

FRA observations of train dispatcher work procedures and dispatcher compliance with the operating rules disclosed the following concerns which are presented in an office by office format.

Philadelphia, PA

- The procedure used by ATK to notify ATK passenger train crews about existing speed restrictions requires train crews to obtain copies of orders currently in effect between Philadelphia and Washington prior to departure from those stations.

  Southbound trains receive these orders at 30th Street Station, Philadelphia. Northbound trains receive the orders at Washington Terminal, Washington, DC. This system minimizes delay on line-of-road.

  As previously explained in the hours of service section of this report, the engineering department notifies the section "D" train dispatcher of speed restrictions within this territory. The section "D" train dispatcher then issues a Format V train order to Penn Block Station for southward trains. A clerk then accepts, photocopies and delivers the order to the CETC train dispatchers by hand. The CETC 1 dispatcher then issues the same order to "K" Tower, Washington, over the telephone for delivery to northward trains.

  During observation of office procedures, FRA observed an instance in which the time interval between the completion of the order by the section "D" dispatcher and receipt by the CETC 1 dispatcher exceeded one-half hour. Interviews with dispatchers suggested that this

occurrence was not unique. Several dispatchers expressed the opinion that handling train orders should be restricted to employees who are qualified on the operating rules and who are fully aware of the significance of train orders.

- Another FRA concern involved the methods used by the train dispatchers to verify that freight trains were in possession of all orders. As indicated above, train orders restricting speeds were passed from the section "D" dispatcher to a clerk. After the clerk hand delivered the order to the CETC dispatchers, the clerk electronically transmitted these orders to up to sixteen off-line locations. The clerk then awaited electronic verification that the orders had been received..

  When trains which had originated off-line arrived at the corridor, the CETC dispatcher contacted the train crew and inquired as to which order numbers the crew possessed. Neither the clerk, nor the CETC dispatcher, employed a procedure to ensure that pertinent information had not been deleted from the order during electronic transmission.

  Carrier officials stated that it would not be practical to attempt to require foreign line clerical employees to repeat the order to CETC. They did agree, however, that dispatcher verification procedures would be expanded to require crews to state the number of each order and the number of lines in each order prior to admission to the corridor.

- During observation of the "non-CETC" dispatchers positions on the north end of the division, FRA observed several instances where OS times were not reported until over an hour after they occurred. This was during the afternoon portion of the daylight shift. At the time of observation, dispatching activities were minimal, and the dispatchers were marginally occupied. The dispatchers took no exception when the operators involved finally reported these times. Operating rule 913 requires train dispatchers to currently maintain the record of train movements. Accepting lengthy, consolidated and backlogged OS reports from operators defeats this requirement, particularly when activity on the railroad is minimal.

- On two occasions, FRA observed that the dispatchers transfer between shifts did not occur at the train dispatchers desk or console. While FRA is not aware of what other arrangements may have been made (e.g. in

elevators, on the station concourse, or on train platforms) FRA did note that the transfer was not signed in the presence of the relieved dispatcher.

- o One dispatcher stated that ATK is not always notified of freight trains containing restrictions including cars of excessive dimension. The employee cited as an example tri-level automobile cars which are restricted from certain tracks within his jurisdiction. He stated that he now telephones the freight carrier directly for this information. Another train dispatcher expressed similar concerns about notification of placarded tank cars. He stated that there is a procedure between ATK and CR, but that the system is not always reliable.

New York, NY

- o On several occasions FRA observed that block operators failed to properly repeat train orders to the train dispatcher as prescribed by operating rule 206. This occurred because the operators did not spell out the names of stations and numerals in the body of the order. Train dispatchers did not take exception to this practice and completed the orders.

- o Dispatchers were observed underscoring train orders in the order book prior to repetition by the operator. This practice is prohibited by rule 206.

- o Several instances were observed where the section C dispatchers did not provide written transfers in the train order book for relieving train dispatchers. This is prohibited by rule 913.

- o Examination of the dispatchers record of train movements disclosed that the carrier attaches a computer printout to identify engineers, conductors and their times on duty. In some cases this information was incomplete, in others it was incorrect.

- o The block operator at the dispatchers office is responsible for the delivery of train orders for trains at Pennsylvania Station, New York City. Although the operator is required to prepare Clearance Forms "A" for each document delivered, copies were not retained. This does not comply with operating rule 211 which requires operators to forward a record of delivery of orders to the division operator at specified intervals.

- FRA observed several instances where orders addressed to two or more offices were not transmitted to all affected offices simultaneously. On one occasion, the period of delay involved was thirty minutes between the time of delivery to the first office and delivery to the last. FRA concluded that this was done to facilitate the movement of traffic.

  Operating rule 208 does provide the train dispatcher with the latitude to address communications failures and other priority situations (e.g. derailments or collisions) and permits the dispatcher to issue orders to offices individually. However, FRA believes that to allow employees to conclude that routine operations and minor inconveniences supersede the rule renders the rule almost meaningless.

- On another occasion, the section "B" train dispatcher permitted an operator to deliver an incorrect train order. The order that was intended restricted the speed of trains to sixty miles per hour due to track conditions. The dispatcher properly issued the order but the operator copied the speed in error as ninety miles per hour. The operator repeated the order back to the dispatcher, but the dispatcher failed to notice the error. The order was delivered to at least one train. The carrier removed the dispatcher from service pending further investigation.

- Interviews with train dispatchers indicated that CR freight trains containing hazardous materials are occasionally accepted by ATK before ATK dispatchers have full knowledge of the contents of the cars. Dispatchers stated that they are reprimanded when they delay trains awaiting hazardous materials information.

IV. OPERATIONAL TESTING PROGRAM

ATK's program of operational tests and inspections is entitled T.E.S.T.S. (Total Efficiency and Safety Test System). Most operational tests involving train dispatchers are performed by assistant superintendents, chief dispatchers, and the division operating rules staff.

Employees at the Boston commuter office and on the commuter lines do not use the regular Amtrak operating rule book. Instead these employees use the GTI operating rules. The chief train dispatcher at the commuter office conducted 205 tests or observations during the first seven months of 1987. More than one-half of all tests were for general rules (e.g. deportment, grooming, etc.). Only one test was conducted for compliance with the ABS rules (Rules D-251 through D-255), only one test was

conducted for compliance with the CTC rules (rules 265 to 274) and only eight tests were conducted for compliance with the track car rules (Rules 400 to 421). There were no exceptions or failures reported.

At the South Boston office, a total of 523 checks were made. Although distribution of the tests was improved, again no failures or exceptions were reported. Only three tests were conducted for Rule "G".

In New York, there were 2032 tests performed with 64 reported exceptions or failures.

At Philadelphia, a total of 1985 tests were performed during the first 5-months of 1988. A total of 22 exceptions were reported involving 8 of the 57 employees tested. On average about 35 tests were conducted on each employee. However, one assistant chief dispatcher was tested only 7 times and another assistant chief was tested 132 times. No exceptions or failures were reported for either employee.

FRA was somewhat surprised, however, that with this level of testing, the train dispatchers were not aware of the program. Dispatchers interviewed stated they knew that the supervisors periodically monitored tape recordings of the train line and radio, but were unaware of any test procedure for dispatchers where events were prearranged.

FRA was also somewhat concerned that ATK still permits supervisors to log tests and report failures which are not directly observed by the supervisor. Such tests are based upon facts collected pursuant to disciplinary investigation and are not the direct result of an operational test or inspection. This practice can alter the carriers data base and may provide a false indication of the actual ratio of tests performed to test failures. Although all rules violations should be a part of the database, such "after the fact" records distort the statistical data and prevent senior management from conducting a meaningful analysis regarding officer participation in the program. ATK should reserve a database code for these types of violations in order that the information can be properly sorted for evaluation.

V. ENVIRONMENT AND WORKLOAD

General

In general, FRA found individual dispatching districts were assigned in a reasonable and logical manner. Except for occasional "rush hour" periods, workloads are not so great as to compel dispatchers to work at the outside limits of their ability or skills in order to avoid train delay.

Examination of the section "D" train dispatchers position at the South Boston office, however, disclosed that this position was extremely busy during the first and second shifts. The dispatchers observed at this desk often appeared to be working at the limits of their abilities in order to avoid train delay. The recent addition of a newly reopened line, the Needham Branch, contributed significantly to the problem.

Discussions with top division officials were conducted, and the carrier responded by transferring the Needham Branch to the section "A" desk, where the overall duties were not as demanding.

Another possible qualified exception to this finding was the CETC 2 dispatching district in Philadelphia. Both the carrier and the ATDA have agreed that time and motion studies on this position are warranted. The study has apparently been delayed for some time however. Neither labor or management provided FRA with satisfactory reason for this delay.

Train dispatchers in the Philadelphia office work at computer assisted dispatching stations (CETC) on the south end of the territory and through block stations on the north end. Dispatching in the New York office is accomplished through block stations. In Boston, three of the south side dispatchers work through block stations and one dispatcher works at a traffic control console. Both of the north side commuter dispatchers work at traffic control consoles.

ENVIRONMENT

The primary environmental concerns of lighting, heating, cooling and ventilation were considered at each office. Overall FRA found conditions, other than noise, to be satisfactory at both of the Boston offices. Overcrowding, which resulted from the close quarters of the GTI offices previously used by ATK, was a problem. However, this office is no longer in use. Officers and employees at these locations expressed few complaints.

At the New York office, FRA found that housekeeping was not satisfactory. Our inspectors deemed the office to be unsanitary and so informed the carrier.

While house keeping at the Philadelphia office was satisfactory, other environmental factors were somewhat unfavorable. Within the CETC control center, train dispatchers, power directors and other operating department personnel are located within the "traffic and power control area".

The floor of this area is tiered so that all CETC personnel in the room have a clear view of the overview display. This display is a video projection screen system which provides a visual panoramic color representation of the entire CETC territory. The

overview screen is sixty feet long and four feet high. It provides a fixed schematic diagram of main tracks, sidings, and branch line junctions. It marks the location of rusty rails, displays the location of unwired tracks and indicates the status of electric traction lines. It identifies the location, direction, and identification of all trains and on-track equipment moving over the territory as well. The screen also displays the condition of controlled signals (clear or stop), the position of power switches (normal or reverse), the limits of plate orders[3] in effect, the limits of electronic blocking devices, and the condition of hazard warning detectors (actuated or dormant).

Four train dispatchers are located on the first tier nearest the screens. From south to north, these dispatchers are identified as CETC one, two, three and four. Consoles are arranged to position the dispatcher near the portion of the overview representing his territory. There are no sound barriers between the dispatchers themselves, nor is there any sound proofing between the CETC dispatchers work area and other personnel in the room.

The second tier is occupied by two assistant chief dispatchers and three clerks. The third tier is assigned to four power directors and an employee of the communications and signal (C&S) department. There are additional data access consoles in the rear of the facility for use by management or technical personnel.

The movement director is located in a private office at the right rear of the control center. A conference room is located behind the movement director, and the assistant superintendents office is located adjacent to the conference room. Each of these offices overlook the control room and are equipped with observation windows and blinds. A partially dismantled break area is located on the extreme left hand side of the facility.

Four additional train dispatchers, who dispatch the former Philadelphia district territory, also work within the control center. These dispatchers are assigned to cubicles which are located on the first tier with the CETC dispatchers. The cubicles consist of partitions about five feet high which are open topped and without doors. Two of these offices are interconnected on the right side of the control center, and two are interconnected on the left side. These cubicles were apparently added as an afterthought in order to consolidate the former Philadelphia territory with the CETC territory.

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[3] A mandatory directive which suspends operation of electric trains and locomotive on a specified track between specified limits.

Illumination

The control center has no outside windows and lighting is intentionally kept dim in order to accommodate the overview display projectors. Lighting within the non-CETC dispatchers cubicles was adequate for most functions. However, some dispatchers were observed having difficulty locating rubber stamps within the desk drawers. Reflected light from these cubicles did tend to "wash out" certain areas of the overview display.

Lighting at the CETC consoles has been upgraded from original specifications, but is still only marginally adequate. Employees at the center almost uniformly complained that the constant twilight was depressing and encumbered the performance of duties.

The carrier agreed that the lighting warranted improvement, and stated that florescent lighting with focused shades was on order. This system should provide improved floor lighting without undermining the effectiveness of the overview display.

Noise

FRA found the overall level of noise in the Philadelphia office to be sufficient to be considered distracting or to occasionally require repetition of verbal communications. The ambient noise was created by a variety of sources. The consoles at the center are equipped with individual headphones, telephone hand sets, and loudspeakers. Most of the employees at the center prefer to monitor communications through the open loudspeakers. The Philadelphia district train dispatchers in the cubicles also utilize open loudspeakers for "block line" telephone communications.

Two report clerks are positioned directly behind the CETC 1 and CETC 2 dispatchers. The two assistant chief dispatchers consoles are positioned directly behind the CETC 3 and CETC 4 dispatchers. The clerks and assistant chiefs are frequently engaged in telephone discussions which are not immediately connected with the safe and efficient movement of on-track vehicles.

Similarly, the power directors and signal department employees often transact carrier business which is not immediately germane to traffic control. Although the communications systems at the consoles are equipped with intercom capability, the system is seldom used. Employees appear to prefer shouting. The amphitheater environment of the control center does little to overcome these overlapping conversations. The open environment also does little to discourage personal conversations between the dispatchers and employees on the other tiers.

During the assessment FRA observed that, although the center is equipped with a conference room which can be used as a spectators gallery without interfering with operations, visitors were frequently escorted through the control center itself. Several dispatchers complained that "question and answer" sessions with visitors were annoying and distracting. During the assessment, visitors did not approach the train dispatchers directly.

Interviews with the CETC dispatchers disclosed mixed reactions to the ambient noise. Some dispatchers were vehemently opposed to the open construction, some were indifferent and some preferred the setup.

On one occasion FRA observed a loud and boisterous confrontation between a division officer and an on-duty labor representative. The nature of the discussion related to administrative policy. The confrontation was disruptive, unprofessional and distracting to the employees on the floor.

At the New York office, FRA found that all three trick dispatchers are enclosed within one room. These dispatchers use open loudspeakers for block line communications, and communications are frequently intense. Even though there are partitions, radio transmissions from loudspeakers on the Section A and B desks compound the problem.

At South Boston, noise problems were largely confined to the consolidated "A" and "D" dispatchers office.

Security

The CETC control center is located within the main passenger terminal in Philadelphia, but is isolated from the majority of railroad operations by two floors of the building. The initial security system controlled access by magnetically-coded cards. Security points were located at the lone access elevator, at the entrance to the reception area, and at the entrance to the control center itself. The elevator car was also equipped with a security camera. At the time of our observations, the control center door lock was disabled, and the elevator security camera was removed.

There was no published evacuation plan for the center. There are two fire exits. At the time of the audit, one exit was restricted by construction. The other route was through a stairwell that employees at the center claimed was unlighted. Management does not periodically inspect these egress routes.

Temperature Control

Heating and air conditioning at the CETC center varied considerably during the tours of duty when FRA was present. Several dispatchers complained that the center becomes so cold at times that even during summer months it is necessary to wear sweaters or jackets. Portable electric heaters were observed near consoles as well. Inspectors' personal observations verified the employees statements.

Ventilation

Employees at the CETC center also expressed dissatisfaction with the closed ventilation system. Many dispatchers voiced their laymen's opinion that the frequency of illness at the center was a result of airborne respiratory infections captured within the recirculating system.

Ventilation at the New York facility was marginal, and our observers were of the opinion that air quality was in need of improvement. Ventilators were covered with accumulated dust, dirt and grime.

Administrative/Clerical Workload

With respect to workload not immediately connected with the safe and efficient movement of trains, FRA found that ATK employs an adequate clerical staff at all dispatchers offices. Non-dispatching clerical and administrative duties imposed upon train dispatchers are nominal.

Computer Assisted Dispatching

Overall, FRA found that the CETC system represents a significant step by ATK toward incorporating state of the art technology to improve railroad safety, and to assist train dispatchers with organizing and managing the carriers operational affairs.

Our inspectors found that the CETC master computer system utilizes dual equipment so that control will be maintained in the event of equipment failure. Power for the control center is provided by uninterruptible power supplies. A short term battery backup system, coupled with a diesel generator, provides emergency power. The data communication system provides two paths to each remote controlled position, and, at locations in the field, remote terminal units are constructed as two complete and independent systems. These terminal units have automatic switchover capability when so directed from the master computer in Philadelphia. Each controlled location can be operated locally in the field in the event of a system failure.

The CETC system can be envisioned as two major subsystems; the centralized traffic control (CTC) subsystem, and the power supply and supervisory control (SCADA) subsystem. FRA's activities largely focused upon the CTC subsystem.

The CTC subsystem processes commands to the basic signal system in the field. It receives and displays status indications from the field on the overview display and on individual console CRT monitors. The subsystem also uses computer logic to automate other train dispatching functions to relieve the dispatcher for more productive planning and analysis functions. These functions include monitoring overheated bearing detectors, train identification and tracking, record keeping, and preparation of reports.

Each of the CETC train dispatching consoles includes three CRT monitors. Each monitor is a 19-inch color unit which uses up to eight colors to indicate the condition of the selected segment of the railroad. Dispatcher commands may be entered into the computer through a touch sensitive system of infrared lights and sensors surrounding the CRT bezel called "poke points". Alternatively, information and commands may be entered on a computer style keyboard, similar to a typewriter. A consolidated communications unit and a small writing area complete the console layout.

The three CRT monitors on the console are interchangeable. Any one of the three units can be used for train/track control, data entry and monitoring. However, in order for a train dispatcher to have a full view of activities on his district from the console CRT's, all monitors are required. Each monitor will display up to three interlockings, and each dispatching district has between seven and eight interlockings.

The CTC subsystem provides a variety of train routing options including automatic route clearing, entrance/exit (i.e. NX), fleet, and unit lever operations. At present the carrier does not use the automatic routing capability.

The system also utilizes a variety of electronic "blocking device" systems. Interlocking switches can be blocked in the normal, reverse, or normal and reverse (out of service) positions. Individual signals can be blocked. Segments of track can be blocked for movements in one direction only. This is called "exit blocking." Segments of track can also be blocked for movements in both directions. This is known as "track blocking."

One unique feature of the CETC system is an internal logic control which prohibits the release of a blocking device, and prevents a reduction of restriction, without concurrence. The original CETC system plans provided that the act of removing or unblocking a blocked device required two persons. The train

dispatcher initiated the procedure, and then a second person at another console was required to verify and concur with the decision. The final system allows the train dispatcher to perform both functions, but retains the two step procedure. An execution command must be given, followed by a concurrence command from a different screen. The process attempts to simulate the old check-and-balance system between dispatchers and operators. This system is superior to many computer assisted systems on other railroads in which the cancelling of blocking protection is a simple one step function.

During the assessment, FRA noted that blue signal protection for workmen on main tracks at the Baltimore, MD station and other CETC locations was provided by train dispatchers using electronic blocking devices. The dispatcher did not line the switch away, since this could result in delay to trains passing on adjacent tracks.

Blue signal protection is governed by FRA regulations. Those regulations do not currently provide for main track protection of workmen by remotely controlled switches. The practices observed by FRA did not meet the standards for remotely controlled switches.

FRA suspects that the exit blocking procedures employed by ATKs' CETC system may well provide equivalent protection for workmen on main tracks. However, these procedures do not comply with the regulation as currently drafted and therefore relief must be petitioned through the waiver process.

The original plans for the poke point system appear to have contemplated the use of a stylus such as the eraser end of a pencil. Most of the dispatchers observed used their fingers, which were of a larger circumference than the designers anticipated. Although the system works well, great care and attention must be exercised to obtain an accurate position to break the proper light beams. Some dispatchers did not appear to be aware of this situation and expressed reservations about the reliability of the system.

Dispatchers also pointed out what they considered to be shortcomings in the console keyboard design. They noted that the input capacity of the keyboard is so limited that the machine can be over-typed by even a moderately proficient typist. They pointed out that the keyboard operating system does not automatically wrap words from the end of one line to the beginning of another. Therefore, the curser must be repositioned manually.

They also stated that the system required the use of multiple screens and multiple entries for some reports. They cited standard unusual occurrence reports as an example. They

suggested that the format is complicated and time consuming and was not suitable for corridor operations.

Apparently, at least some carrier officials concur. At the time of the assessment, unusual occurrence reports were being hand written by dispatchers and later transcribed by the clerical staff into another computer system. This system was identified as the "arrow computer."

FRA also noted that the automatic record keeping functions of the CTC subsystem involved the mechanical preparation of the dispatchers record of train movements. The contents of this document are prescribed by FRA regulations.

Federal regulations require that a record must be maintained for each dispatching district. The CETC record is consolidated and does not indicate dispatching districts. The following required information was not included: identification of dispatchers and their times on duty, and weather conditions at six hour intervals.

FRA also examined the console alarm system used by CETC. This system was one of the most comprehensive systems available in the railroad industry. Numerous situations and status changes cause audio and visual alarms to which the dispatcher must respond. Alarms are categorized into three groups according to fixed priorities.

Hazard detectors (including dragging equipment detectors and hot box detectors) fall within the first priority of alarms. These alarms are identified by a rapidly flashing video message and a continuous audible alarm.

The second priority of alarms includes safety sensitive information deemed to be of slightly lower priority. This includes items such as switch failures. These alarms are identified by a video message with a slower rate of flash and a single chime audio alarm.

The third type of alarm alerts the dispatcher that the command that he is inputing is already in effect. There is no audio alarm for these messages.

The overall concept of the alarm system is superb. However, the implementation has several shortcomings. The audible alarm system is controlled at the individual train dispatchers console. There is no volume control. The audio can only be turned on or off. During the assessment, FRA inspectors observed that most dispatchers found frequent audio alarms to be annoying and distracting. Therefore, most dispatchers turned the audio alarms off during their tour of duty. FRA does not believe that this practice is in the best interest of safety.

FRA also found that the dispatchers often expressed reservations about the frequency and nature of alarms. According to the dispatchers, alarm messages are often received at the consoles at a rate of 80 to 160 per hour. Most messages relate to unidentified occupancies (e.g. momentary TOL's in the field). Visual alarm messages appear at the bottom of the screen. An alarm will remain on the screen until it is acknowledged. When additional alarms are received, the letter "A" (alarm) will change from a steady display to flashing as an indicator. When the displayed alarm is acknowledged, the next oldest message will be displayed.

FRA observed that train dispatchers at CETC consoles habitually accumulated a large backlog of messages. With the audio alarm system disabled, and a video alarm backlog, our inspectors were concerned that a serious safety condition could be overlooked.

One example of such an event is a hot box or dragging equipment alarm. With the audio off and the video backlogged, the only alarm indicator would be a small visual symbol on the CRT and overview display. While most hazard detectors are so interconnected that actuation of a detector will cause the next absolute signal to change to stop, at least one detector does not have this feature.

According to technical personnel at the center, the CETC system is so designed that when remote terminal units in the field are off-line for maintenance or inspection, and signals are in the fleet mode, the interconnection between the detector and the signal is broken.

Discussion of this matter with the carrier's technical staff indicated that this situation would be more unlikely if the train dispatchers used the console as intended by the designer. The technicians stated that the most important tool for handling alarms is the "alarm summary display screen." All active alarms are listed on this screen in chronological order. They suggested that one CRT monitor on each dispatchers console should be devoted to this screen. They said that the problem was that the dispatchers inhibited the effectiveness of the machine by insisting that all CRT monitors display the train status schematic diagrams. They stated that this practice is unnecessary because the information is already available on the overview display.

Later contact with the dispatchers themselves, and with operating department supervisors, essentially collaborated the technicians statements. Dispatchers stated that they rely heavily on the visual train movement information on the screens and are very uncomfortable without a full view of their territory. They added that the overview screens are periodically

out of focus for extended periods of time, and they suggested that transferring their attention between the overview and the console monitors was distracting. Supervisors concurred.

With the possible exception of the CETC 2 district, FRA found that the workload of ATK trick dispatchers was not unreasonable. FRA did observe, however, that the time and labor required to input instructions on the CETC consoles appeared to be more burdensome than working through operators or even working on non-computer assisted traffic control machines. It should be noted, however, that dispatchers on all tours of duty suggested that the maintenance workload during the FRA assessment was suspiciously light. Many employees offered the opinion that the carrier had delayed some routine maintenance activities in order to create an artificially low workload for FRA's benefit.

FRA was also somewhat concerned about the long periods of time which dispatchers spend in close proximity to CRT monitors. FRA inspectors found that the new CETC installation closely parallels air traffic control facilities in its' use of computer screens and consolidated communication systems. Nationwide, FRA has found that new CAD facilities often result in larger dispatching districts. FRA believes that designers and implementors of new generation installations should consider the staffing and workload management policies at air traffic control facilities when establishing analogous policies.

Among these considerations should be a provision for periodic employee relief during a tour of duty. Sufficient personnel should be in place to allow train dispatchers to leave the work station to take meal and other periodic breaks or use the rest room.

Morale

The final environmental factor considered by FRA was employee morale. Findings at both of the Boston Division offices disclosed few complaints and employee management relations appeared to be normal.

Interviews with the train dispatchers and the support staff at the Philadelphia and New York offices were substantially different. The majority of employees at these locations expressed substantial reservations about management and managerial practices. The dispatchers stated that they do not feel that they can communicate ideas or suggestions with management. Some stated that supervision was excessively ridged and arbitrary in matters relating to working conditions and discipline. Several individuals suggested that supervisors who make routine staffing and procedural decisions should be qualified to work the jobs.

A number of dispatchers expressed at least some degree of reservation on the competence of the CETC technical staff. Contact with the some of the technicians indicated similar reservations about the dispatchers. Overall, there appears to be ample room for improvement of relations among all parties.

VI COMMUNICATIONS

At the former Boston commuter dispatchers offices at GTI, FRA expressed concern that there was only one radio available for both train dispatchers, making simultaneous use impossible. FRA was advised that this situation would be corrected at the new North Boston Station facilities.

Two of the four dispatching desks in the South Boston office have private offices and individual radios. The "A" and "D" desks share a common room and a joint radio. Our inspectors noted that the "B" and "C" district dispatchers seldom used radios. At the "D" desk console, the dispatcher uses the radio frequently. However, many communications are nullified by the overpowering radio transmitter used by the Conrail dispatching office at Selkirk, NY. The constant chatter from the "D" desk was reported by dispatchers to be annoying and distracting. Our inspectors also noted a significant amount of non-transportation related MOW communication on the road channel.

At the New York office, our inspectors found that the train dispatchers do not have a direct telephone link with the power director. The line was removed several years ago during replacement of a cable. The New York Division is predominantly electrified. In the event of an emergency, unnecessary delay in contacting the power director to de-energize the electrification system could pose a serious safety hazard. FRA also found that the section "A" dispatchers desk does not have a functional selector system with which to summon the operators at Harold, "C" Tower, and "F" Tower to the train wire. The absence of an operable selector system poses the possibility of delay when responding to emergencies.

The radio system at the New York office was also examined and found to be a source of distraction. This was primarily due to inadequate acoustical separation between dispatching desks. Our inspectors also noted that compliance with both Federal radio standards and carrier operating rules pertaining to the use of the radio were notably lax.

At the Philadelphia office, FRA found that the non-CETC dispatchers desks are equipped with a dedicated train wire and a commercial telephone. These devices functioned as intended and appeared to be adequate. These train dispatchers do not use the radio directly. Block stations on line-of-road are each equipped

with transceivers and block operators relay information to the dispatcher.

The CETC consoles were each equipped with a consolidated radio, telephone and intercom unit. The communications unit provides both commercial telephone access and dedicated ATK trunk service. Individual intercom lines interconnect each console. Separate radio channels are provided for operations, maintenance-of-way, and security. All conversations to and from these consoles are tape recorded, including the time and date of the conversation and the individual console involved.

ATK inherited it's present radio channel allocation from the former Penn Central Transportation Company. Since the dissolution of Penn Central, numerous other independent carriers have come into being who also share these frequencies. These include CR, SEPTA, and NJTR. In addition, other foreign lines, including DH and LI, use the ATK frequency while on ATK property.

Like most other rail carriers, ATK no longer maintains track side "T-box" telephones. Communications between maintenance employees and train dispatchers are largely conducted over the radio. Portable radios are most often used for this purpose. These units do not have the power or the clarity of locomotive or wayside radio units. The number of interlockings where maintenance may be simultaneously performed within each dispatching district makes it imperative that clear communications are available.

ATK utilizes a monoplex radio system wherein all operational radio conversations (i.e. intra-train, inter-train, and mobile to wayside communications) are broadcast over a continuously open frequency. Complaints regarding the very heavy traffic and congestion on the radio system were almost universal among the train dispatchers interviewed by our inspectors. Monitoring sessions by our inspectors disclosed that interference and "override" often disrupted communications. Communications on the south end of the CETC territory were often garbled, particularly when portable radios were involved. Communications between the CETC 3 and CETC 4 train dispatchers and trains on the north end of the territory often disrupted communications between the CETC 1 and CETC 2 dispatchers and locations on the south end. FRA also examined radio procedures during these sessions and found that while the dispatchers were generally in compliance with Federal regulations, many employees in the field were not. Dispatchers did not take exception when improper procedures were employed.

Another frequent complaint from the dispatchers involved the design of the communications unit itself. The unit allows the dispatcher to engage in only one conversation at a time. The

dispatchers stated that the system is inferior to a separate radio and telephone system and hampers their effectiveness. FRA inspectors were also advised that the radio at the non-CETC assistant chief train dispatchers console was inoperative and had been out of service for some time.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

The following concerns and recommendations were identified by our staff:

Concern ATK-01: FRA observed an assistant chief dispatcher in the New York offices who "sat in" while the assigned train dispatcher was away from his desk. The assistant accepted a train report via telephone from an operator. In this instance the assistant worked two shifts and was on duty sixteen hours continuously.

Recommendation: ATK must insure that employees are knowledgeable about the requirements of the Hours of Service Act, particularly those requirements which govern commingled service.

Concern ATK-02: While observing CETC operations at the Philadelphia office, FRA found that the duties of two clerical positions included service covered by the Hours of Service Act. FRA concludes that these employees did, by the use of an electronic device, transmit orders pertaining to or affecting train movements. Clerical employees interviewed by FRA stated that they are frequently required or permitted to work double shifts (for periods in excess of that permitted by statute). Carrier officials interviewed by FRA stated that they did not consider the functions of these clerks covered by the Act.

Recommendation: ATK must insure that employees who perform service covered by the Hours of Service Act are knowledgeable about the requirements of the law. The carrier must take all practicable steps to ensure that employees are not required or permitted to exceed statutory limitations on hours imposed by the Act. The carrier must maintain appropriate hours of duty records for these employees as required by Federal regulations.

Concern ATK-03: During the first six months of 1988, dispatchers in the Philadelphia office worked a total of 136 rest days. On an annual basis, this equates to over 270 overtime days per year. One additional guaranteed extra dispatchers position could eliminate most of this overtime.

Recommendation: ATK should consider expanding the existing guaranteed extra list for train dispatchers to reduce the need for overtime.

Concern ATK-04: All recently selected train dispatcher candidates are block operators who carry their rules qualifications from their previous jobs. The rules which pertain to both occupations are the same. However, FRA perceives that there are significant differences between following instructions and formulating them. ATK does not have a pre-promotional evaluation test with which to measure the acquired knowledge of candidate train dispatchers. FRA believes that the carrier should employ a systematic examination procedure to 1) identify potential areas of misunderstanding, 2) evaluate actual need for additional rules instruction, and 3) target instructions to students if necessary.

Recommendation: ATK should adopt a pre-promotion written examination for train dispatcher candidates.

Concern ATK-05: The operating rules test program permits train dispatchers to incorrectly answer up to 15% of all questions and still successfully complete the course. ATK does not prioritize those rules which are critical to safety (and which, if misapplied, could result in serious accident) into a "must pass" category.

Recommendation: ATK should review the existing rules examination policy to consider the need for "must pass" type questions (e.g., procedures for issuing format "Q" train orders for disabled trains).

Concern ATK-06: The Philadelphia division issues a handbook entitled the **Amtrak Dispatchers Manual, Philadelphia Division.** This manual contains interpretations of the operating rules, provides safety sensitive procedural instructions, and includes instructions for handling emergencies. The manual is an excellent organizational tool. However, procedural changes which have occurred since the development of CETC have not been incorporated into the manual.

Recommendation: ATK should require supervision to review and update the train dispatchers manual on a continuing basis.

Concern ATK-07: At Philadelphia, FRA observed one occasion where the time interval between the completion of a speed restriction order by the section "D" dispatcher and receipt by the CETC 1 dispatcher exceeded one-half hour. Interviews with dispatchers suggested that this occurrence was not unique.

Recommendation: ATK should ensure that all employees who handle train orders are knowledgeable of the importance of prompt delivery. The carrier should conduct a program of operational tests and inspections with sufficient frequency and of sufficient quality to detect and remedy such problems.

Concern ATK-08: At Philadelphia, train orders restricting speed were passed from the section "D" dispatcher to a clerk. The clerk hand delivered the orders to the CETC dispatchers, and then electronically transmitted these orders to up to sixteen off-line locations. The clerk then awaited electronic verification that the orders had been received.

Trains originating off-line arrived at the corridor and were contacted by the CETC dispatchers. The train crew was questioned as to which order numbers the crew possessed. Neither the clerk, nor the CETC dispatcher, employed an absolute procedure to ensure that pertinent information had not been deleted from orders during the electronic transmission.

Recommendation: ATK should adopt adequate controls to ensure that train orders which are transmitted electronically have been received in their entirety. Carrier officials stated that verification procedures would be expanded to require crews to state the number of each order and the number of lines in each order prior to admission to the corridor.

Concern ATK-09: FRA observed several instances at Philadelphia where OS times were not reported by operators until over an hour after they occurred. This was during the non-peak periods when dispatching activities were minimal. The dispatchers took no exception when the operators involved finally reported these times.

Recommendation: ATK should conduct operational tests and inspections with sufficient frequency to detect and correct lax work practices.

Concern ATK-10: On two occasions in Philadelphia, FRA observed that the dispatchers transfer between shifts did not occur at the train dispatchers desk or console. The transfer was not signed in the presence of the relieved dispatcher.

At New York, several instances were observed where the Section C dispatchers did not provide written transfers in the train order book for relieving train dispatchers.

Recommendation: ATK has an excellent operating rule which provides comprehensive instructions for transfer of responsibility between train dispatchers. Compliance with the rule should be monitored by regular operational tests and inspections.

Concern ATK-11: Train dispatchers at Philadelphia and New York indicated that CR freight trains containing hazardous materials or cars of excessive dimensions are occasionally accepted by ATK before ATK dispatchers have full knowledge of the contents of the cars and restrictions. New York dispatchers stated that they are

reprimanded when they delay freight trains while awaiting hazardous materials information.

Recommendation: ATK should review procedures and arrangements in effect with freight carriers to ensure that ATK has immediate and reliable access to the accurate identification of hazardous materials and other pertinent equipment restrictions.

Concern ATK-12: At New York FRA observed that block operators failed to properly repeat train orders to the train dispatcher. The operators did not spell out the names of stations and numerals in the body of the order. Train dispatchers did not take exception to this practice and completed the orders.

Recommendation: ATK should prioritize operational tests designed to disclose and correct non-compliant work practices.

Concern ATK-13: At New York, dispatchers were observed underscoring train orders in the train order book prior to repetition by the operator. The dispatchers record of train movements includes a computer printout to identify engineers, conductors and their times on duty. In some cases this information was incomplete and in some cases it was incorrect.

Recommendation: A quality program of operational tests and inspections should identify and correct such problems.

Concern ATK-14: Train dispatchers at Philadelphia were not aware of ATK's operational testing program. These employees were only aware of supervisory review of recordings from previous tours of duty. While FRA agrees that monitoring recordings is a valuable inspection tool, Federal regulations require inspections and tests to determine the extent of compliance with the operating rules.

Recommendation: ATK should review the present program of operational testing and inspection for train dispatchers. The carrier should ensure that participating officers employ a reasonable balance between review of prerecorded activity and real time observations based on prearranged events.

Concern ATK-15: ATK permits supervisors to log tests and report failures which are not directly observed by the supervisor. This practice can alter the carriers data base and may provide a false indication of the actual ratio of tests performed to test failures. Although all rules violations should be a part of the database, such "after the fact" records distort the statistical data and prevent senior management from conducting a meaningful analysis regarding officer participation in the program.

Recommendation: ATK should reserve a database code for these types of rule violations in order that the information can be properly sorted for evaluation.

Concern ATK-16: At the New York office, FRA found that housekeeping was substandard and unsanitary.

Recommendation: The carrier should review house keeping practices at this facility.

Concern ATK-17: There is no soundproofing between the CETC dispatchers work area and other personnel in the CETC control room. FRA found the overall level of noise in the Philadelphia office to be sufficient to be considered distracting or to occasionally require repetition of verbal communications.

Recommendation 1: ATK should arrange to separate the CETC train dispatchers from the noise created by other employees working in the office. A clear or "see through" type partition would enable other employees to monitor the overview display without distracting the train dispatchers. Communications between the dispatchers and support personnel could be transacted by intercom.

Recommendation 2: The conference/observation room adjoining the control center provides casual observers and visitors with an excellent view of the center. ATK should limit access to the work area of the control center to those persons who must enter the facility to conduct business.

Recommendation 3: The presence of non-CETC train dispatchers in proximity to the CETC dispatchers creates unnecessary noise, foot traffic and distraction. The carrier should relocate the non-CETC desks to minimize disruptions.

Concern ATK-18: Lighting at the CETC consoles is only marginally adequate. Employees at the center complained that the environment was depressing and encumbered the performance of duties.

Recommendation: ATK should arrange to improve lighting at CETC consoles for reading and writing purposes. Consideration should also be given to improving lighting for foot traffic as well. The carrier has informed FRA that improved lighting was on order and would be installed upon arrival.

Concern ATK-19: At the New York office, FRA found that all three trick dispatchers are enclosed within one room. Open loudspeakers are used for block line communications, and radio transmissions from loudspeakers on the Sections A and B dispatchers desks compound the problem.

Recommendation: Individual train dispatchers desks should be protected from irrelevant noise by acoustical baffling.

Concern ATK-20: ATK does not require periodic inspections of emergency evacuation plans and egress routes.

Recommendation: The carrier should establish procedures to ensure that egress routes are accessible through periodic planned inspections.

Concern ATK-21: Heating and air conditioning at the CETC center was notably uneven and varied considerably during the tours of duty when FRA was present. Interviews with employees disclosed that this was a significant source of employee dissatisfaction.

Recommendation: ATK should review this situation and take action as necessary to provide a reliable and non-distracting work environment.

Concern ATK-22: Ventilation at the New York facility was marginal. Ventilators were in need of cleaning. Employees at the CETC control center alleged that air borne contaminates in the closed ventilation system caused an increase in the frequency and severity of personal illnesses (i.e. colds, influenzas and respiratory infections).

Recommendation: ATK should use the resources of it's environmental staff to determine if a health hazard may exist, or if there is a need for employee education to restore confidence.

Concern ATK-23: During the assessment, FRA noted that blue signal protection for workmen on main tracks was provided by CETC train dispatchers using electronic blocking devices. The practices observed did not comply with Federal regulations.

Recommendation: FRA suspects that the exit blocking procedures employed by the ATK CETC system may well provide equivalent protection for workmen on main tracks. However, these procedures do not comply with the regulation and therefore relief must be petitioned through the waiver process.

Concern ATK-24: FRA noted that the automatic record keeping functions of the CTC subsystem involved the mechanical preparation of the dispatchers record of train movements. The following required information was not included; identification of dispatchers and their times on duty, and weather conditions at six hour intervals.

Recommendation: ATK must include all Federally required information on this document.

Concern ATK-25: The CETC audible alarm system is controlled at the individual train dispatchers console. There is no volume control. The audio can only be turned on or off. During the assessment, FRA found that many dispatchers turned the audio alarms off.

Recommendation: FRA does not believe that this practice is in the best interest of safety. Employees should not have the ability or the authority to disengage a carrier safety device.

Concern ATK-26: FRA observed that train dispatchers at CETC consoles habitually accumulated a large backlog of visual alarm messages. Most messages relate to unidentified occupancies (e.g. momentary TOL's in the field). Visual alarm messages appear at the bottom of the screen. An alarm will remain on the screen until it is acknowledged. When additional alarms are received, the letter "A" (alarm) will change from a steady display to flashing as an indicator. When the displayed alarm is acknowledged, the next oldest message will be displayed. The frequency with which "alarms" are generated tends to diminish their significance to the dispatcher.

Recommendation: ATK should consider the feasibility of segregating known minor alarms from priority events such as hazard warning actuations.

Concern ATK-27: The new CETC installation closely parallels air traffic control facilities in its' use of computer screens and consolidated communication systems. At present, there is no provision for periodic employee relief during a tour of duty.

Recommendation: FRA believes that ATK should consider the staffing and workload management policies at air traffic control facilities when establishing analogous policies. Sufficient personnel should be in place to allow train dispatchers to leave the work station to take meal and other periodic breaks or use the rest room.

Concern ATK-28: In the Boston Commuter office, the "D" desk dispatcher uses the radio frequently. Many communications are nullified by the overpowering radio transmitter used by the Conrail dispatching office at Selkirk, NY. The constant chatter from the "D" desk was reported by section "A" dispatchers to be annoying and distracting. Our inspectors also noted a significant amount of non-transportation related MOW communication on the road channel.

Recommendation 1: Provision should be made to reduce the effect of "cross talk" between the section "A" and the section "D" train dispatchers positions.

Recommendation 2: ATK management should make every effort to jointly study the Selkirk radio interference situation with CR to eliminate or at least reduce the extent of the problem.

Recommendation 3: ATK should increase the number of monitoring sessions in the Boston area devoted to detecting nonessential and non-operational use of the radio. This would diminish congestion under the carriers control.

Concern ATK-29: At the New York office, our inspectors found that the train dispatchers do not have a direct telephone link with the power director. The section "A" dispatchers desk does not have a functional selector system with which to summon the operators at Harold, "C" tower, and "F" tower to the train wire. The radio system was found to be a source of distraction. This was primarily due to inadequate acoustical separation between dispatching desks. Our inspectors also noted that employee compliance with radio standards was notably lax.

Recommendation: The carrier should review communications needs and procedures at this location.

Concern ATK-30: Complaints regarding the very heavy traffic and congestion on the radio system were almost universal among the CETC train dispatchers interviewed by our inspectors. Monitoring sessions by our inspectors disclosed that interference and "override" often disrupted communications.

Recommendation: ATK should study the problem of radio congestion on the Northeast Corridor as a top priority. According to the technical staff at CETC, the carrier has purchased a new radio system to improve communications. The system will not, however, address the congestion problem.

CHAPTER 3- ATCHISON TOPEKA AND SANTA FE RAILWAY COMPANY

I. INTRODUCTION

The Atchison Topeka and Santa Fe Railway Company (ATSF), is headquartered at Chicago, Illinois. The carrier operates through or within the states of Iowa, Illinois, Louisiana, Missouri, Kansas, Oklahoma, Texas, New Mexico, Colorado, Arizona and California, with a total of 11,699 track miles. In 1987 it operated 45,265,428 total train miles of which 4,085,874 were yard and switching miles.

The ATSF consists of two operating regions, identified as the Eastern Region and the Western Region. The Eastern Region is comprised of the Texas, Illinois and Kansas divisions. Three divisions, New Mexico, Arizona and California, make up the Western Region.

Table ATSF-1 shows the locations of the dispatching offices and the number of dispatchers on each shift.

TABLE ATSF-I
TRAIN DISPATCHING OFFICES AND
DISPATCHER POSITIONS PER SHIFT

LOCATION	FIRST	SECOND	THIRD	TOTAL
Winslow, Arizona	4	4	4	12
Fresno, California	2	2	2	6
San Bernardino, California	4	4	3	11
La Junta, Colorado	2	2	2	6
Fort Madison, Iowa	4	3	2	9
Kansas City, Kansas	2	2	2	6
Newton, Kansas	3	3	3	9
Clovis, New Mexico	3	3	2	8
Amarillo, Texas	5	4	4	13
Fort Worth, Texas	3	3	3	9
Temple, Texas	4	3	3	10
TOTAL	36	33	30	99

The dispatching positions located at Clovis will be moved within the next 18 months to a new regional office at Albuquerque, New Mexico. The Winslow and La Junta offices may also be consolidated into that regional facility at a later time.

II. STAFFING AND TRAINING

Organization

During the assessment the carrier was in the process of changing the organizational structure to a regional concept in which dispatching activities are reported from the Manager Operations Planning (chief dispatcher) to both divisional and regional officials.

The chief dispatcher is responsible for the overall operation of the dispatching offices and the supervision of the dispatchers and the support staff located in the dispatching office.

The chief dispatchers in six of the dispatching offices have those additional responsibilities that are assigned to assistant chief dispatchers. There are no assistant chief dispatchers at those locations.

At the time of the assessment, there were 27 assistant chief dispatchers in the eleven offices; 5 on first shift and 11 each on the second and the third shifts.

Dispatchers who do not hold a regularly assigned position are assigned to an extra board. They work temporary vacancies caused by vacations, illness or other reasons. A certain number of extra board dispatchers are guaranteed full-time pay. Others are paid only for work performed.

The individual dispatchers are responsible for the efficient movement of trains and on-track equipment over an assigned territory, performing duties as defined in Section I of this report.

Hours of Service

In 1987 the ATSF reported 21 instances in which dispatchers performed service in excess of that permitted by Federal statute.

Dispatchers worked 477 assigned rest days during a 12 month period in 1986 and 1987. The dispatchers at the San Bernardino and Fresno offices worked 232 and 147 rest days, respectively, during 1987.

The ATSF also has a category of employees identified as communication coordinators. These employees issue, by radio, track bulletins which affect the movement of trains to train

crews. The railroad does not require these employees to complete and sign hours of service records. In addition, some dispatchers in the Clovis, Amarillo and Temple offices did not enter their hours on duty on the dispatchers' record of movement of trains and sign that record as required.

Candidate Selection

Eight dispatching offices accept applications from employees with train order or operator background. Three offices offer the same opportunity to employees of any craft.

TRAINING

FRA reviewed initial and periodic dispatcher training in the areas of operating rules and timetable special instructions, new technology applications, and physical characteristics qualifications. Following is a synopsis of that review.

Initial Training

ATSF at one time conducted classroom training of dispatchers at Amarillo, followed by on-the-job training in the office where the dispatcher was assigned to work. Because many dispatchers now working received that training, the course is summarized below:

- Four to six weeks of instruction on the carrier operating rules and Federal regulations relating to blue signal, radio standards and procedures, rear end marker device, and the Hours of Service Act. All aspects of train and on track equipment methods of operation including automatic block, Track Warrant Control, Centralized Traffic Control and Track and Time authorities were taught.

- The student was required to complete a written/oral examination with a grade of 90 percent or better.

- The student received on-the-job training with an experienced dispatcher on one or more positions until he was confident that he had acquired the knowledge and skill to function alone.

- Under the supervision of an experienced dispatcher the student was required to dispatch those territories on which he had received on-the-job training. If his/her performance was acceptable the student was promoted. If the performance was not acceptable the student either continued on-the-job training or was released from the training program.

- The chief dispatcher of each office determined when a student was qualified based upon that students performance and upon the concurrence of the dispatcher(s) with whom the student trained.

Student dispatchers now receive training in the office in which they will work. The training is comprised of operating rules instruction and a written examination on those rules by local officials or the division superintendent of rules. The student then receives on-the-job training with a working dispatcher. The written and oral examination and the final qualification procedure is the same as that summarized above for the Amarillo facility.

ATSF officials said that they do not anticipate the resumption of training at the Amarillo facility.

Periodic Training

Dispatchers are required to attend an annual class of operating rules instruction which is attended by all operating employees. No examination is given but employees are encouraged to ask questions about the rules. The course of instruction is general in nature and not specific to dispatching duties.

In addition to the general rules instruction class dispatchers are required to attend a second rules instruction class which is dispatcher specific and to complete a written examination. The number of questions on the examination varies among the operating regions from 90 to 200, with a minimum grade of 80 to 90 percent required. Six offices require dispatchers to be instructed and examined yearly, two offices every second year, and three offices every fourth year or more.

Physical characteristics familiarization trips by dispatchers are required at the discretion of the chief dispatcher of each office. The Fort Madison and Newton offices did not require dispatchers to qualify on physical characteristics.

III. RULES AND PROCEDURES

Operating Rules

In addition to regional timetables, dispatchers are governed by to **The General Code of Operating Rules** (GCOR) which has been effect on the ATSF since October 28, 1985. Some of the procedures that are to be used by dispatchers are enumerated in the **Rules and Instructions for Train Dispatchers and Control Operators.**

Train and other on-track equipment movements are governed by Centralized Traffic Control (CTC), Track Warrant Control (TWC), and Rule 251 operating rules.

Operating Procedures

The following concerns apply to operating procedures in all offices or, where so identified, to groups of offices:

- The carrier permits dispatchers to issue track warrants which authorize trains to operate through or within yard limits. This creates an internal ambiguity over whether more than one train movement may take place within yard limits in track warrant territory; in essence, a conflict between rules 93 and 409.

  Rule 93 states that "Within yard limits, the main track may be used by trains or engines, not protecting against other trains or engines".

  Dispatchers in five of the ATSF offices were confused by this ambiguity.

- In TWC operations, dispatchers are permitted to authorize a following train to operate to a location behind a preceding train after the preceding train has reported it was beyond that location. A literal reading of the GCOR does not permit that.

  Even though that operating practice is not itself unsafe FRA believes safety is enhanced if operating rules leave no room for misunderstanding.

- A second technical conflict exists in the GCOR relating to TWC operations. The dispatcher may relieve a train from providing flag protection within the limits of its authority. A literal reading of the GCOR does not permit the dispatcher to authorize a following train to enter the limits of the preceding train until after the arrival of that train at the final point of its authority and only after the dispatcher has marked his copy of the track warrant which authorized that train void as prescribed by GCOR Rule 411(1). However, dispatchers are permitted to authorize the following train to move to a location behind the preceding train after the preceding train has reported it is beyond that location.

  Again, the operating practice is not per se unsafe. But it does reflect a conflict in the operating rules.

- Dispatchers are permitted to extend track and time authorities even though there is no operating rule which permits that. Neither is there is a space on the track and time authority form to record that information.

The following is a synopsis of observations conducted in the individual offices:

Winslow

- There is one standard clock in the office. The dispatchers work with their backs to the clock and use the analog time displayed on the control equipment.

- Some dispatchers are not ending radio transmissions with "over" or "out" as required by the Federal regulations.

- The dispatchers record of movement of trains is not printed with the distance between stations or the station designations as required by Federal regulations.

- The weather conditions were not always recorded as required by Federal regulations.

Fresno

- There is confusion among dispatchers as to the correct interpretation of GCOR Rule No. 408. Some dispatchers understand the rule to mean that when a train has been granted work authority by a track warrant, flag protection must be provided by the crew. Other dispatchers interpret the rule to mean that flag protection is not required.

San Bernardino

- Some dispatchers had not made themselves aware of the current general orders in effect as required by GCOR rule No. 3.

- Most of the dispatchers did not end radio transmissions with the words "over" or "out" as required by Federal regulations.

- A dispatcher did not require a yard crew member to properly repeat the radio instructions given by the train dispatcher for the crew member's locomotive to pass a red signal, as required by the GCOR and Federal regulations.

La Junta

- A standard clock is not provided.
- Two dispatchers did not review the general orders, bulletins, notices and circulares before commencing work as required by GCOR Rule No. 4C.
- A dispatcher did not apply blocking devices on the CTC control panel before granting track and time limits as required by GCOR Rule No. 351(A).
- Some dispatchers proceeded with a radio transmission of a mandatory directive even though the employee who was receiving the authority did not identify himself as required by the GCOR and Federal regulations.

Kansas City

- A dispatcher, after issuing a track and time authority for a maintenance-of-way gang as required by GCOR Rule 351(B), permitted a work train to enter that protected territory by simply saying "OK" to a request from the crew to do so, in violation of GCOR Rule No. 351(C).
- Dispatchers used station designations (abbreviations) instead of station names to record track and time limit authorities.
- A dispatcher used the abbreviation "UR" to mean "until released" even though that abbreviation was also the designation of a station.
- The clock was not designated as a standard clock as required by GCOR Rule No. 1.

Clovis

- Some dispatchers, when issuing TWC authority, did not enter the track to be used in the space provided on the track warrant form in violation of GCOR Rule 401.
- Some dispatchers issued track and time authorities before applying the blocking devices to the control panel as required by GCOR Rule No. 351 (a).
- There is no clock in the office which has been designated by a sign as a standard clock as required by GCOR Rule No. 1.

- Some train dispatchers did not identify themselves as "dispatcher" on the dispatcher's telephone when, after having been absent, they returned to their desks, as required by Rule No. 1 of the carriers Rules for Train Dispatchers and Control Operators.

- A dispatcher issued a track warrant with the movement authority ending at "end of track". The main track extended beyond the location where the train was authorized to operate. There was no location which was identified in the timetable as "end of track".

Amarillo

- Track and time limit authorities were issued by some dispatchers before the blocking devices were applied to the control panel in violation of GCOR Rule No. 351 (a).

- Some train dispatchers did not identify themselves as "dispatcher" on the dispatcher's telephone as required by Rule No. 1 of the Instructions for Train Dispatchers and Control Operators when after having been absent, they returned to their desks.

- Some dispatchers, when issuing a track warrant authority, did not enter the track to be used in the space provided on the track warrant form in violation of GCOR Rule 401.

Fort Worth

- There was almost a complete lack of compliance with the GCOR radio rules by dispatchers and the employees they interface with.

- The Northern Division, General Order books, Division Operating Circulares and the Division Trainmaster's Notices are maintained in a manner which does not comply with the GCOR Rule (c). There were pages missing, pages which were blank, loose pages, two pages stapled together and the Division Trainmaster Notices were posted in the General Order Book.

Temple

- The General Order books at each desk were improperly maintained. Some general orders were missing, others were posted out of consecutive order and some were improperly cancelled.

- Some dispatchers did not record the time when the transfer between dispatchers was made as required by Rule No. 17 of the Instructions for Train Dispatchers and Control Operators.

- Some dispatchers did not mark track warrants void in the track warrant book as required by GCOR Rule No. 411 when trains reported clear of the limits.

- A dispatcher issued a track warrant on the radio before he required the recipient to identify himself in violation of GCOR Rule No. 521(2).

- Track and Time authority records were found to have been altered by writing over the locations and the time of issuance in violation of Rule 5 of the Instructions to Train Dispatchers and Control Operators.

IV. OPERATIONAL TESTING PROGRAM

The ATSF program was last revised on January 1, 1987. It requires that operational efficiency testing be conducted at random times and places throughout each month, including weekends and holidays. One-fourth of the tests are to be made between 10 p.m. and 6 a.m. The chief dispatcher is given authority to conduct four different tests on dispatchers.

Several chief dispatchers stated their opinion that because the dispatchers are carrier officials they are exempt from the operational testing program.

The FRA determined the average annual number of tests for each dispatcher for each office by dividing the number of tests conducted by the number of desks in each office. This formula does not include regularly assigned relief dispatchers, the extra board dispatchers, and the assistant chief dispatchers. If those employees had been factored into the already low number of tests for each dispatcher, the average number of tests would have been even lower.

Table ATSF-II shows the number of dispatchers in each office, the number of operational tests and inspections conducted, the percentage of failures, the total failure rate, and the average annual number of such tests and inspections for each dispatcher.

TABLE ATSF II
OPERATIONAL TESTING DATA

LOCATION	DISPATCHERS	TESTS	# FAILURES	% FAILURES	ANNUAL TESTS PER DISPATCHER
Winslow	12	0	0	0	0
Fresno	6	0	0	0	0
San Bernardino	11	0	0	0	0
La Junta	6	0	0	0	0
Ft. Madison	9	0	0	0	0
Kansas City	6	0	0	0	0
Newton	9	0	0	0	0
Clovis	8	47	2	4.2	5.8
Amarillo	13	0	0	0	0
Fort Worth	9	0	0	0	0
Temple	10	0	0	0	0
Total	99	47	2	2	0.5

The number of operational tests and inspections conducted on dispatchers in the Clovis office is not sufficient to assure that the employees understand how to comply with the carrier operating rules. The absence of tests in the other offices represents a complete disregard of the requirements of Federal regulations.

V. ENVIRONMENT AND WORKLOAD

General

The FRA found that the majority of the dispatching offices on the ATSF provide an adequate working environment. With some exceptions the workload is allocated in a logical and reasonable manner so that the dispatchers are not compelled to work at the limit of their ability or skills.

ATSF train dispatchers work at computer assisted desks, centralized traffic control desks, track warrant control desks or at desks with a combination of those systems for directing the movement of trains.

FRA observed that the workload on the some of the first shift desks, and during the early evening hours on the second shift desks, was significantly higher than at other times because track maintenance programs were ongoing during those times.

Individual Dispatching Offices

During the assessment, FRA noted that certain conditions were confined to individual offices as follows:

Winslow

- The workload on the first shift and the early evening portion of the second shift at times required the dispatcher to work to the limit of his ability and endurance. At other times the workload was well within acceptable limits.

- Desks No. 1 and 2 are combined when one of the dispatchers assigned to those two positions is absent. The combined territory is controlled from desk No. 2. Because desk No. 1 utilizes a computer generated train sheet and desk No. 2 a printed sheet which requires handwritten entries, the workload on the combined desks is increased significantly.

- The workload on some desks is increased because dispatchers are required to make hand written entries and also enter the same information into the computer system on a keyboard.

San Bernardino

- The workload on the First Subdivision first shift desk, at times, caused the dispatcher to work to the limit of his skill and endurance.

La Junta

- When this office was recently remodeled the radio controls and computer keyboard were located so the dispatcher must move back and forth to operate them. He also must place himself where his view of the control panel is restricted.

Fort Worth

- The workload on the first shift and the early evening part of the second shift, at times, was so heavy that the most experienced dispatcher was required to work at the limit of his skills and endurance.

- Dispatching functions were disrupted by the flow of foot traffic through the office. Much of the foot traffic was generated by individuals who had no legitimate reason to be there. The facility is designed so that foot traffic must move through each of the three dispatching offices to reach the chief dispatcher's office.

  Two desks are located in one very small room which has poor lighting and ventilation. Each dispatcher in the normal conduct of his work disturbs the other. Each, at times, must shout to make himself heard.

Temple

- The office is designed with three desks in three cubicals. Dispatching functions are sometimes disrupted because foot traffic must pass through cubicals No. 2 and 3 to reach desk No. 1.

VI. COMMUNICATIONS

General

Dispatchers consoles are equipped with radios, carrier telephones, and commercial telephones. Highway vehicles and on-rail equipment, other than locomotives, are equipped with a mobile radio telephone system.

During the assessment FRA inspectors found that the radio procedures of the dispatchers were generally average while those of employees conversing on the radio with the dispatcher were generally poor. Failure of employees to identify their station as required by Federal regulations was common. Neither the train dispatchers nor the employees they communicated with used the words "over" and "out" as required.

- Winslow - Radio equipped track wayside detectors, which automatically transmit after each passing train, often disrupted dispatcher communications. The maintenance-of-way and signal department employees also disrupt dispatcher communications because they use the same radio channel.

- San Bernardino - Radio interference on the main track road channel is heavy and adversely affects dispatching and other operations, especially in the Los Angeles basin.

- Kansas City - Many radio transmissions from maintenance-of-way employees and trains disrupted dispatcher communications.

- Newton - FRA noted excessive interference at the Oklahoma City desk because of override by dispatching offices at Amarillo and Fort Worth. Another source of interference was the ATSF yardmaster's radio at Oklahoma City.

- Clovis - The dispatcher's radio channel was congested by transmissions from other dispatchers and train and yard crews. Dispatchers were required to transmit and crew members were required to repeat track warrant authorities several times before the authorities could be completed.

- Amarillo - Because of interfering radio transmissions dispatchers often were required to transmit the same track warrant authority to a train numerous times before the authority was understood by the crew. Crew members often had to repeat track warrant authorities several times before the dispatcher could determine the authority had been correctly received. Heavy radio interference was received from the ATSF Clovis and the Fort Worth dispatching offices and from train and yard crews.

  On one occasion a mobile unit interrupted the dispatcher's transmission and the crews repetition of a track warrant four times before the dispatcher could complete the authority.

- Fort Worth - Radio transmissions from the dispatching offices at Clovis and Amarillo continually interfered with the issuance of mandatory directives. Additional radio interference was caused by yard crews and train crews using the dispatching channel.

- Temple - Before the dispatcher could use the radio it was often necessary to ask other employees to discontinue their conversations. The dispatcher's radio frequency was in constant use by yard crews, train crews, yardmasters, carrier officials and other dispatchers.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern ATSF-01: An inordinate number of dispatchers worked their assigned rest days at San Bernardino and Fresno.

Recommendation: The ATSF should maintain a level of staffing which will minimize dispatchers working their rest days.

Concern ATSF-02: The number of experienced operators available to be considered for dispatcher training is decreasing and may soon be exhausted. Employees from other railroad crafts, including those with no railroad operating experience are the next source available to train for dispatching positions. Because of this the current training program may not be adequate for future needs.

Recommendation: The carrier should consider establishing a classroom and simulator training program. Included should be comprehensive instruction on operating rules and dispatching procedures.

Concern ATSF-03: There is not a system policy for periodic operating rules instruction and examination of dispatchers.

Recommendation: The ATSF must establish a program of periodic training as required by Federal regulations.

Concern ATSF-04: There is not a system standard for instructing dispatchers on the physical characteristics of the railroad. Two offices does not require such training.

Recommendation: The ATSF should establish a system to qualify new dispatchers and periodically re-qualify all dispatchers on the physical characteristics of the railroad.

Concern ATSF-05: There was confusion among dispatchers about the interpretation and application of some of the operating rules. Examples noted by FRA were Rules 93, 408, 409, and 411.

Recommendation: ATSF should target these rules for clarification during the required periodic rules instruction classes. The railroad should increase operational testing on these rules to ensure that they are properly applied.

Concern ATSF-06: With the exception of one office which has conducted a small number of tests, dispatchers have not been tested on their ability to apply the operating rules and other instructions as required by Federal regulations.

The operational test program does not include many safety-critical operating rules which the dispatcher is responsible for implementing. Only the chief dispatcher is required to conduct tests.

Recommendation: The ATSF should immediately develop and implement an adequate program of operational testing for train dispatchers. The program should include, at a minimum, safety-critical operating rules, and the procedures in the GCOR and the Instructions to Train Dispatchers and Control Operators. Officials from each department whose employees interface with the

dispatcher should be required to conduct operational efficiency testing of dispatchers.

Concern ATSF-07: The workload on the first and second trick desks at Winslow, San Bernandino, and Fort Worth were, at times, sufficiently busy to cause the most capable and experienced dispatcher to work at the upper limits of their ability and endurance.

Recommendation: The carrier should audit the workloads of these positions.

Concern ATSF-08: Dispatchers often did not record their hours on duty or sign the record as required by Federal regulations. The ATSF did not consider communication coordinators to be covered by the Hours of Service Act, even though these employees were clearly engaged in duties specified by the statute.

Recommendation: Those employees who perform duties which come within the Hours of Service Act must complete and sign records as required by Federal regulations.

Concern ATSF-09: Forth Worth - Dispatchers are disrupted by noise and an extremely crowded working environment in a small office which houses two dispatching desks.

Recommendation: Dispatching functions should be housed in a quiet and uncrowded working environment.

Concern ATSF-10: Persons who have no legitimate need to be there are allowed to enter the dispatching offices at Forth Worth and Temple. Their presence is disruptive to dispatchers.

Recommendation: The carrier should take immediate action to restrict unauthorized persons from the dispatching offices.

Concern ATSF-11: Dispatchers often did not use proper radio procedures. Neither did they require that other employees do so.

Recommendation: Dispatchers and those they work with should be reinstructed on the radio rules and procedures. Operational tests relating to proper radio use should be conducted to ensure compliance.

Concern ATSF-12: Interfering transmissions from other stations and employees often disrupted dispatcher communications. Sources of interference included other dispatching offices, maintenance employees, and railroad switching yards.

Recommendation: Employees in other departments should be provided with and required to use other channels. The carrier should regularly audit the radio channel(s) used by dispatchers to identify those employees who are using the radio for purposes other than on-track movements.

Concern ATSF-13: There is not a system-wide standard for the designation and use of standard clocks.

Recommendation: The carrier should provide and properly designate standard clocks in each office.

CHAPTER 4- BURLINGTON NORTHERN RAILROAD COMPANY

I. INTRODUCTION

The Burlington Northern Railroad Company (BN), headquartered at Overland Park, KS, is the second largest railroad common carrier in the United States in terms of total track mileage. It operates in 24 states and two Canadian Provinces. The BN extends from Chicago, IL, and St. Louis, MO, in the east to Seattle, WA, in the west; from Minneapolis/St. Paul, MN, in the north to Pensacola, FL, in the southeast and Houston, TX, in the southwest. There are large classification terminals located at Chicago, IL; Denver, CO; Kansas City, MO; Minneapolis, MN and Seattle, WA.

At the time of the assessment, the railroad was divided into five regions. Each region was comprised of three divisions. A reorganization plan implementedin August 1988, reduced the number of regions to two and the number of divisions to nine. The regional headquarters are in Minneapolis, MN, and Denver, CO.

The following table illustrates the locations of the BN train dispatching offices and the number of dispatchers on each shift:

TABLE BN-I
TRAIN DISPATCHING OFFICES AND
DISPATCHER POSITIONS PER SHIFT

LOCATION	FIRST	SECOND	THIRD	TOTAL
Galesburg, IL	7	7	7	21
Fridley, MN	10	10	10	30
Springfield, MO	6	6	6	18
Billings, MT	5	5	5	15
Alliance, NE	5	5	5	15
Lincoln, NE	4	4	4	12
McCook, NE	3	3	3	9
Ft. Worth, TX *	3	3	3	9
Seattle, WA	9	8	8	25
TOTALS	52	51	51	154

* The dispatching positions located at Ft. Worth, were consolidated with those at McCook and Springfield. FRA conducted

an assessment of the Ft. Worth office prior to the move and the results of that audit are a part of this report.

II. STAFFING AND TRAINING

STAFFING

FRA's evaluation of staffing included the organizational structure as it relates to the dispatching environment, the duties of the assistant chief dispatcher force, and determination of staffing levels.

Organization

Over the past several years the BN has began a transformation of the dispatching organizational structure from the traditional industry standard where train dispatchers reported through the chief dispatchers to the division superintendents. Consolidation of dispatching offices into interdivisional centers has necessitated a change in the structure in which the dispatchers, through the chief dispatchers, report to and communicate with region and division level officers.

Concurrent with these dispatching consolidations are consolidations of operating regions and divisions, as explained in the introduction. Because these consolidations occurred before, during, and after the assessment field work was completed, FRA did not fully evaluate these new organizational relationships.

Duties

The chief train dispatcher is responsible for the overall operation of the dispatching office and the supervision of the dispatchers, the assistant chief dispatchers and the support staff located in the office.

At the time of the assessment, the BN had a total of 57 assistant chief dispatchers. The day shift had 20 assistant chiefs, the afternoon shift had 19, and the night shift had 18.

The individual dispatchers are responsible for the efficient movement of trains and on-track equipment over an assigned territory, performing duties as defined in Section One of this report.

Hours of Service

In 1987 the BN reported to FRA 19 cases in which train dispatchers performed service in excess of that permitted by Federal statute. Of the 19 cases, 14 were related to a shortage of qualified dispatchers.

All BN dispatching centers have additional qualified train dispatchers who are assigned as extra list employees. Except for the Billings, Montana, and Fridley, Minnesota, centers the extra lists include employees who are guaranteed compensation to be available to protect the train dispatcher and assistant chief dispatcher positions.

BN dispatchers were, at least occasionally, required to work on their assigned rest days. While the number varied from office to office, dispatchers at Billings, Montana, and Fridley, Minnesota, were required to work 435 and 341 rest days, respectively, during 1987.

Candidate Selection

BN offers employees of any craft the opportunity to apply and be considered for train dispatching positions. The candidates must pass an initial 26-page open-book questionnaire which covers all aspects of the carrier rules applicable to train and other on-track operations. After the initial examination, each applicant must, within 60 days, pass a rules examination on the General Code of Operating Rules. Applicants who successfully complete both examinations are entered in the formal training program.

TRAINING

During the assessment, FRA reviewed initial and periodic dispatcher training in the areas of operating rules and timetable special instructions, new technology applications, and physical characteristics qualifications. Following is a synopsis of that review.

Initial Training

In 1987, the BN opened a formal train dispatching school, which is the first of its kind in the nation. The school is located on the campus of the Johnson County, Kansas, Community College in Overland Park, Kansas. BN purchased and installed a simulator which was designed and built by the Illinois Institute of Technology. The simulator is capable of imitating actual train and track car movements on various segments of the railroad.

Dispatcher candidates are assigned a course of study and training as follows:

- Two weeks at the Overland Park school for carrier operating rules and Federal regulations related to the train dispatcher positions including blue signal regulations, radio standards and procedures, rear end marker requirements, and the Hours of Service Act. At the end of the two week period, the candidate must

complete a written examination on the carrier's operating rules. A minimum score of 90 per cent is required for passing.

- One week at their assigned dispatcher headquarters for on-the-job training with experienced dispatchers.

- Three weeks at the Overland Park school for simulator training on all aspects of train and on-track equipment methods of operation including automatic block, traffic control, track warrant, and track and time authorities.

- One week in their assigned dispatcher headquarters. At this time, they establish seniority and are assigned to perform the actual dispatching work under the supervision of experienced dispatchers. If their job performance is considered acceptable, they receive assignment as a regular or extra list dispatcher. If their performance is not yet at an acceptable level, they continue to work under the review of experienced dispatchers. The final decision regarding qualification is made by the chief dispatcher.

At the time of the assessment, the BN anticipated a schedule consisting of three of the formal classroom/on-job-training sessions per year.

Periodic Training

The BN requires all train dispatchers to attend an annual class on operating rules and to pass an examination on these rules with a minimum score of 90 per cent. The number of questions on the tests ranged from 125 to 200, at the discretion of the region in which the office was located.

Physical characteristics familiarization trips are at the discretion of the chief dispatchers of the nine dispatching centers. Five of the centers required dispatchers to take such trips annually, while the Billings, MT; Galesburg, IL; Lincoln, NE; and Springfield, MO., offices did not require dispatchers to do so. FRA believes train dispatchers should have current and accurate knowledge of the physical characteristics of the territory over which they dispatch.

III. RULES AND PROCEDURES

Operating Rules

In addition to regional timetables, dispatchers are governed by several systems of rules. The BN subscribes to **The General Code of Operating Rules** which have been in effect on BN since April 27, 1986. The procedures used by dispatchers are enumerated in the **Rules and Instructions for Train Dispatchers and Control Operators**, and the **Instructions for Agents, Control Operators, Train Order Operators, and Bridgetenders.**

Train and on-track equipment movements are governed by Centralized Traffic Control [CTC], Track Warrant Control [TWC], and Rule 251.

Operating Procedures

Following is an office by office synopsis of exceptions taken by FRA during the assessment:

Galesburg, IL

- Train dispatchers were not complying with the provisions of rule 6 H 5 in the **Rules and Instructions for Train Dispatchers and Control Operators.** This rule requires the train dispatcher to draw an "X" with red pencil through the track warrant number on the train sheet after the track warrant has been made void or reported clear. Failure to comply with this rule could result in an excessive number of track warrants appearing to be in effect and be needlessly confusing for the dispatcher. It also creates the possibility that erroneous information could be transferred at the change of shift.

- The dispatchers record of movement of trains were not maintained as required by carrier instructions.

- Multiple instances of violations of the radio rules were also noted.

- On more than one occasion dispatchers going on or off duty did not sign the transfer as required by rule 15 (a) or (b).

Springfield, MO

- There is an internal ambiguity over whether more than one train movement may take place with Yard Limits in TWC territory; in essence, a conflict between Rule 93

and Rule 409. At other dispatching offices this issue has been resolved by clarifying general orders.

- On two occasions operators attempted to clear trains while omitting applicable track bulletins from a clearance. In both instances the dispatchers were aware of the operators' failures and immediately corrected them.

- Rules S-250 and 252 were violated when track permits were issued to a second movement before a first movement had reported clear.

Alliance, NE

- Each dispatcher had acknowledged in the general order book that he/she had read general order A-14. This general order directed that a sticker be placed on the last page of the timetable. Not one of the timetables being used by the dispatchers at the five desks had the sticker applied.

- Maintenance of way (MW) employees working on the main track with track and time limit authority regularly failed to clear the main track before the expiration of the time granted. Some MW employees were more than 30 minutes overdue clearing the main track and releasing the limits of their authority.

- Locomotive hostlers entering the CTC main track at the east end of Alliance yard by signal indication made back up movements without signal indication or other authority from the train dispatcher.

- On one occasion a train dispatcher transmitted a speed restriction over the radio to a train. The transmission was not in the format of a train order as required by the carrier operating rules. The employee receiving the transmission did not repeat the restriction as required by the rules.

Lincoln, NE

- Although carrier instructions prohibit certain locomotives from operating on the 5th subdivision, records showed that on 20 occasions within a 30 day period dispatchers verbally authorized the operation of the prohibited locomotives on that subdivision.

IV. OPERATIONAL TESTING PROGRAM

All railroads including Burlington Northern are required by Federal regulations to conduct tests and inspections of their employees. The purpose of the tests and inspections is to determine the extent of employee compliance with the operating rules.

The BN program was last revised on January 1, 1987. It requires that each employee governed by the rules be tested at least once every six months. The program also makes the Superintendent responsible for assigning the number of tests each officer must conduct monthly.

While this delegation of responsibility would have met carrier needs under the traditional dispatcher chain of command, it does not adequately address current and future organizational structure changes. FRA requested copies of any computer generated reports used by BN to evaluate and manage the operational testing program. The BN was unable to provide any such reports, which leads FRA to conclude the program is not adequately audited and managed by the carrier.

The BN program specifies 14 items upon which dispatchers are to be tested. In addition, officers may conduct tests on other operating rules and on the rules contained in additional publications. Two of those publications are the **Rules and Instructions for Train Dispatchers and Control Operators**, and the **Instructions for Agents, Control Operators, Train Order Operators, and Bridgetenders.**

FRA determined the average annual number of tests per dispatcher for each office by dividing the number of tests conducted by the number of desks per office. This formula does not consider such factors as the regularly assigned relief positions, the extra list dispatchers, and the assistant chief dispatchers. If those employees were factored in, the already low number of tests per dispatcher would have been even lower. The following table illustrates the number of dispatchers per office, the number of operational tests and inspections conducted, the number of failures, the total failure rate , and the average annual number of such tests and inspections per dispatcher.

TABLE BN-II
OPERATIONAL TESTING DATA

LOCATION	DISPATCHERS	TESTS	FAILURES	PERCENT FAILURES	ANNUAL TESTS PER DISPATCHER
Galesburg	21	91	8	8.7	4.3
Fridley	30	437	6	1.3	14.6
Springfield	18	668	17	2.5	37.1
Billings	15	150	33	22.0	10.0
Alliance	15	521	5	0.9	34.7
Lincoln	12	52	0	0	4.3
McCook	9	248	16	6.4	27.6
Ft. Worth	9	187	15	8.0	20.7
Seattle	25	551	3	0.5	22.04
TOTALS	154	2905	103	3.5	18.9

It is apparent the relatively small number of operational tests and inspections conducted on train dispatchers is not sufficient for the BN to assure these employees are familiar with the railroad's operating rules and timetable instructions, as required by Federal regulations. The low number of tests at the Galesburg and Lincoln offices is not only inadequate, it is also inconsistent with the carrier's stated policy of conducting at least one test on each dispatcher every 90 days. When notified of FRA's concern regarding the low number of tests, BN officials agreed that testing would be increased.

The FRA evaluation of this program also disclosed the following:

- At Billings, Lincoln, and Ft. Worth, the chief dispatcher is the only railroad officer conducting tests and inspections of train dispatchers.
- At McCook, the chief dispatcher conducted 220 or 88.7 per cent of all of the tests conducted, and recorded 16 or 100 per cent of the failures.
- Of the 15 failures recorded at the Ft. Worth office, 5 or 33 per cent were for failure to comply with the

provisions of operating rule 407. This rule governs the changing of a track warrant.

- The three failures recorded at the Seattle office resulted in verbal reprimands as the corrective action taken. Furthermore, the three failures for an entire year were in glaring conflict with FRA findings in that office. FRA Inspectors detected 60 instances of non-compliance with rules, special instructions, or federal regulations.

- At Alliance, of the 521 tests conducted 194 or 37.2 per cent were for compliance with those rules requiring that the train sheet be signed and that the weather be recorded. This category of tests also accounted for 5 or 100 per cent of the failures. In addition there were 142 tests or 27.2 per cent for Rule G and 125 tests or 23.9 per cent for radio rules. The remaining 60 tests or 11.5 per cent were for other operating rules.

- At all BN offices dispatchers had not been notified when they had been tested. Neither were they notified of the results of those tests.

At McCook, FRA noted the impact of the carrier's alternate discipline program. Under this program, a dispatcher subject to discipline for certain limited causes may continue to work at 80 percent of salary while not engaged directly in train dispatching. Under the program some dispatchers have been sent to the carrier's training center for retraining. At the training center those dispatchers explain the circumstances leading to their discipline to other students to the mutual benefit of all.

V. ENVIRONMENT AND WORKLOAD

General

In general, FRA found that the majority of train dispatchers offices on the BN provide an adequate working environment. On the whole, individual dispatching districts were assigned in a logical and reasonable manner, and except for occasional peak periods, workloads are not so great as to compel dispatchers to work at the outside limits of their ability or skills in order to avoid delay.

BN train dispatchers work at computer assisted work stations, centralized traffic control stations, voice train control desks, or at any combination of these systems. FRA found that workloads on the daylight shift were significantly higher than during other tours of duty. This was due to the carrier's practice of aggregating maintenance programs on the first shift.

Through observations of the various train dispatching desks, FRA is of the opinion that the traffic load at three positions posed a somewhat greater potential for train dispatchers to work to the limits of their abilities. Two of the positions were centralized traffic control operations, and one was a voice control (TWC) position. Carrier officials were aware of this and did not dispute FRA's concerns.

The primary environmental considerations of lighting, heating, cooling, and ventilation were adequate except for one office.

Except for those locations where train dispatchers worked within enclosed individual offices, the overall level of noise was often sufficient to be considered distracting and to require the repetition of communications. The primary sources of the noise were open communication speakers. Although line static and hum were minimal, speakers were often adjusted to maximum volume so as to command the dispatchers attention over the surrounding din. Again, carrier officials were knowledgeable and concurred with FRA's opinion. However, after one attempt to encourage the dispatchers to use individual headsets, the previous practice resumed.

FRA found that BN requires train dispatchers to periodically divert their attention from train management to input train progress information into a separate computer information system. This system is designed for the guidance of yard and terminal planning personnel. According to the dispatchers that FRA interviewed, this duty is time consuming, distracting, and essentially clerical in nature. It does not enhance the information available from a dispatching perspective, and mechanical and/or software problems often exacerbate the task.

The **Mobile Radio Access System** (MORAS) is a communication system separate from the dispatchers radio system. BN supervisors regularly use it, instead of the dispatchers radio system, to contact the dispatcher to determine the status of trains and suggest movement priorities. The sounding of the call in "ringer" is distracting and the task of monitoring an additional communication device increases the workload and interrupts the dispatchers planning and concentration. Even though the supervisors are provided with mobile radio units, with direct access to the dispatcher, the congestion caused by the many transmissions on the dispatching radio frequency discourages its use.

Individual Dispatching Offices

During the assessment, FRA noted certain conditions at individual offices as follows:

Billings, Montana

- Only one train dispatchers desk is isolated from noise.
- Five dispatchers share a common work area divided only by partial sound barriers which are minimally effective.
- Unauthorized persons not connected with company business were observed in the facility. Conversations which did not relate to railroad operations offered the opportunity for distraction and increased the overall noise level.
- Additional foot traffic occurred in portions of the office as a result of the office design. The dispatchers noted that this traffic was sometimes distracting and counterproductive.

Alliance, Nebraska

- Train dispatchers work areas are not effectively isolated to eliminate the noise generated by the adjacent dispatchers, clerical personnel and supervision.
- FRA is of the opinion that the workload observed on the North and South CTC dispatchers desks may be sufficient to compel dispatchers to function at the upward limits of their skills in order to avoid train delay.
- Unnecessary pedestrian traffic is permitted in the work area.
- During meal periods, families often enter the facility to visit and bring meals to employees on duty.
- Transportation, engineering and mechanical department officers and employees were observed in and about the offices. They were essentially engaged in social pursuits which were not relevant to the interest of the operation.
- A microwave oven, corn popper, refrigerator and coffee maker are located immediately behind one dispatcher's desk. Those appliances are used by other dispatchers, office support personnel, and visitors. Both the

traffic to and from the "kitchen", and the actual food preparation activities, are a highly unprofessional source of noise and occasional pandemonium.

- Although the assistant chief train dispatchers office is separated from the dispatchers by a sliding glass door, this door is seldom closed. This results in highly unnecessary noise and distraction for the dispatchers.

- Heating and ventilation is poor with as much as 10 degrees variance in temperature from one side of the room to the other.

- Ventilation at times is not adequate, causing some dispatchers to resort to using portable fans to circulate additional air.

McCook, Nebraska

- FRA is concerned that the workload observed on the TWC dispatchers desk may be sufficient to compel dispatchers to work at the upward limits of their abilities and skills to avoid train delay.

Seattle, Washington

- Some dispatchers positions within this office are located side-by-side. There are no sound barriers to block the communications noise coming from the adjoining desks.

VI COMMUNICATIONS

General

BN radio channel number 1 is the normal channel used by train dispatchers and other employees to transmit and receive mandatory directives, instructions and information regarding on track movements. The BN utilizes a computerized communication network referred to as the Compass System. It is designed to automatically route communications by the quickest means to remote stations on the BN system.

Dispatcher consoles are equipped with VHF radio channels, company telephones, and commercial telephones. Also available is a system identified as the "Mobile Radio Access System" (MORAS) which provides supervisors, and other designated employees with mobile telephone communication capabilities. A "voice mail system" enables field personnel to automatically obtain, by telephone, copies of track bulletins and train location lineups without disrupting the dispatcher.

In 1987 the BN commissioned the study of, and experimentation with, a totally new method of communication and train control entitled "Advanced Railroad Electronic System" (ARES). This system will, in part, utilize an orbiting satellite to transmit and receive digital mandatory directives between the dispatcher and the employees on a locomotive.

During the assessment FRA inspectors noted that the radio procedures used by dispatchers were generally average while those of employees conversing on the radio with the dispatcher were generally poor. Notable by their absence were the insistence by dispatchers that employees initiating a transmission properly identify themselves (occupation and station) before continuing with a transmission and the use of the applicable words "over" or "out" when ending a transmission.

Also of concern was interference on the dispatchers radio channel caused by transmissions from MW portable packsets and remote stationary field transmitters.

FRA believes that where radio congestion is significant, a radio channel should be dedicated for the exclusive use of the train dispatcher and employees whose duties require that they communicate with him.

- At Galesburg, IL, the dispatchers radio channel is congested by transmissions that are unrelated to on-track movements. Many of those disrupting transmissions came from signal, MW and yard personnel.

- At Fridley, MN, the location and transmitting power of some wayside and terminal radio installations created an overriding condition onto adjoining dispatchers. This condition was at times disruptive and confusing to all employees.

- At Springfield, MO, during track warrant control operations compliance with radio operating rules was excellent. However, when TWC transmittals were completed the employees often reverted back to using poor radio procedures.

- At Alliance, NE, compliance with radio operating rules is good when rail traffic is light. When traffic increases the quality of radio transmissions decreases proportionately to the increase of traffic. On the first trick, dispatchers are continually interrupted by MORAS telephone calls from field supervisors. Although some of the calls were necessary it was obvious that many of these calls could have been directed to the chief dispatcher or the assistant chief dispatchers.

- At Lincoln, NE, dispatchers were observed continually correcting employees because of their improper radio procedures.

- At McCook, NE, about 760 miles of non-signalled main track is controlled by track warrant control. At various locations "dead spots" create a safety sensitive condition during the transmittal and repetition of TWC authorities. The situation is further compounded by "over riding" interference on the system and, also, employees failing to insure that the radio channel is not being used before initiating a transmission.

- At Seattle, WA, radio equipment at selected consoles produces poor quality reception and transmission. Many times dispatchers had to repeat authorities and instructions, three or more times, to insure that the receiving employee had correctly copied the authority.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern BN-01: BN dispatchers were at least occasionally required to work on their assigned rest days. It appears the carrier lacks sufficient qualified dispatching staff to accommodate the needs for replacement of regular dispatchers for illness, vacations, training, familiarization road trips, and other requirements.

Of particular concern is the Billings office, where dispatchers were required to work their rest days a total of 435 times during 1987, despite the fact the chief dispatcher does not schedule physical characteristics road trips.

Recommendation: The BN should reevaluate current staffing levels to assure the dispatching staff is sufficient to meet the workforce requirements, including re-training needs. The staff levels of the Billings office in particular should be fully audited.

Concern BN-02: There is no system standard governing operating rules examinations for train dispatchers.

Recommendation: The BN should establish a system standard for operating rules examinations to assure consistency.

Concern BN-03: There is no system standard for instructing dispatchers on the physical characteristics of the railroad.

Recommendation: The BN should establish system standards for physical characteristics familiarization.

Concern BN-04: BN utilizes the Track Warrant Control method of operation extensively throughout the railroad system. The technology now exists for computer programming to provide error protection previously provided by discourse between dispatchers and operators. At the time of the assessment, the BN was in the process of programming the Fridley, MN, office computer to provide train dispatchers in TWC territory with overlap error warnings.

Recommendation: The carrier should expedite the introduction of computer assisted overlap protection, particularly for use with the Track Warrant Control method of operation.

Concern BN-05: During the assessment, FRA noted a substantial number of exceptions to the BN rules and procedures. Those exceptions applied not only to the dispatchers themselves, but also to the employees interfacing with the dispatchers for operating authorities.

Recommendation: BN should assign supervisors to the dispatching workplaces to specifically monitor rules compliance of all employees.

Concern BN-06: There was confusion within the Springfield office about the interpretation and application of Rules 93 and 409 within yard limits. At other dispatching offices this issue had been resolved by clarifying general orders.

Recommendation: The BN should establish a system-wide method of explaining, in writing, the meaning of operating rules and how they should be applied.

Concern BN-07: The operation efficiency testing program for dispatchers does not include many safety-critical operating rules which the dispatcher is responsible for implementing.

Recommendation: The program should be expanded to include, at a minimum, safety-critical operating rules and the procedures required of dispatchers in the **Rules and Instructions for Train Dispatchers and Control Operators**, and the **Instructions for Agents, Control Operators, Train Order Operators, and Bridgetenders.**

Concern BN-08: The failure rate for operational efficiency tests varied by location from a high of 22 per cent to a low of 0 per cent. Such a wide range may indicate that tests of questionable validity are being conducted.

Recommendation: The carrier should determine a valid statistical norm for failure rates. Offices which report failure rates significantly above or below the norm should be audited.

Concern BN-09: A wide range of carrier officers interface with dispatchers and have the means and opportunity to conduct operational tests. However, at most locations only chief dispatchers and their assistants conduct tests.

Recommendation: The carrier should instruct supervisors other than the chief dispatcher to conduct operational tests on dispatchers. Supervisors in both the transportation and engineering department should be utilized.

Concern BN-10: At at least one location, a large number of tests was conducted for signing the train sheet and recording the weather. Both of the tests are of some significance and come within the intent of the type of tests required by Federal regulations. However, a disproportionate emphasis on any one test defeats the purpose of a broad based testing program.

Recommendation: The carrier should establish internal quality controls for the testing program. These controls should ensure that all dispatchers are subjected to meaningful tests for all safety critical rules.

Concern BN-11: The use of open speakers which broadcast within "studio" type dispatching offices contribute considerably to the noise and distraction in which dispatchers must function. Although most officers of the BN agree that unnecessary noise hinders concentration and does impede dispatcher performance, FRA finds little evidence that this carrier has a meaningful program to eliminate those noise sources.

Recommendation: The BN should undertake a program of implementing state-of-the art communications equipment to reduce the level of noise in the dispatching offices.

Concern BN-12: FRA observed that two train dispatchers desks at Alliance and one position at McCook were often sufficiently busy to cause train dispatchers to perform duties at the extreme limits of their skills and capabilities.

Recommendation: The BN should periodically conduct an audit of the workload on each dispatching position. The size of the territory should be adjusted so that the resulting workload will permit the dispatcher to have time to reflect and make rational decisions.

Concern BN-13: BN requires train dispatchers to divert their attention from safety related train management to perform duties which are clerical in nature.

Recommendation: Duties not associated with the primary responsibility of directing the movement of trains, employees and equipment should be delegated to support personnel.

Concern BN-14: Dispatching functions are disrupted when dispatchers are required to respond to radio calls, not associated with directing the movement of trains, from supervisors using mobile radio units. The nature of those calls often places the dispatcher in the position of becoming a telephone operator.

Recommendation: The BN should develop and enforce rules for supervisory use of mobile telephones. Calls associated with non-dispatching functions should be directed to support persons.

Concern BN-15: Billings, MT - The office is noisy because of insufficient insulation and poor design. Unauthorized persons are allowed to enter the office and create noise that is distracting to the train dispatcher.

Recommendation: The BN should take immediate action to restrict unauthorized persons from the train dispatchers office. Insulating barriers should be installed between desks.

Concern BN-16: Alliance, NE - Dispatching functions are disrupted by the presence of persons who have no legitimate reason to be there.

Inadequate insulation between the train dispatchers desks further adds to the noise level.

Doors to the assistant chief dispatchers office were left open toward the office of train dispatchers creating unnecessary noise.

The heating and ventilation system causes considerable variance in temperature from one side of the room to the other.

Recommendation: Carrier should restrict entry to the train dispatchers office on an absolute need basis. Assistant chief dispatchers should be aware of the need for a quiet work-place, and not contribute to the problem. The heating and ventilation system should be repaired or replaced to provide a reasonable level of comfort.

Concern BN-17: Dispatcher compliance with federal and carrier radio rules and instructions is average. The dispatchers are not insisting that employees use the proper procedures during radio transmissions and are not always illustrating the required procedures in the course of their transmissions.

Recommendation: The BN should immediately implement a program to teach and enforce proper radio procedures by the dispatchers so that they will comply with all applicable federal and carrier radio rules.

Concern BN-18: The dispatchers radio channel is congested with transmissions originated by employees conducting business on the radio that is not related to on-track movements. Dispatcher transmissions are interrupted by employees failing to listen on the radio channel before commencing a transmission.

Recommendation: The carrier should regularly audit the dispatcher radio channel to identify employees who are using the channel for purposes other than those related to on track movements, or, who fail to comply with the rules pertaining to the initiation of a radio transmission. Those employees should be instructed on proper radio procedures and then required to comply with the rules in all future transmissions.

Concern BN-19: At various locations on the BN the communicating system has been designed in a manner that produces "dead spots" on the dispatcher's radio channel. Some of these "dead spot" locations occur where the method of train control is TWC.

Recommendation: The carrier should evaluate the communication system, determine the exact location of "dead spots" and immediately relocate or reposition radio apparatus to eliminate that condition.

CHAPTER 5- CHICAGO AND NORTHWESTERN TRANSPORTATION COMPANY

I. INTRODUCTION

The Chicago North Western Transportation Company (CNW) headquartered at Chicago, IL, operates more than 6,295 track miles in 11 states. The railroad extends from Chicago in the east to Riverton, WY, in the west: from Duluth, MN, in the north to Kansas City and St. Louis, MO, in the south. In 1987 CNW operated 16,282,127 train miles including 3,408,838 yard train miles. It also operated 493,953,032 passenger miles.

The CNW is a major midwestern railroad which handles significant bridge traffic. It is also a granger railroad transporting grain from midwestern elevators to interchange points with other railroads. Recently, CNW obtained part ownership with the Union Pacific Railroad Company (UP) of a rail route serving the Powder River Basin coal fields in Wyoming.

TABLE CNW-I
TRAIN DISPATCHING OFFICES AND
DISPATCHING POSITION PER SHIFT

LOCATION	FIRST	SECOND	THIRD	TOTAL
West Chicago, IL	5	5	5	15
Boone, IA	5	5	5	15
Chadron, NE	1	1	1	3
TOTAL	11	11	11	33

II. STAFFING AND TRAINING

Organization

The CNW dispatching structure is the traditional industry standard. The assistant chief dispatcher reports to the chief dispatcher who communicates with the assistant division manager of transportation. The next progression in the organizational structure is the assistant vice president-division manager who reports to the vice president transportation then ultimately to the senior vice president of operations.

The chief train dispatcher is responsible for the overall operation of the dispatching office and supervision of the dispatchers and the support staff located at the office. The assistant chief dispatchers perform typical administrative and ancillary functions.
At the time of the assessment the individual dispatchers offices were staffed as follows:

- West Chicago, IL: a chief dispatcher on the day shift; an assistant chief dispatcher and five trick dispatchers on each shift, daily.

- Boone, IA: a chief dispatcher on the day shift; three assistant chief dispatchers and five trick dispatchers on each shift, daily.

- Chadron, NE: a chief dispatcher on the day shift; one trick dispatcher on each shift, daily.

Hours of Service

In 1987, CNW did not report any excess service performed by dispatchers. Currently, all dispatching offices are sufficiently staffed so that dispatchers would not be required to perform service in excess of that permitted by the Hours of Service Act.

Overtime

During the assessment FRA found that CNW dispatchers were frequently required to work on their assigned rest days. The dispatcher's office at St. Paul, MN, was consolidated with the office at West Chicago, creating a temporary shortage of dispatchers. This necessitated 360 assigned rest days to be worked at West Chicago. Dispatchers at Boone and Chadron were required to work 45 and 27 days, respectively, during 1987.

Candidate Selection

The CNW offers employees of any craft the opportunity to apply and be considered for train dispatching positions.

Initial Training

There is no formal classroom training program for dispatchers. Candidates train exclusively on the job for a period of 90 to 260 days. The length of the training period depends upon the progress made by the student.

After a candidate completes the on-job-training and is declared qualified by the dispatchers with whom he trained and by the chief dispatcher he must complete an 84 question written test with a grade of at least 85 percent.

Those who qualify are placed on the dispatcher extra list.

Periodic Training

CNW train dispatchers are reinstructed and reexamined on the carrier operating rules and procedures at two year intervals. They are required to pass a written examination and an evaluation by the chief train dispatcher.

It is the carrier policy to provide all train dispatchers with familiarization trips over their assigned territory when possible.

III. OPERATING RULES AND PRACTICES

Operating Rules

Dispatchers are governed by the **General Code of Operating Rules** which have been in effect since April 27, 1986 and the CNW **System Timetable No. 9** effective July 1, 1988.

Train and on-track equipment movements are governed by Centralized Traffic Control (CTC), Automatic Block Signal System (ABS), Direct Traffic Control System (DTC), and Rule 251. There are also numerous main tracks that are governed by Rule 93 and interlocking rules.

Operating Procedures

In all three of the dispatching offices the dispatchers were not recording the weather at 6-hour intervals as required by Federal regulations.

The following is an office by office synopsis of exceptions taken by the FRA during the assessment.

West Chicago, IL

- Train crew members failed to use proper radio procedures when communicating with the dispatcher as required by Federal regulations and carrier rules.
- A member of a train crew failed to correctly repeat to the dispatcher the release of a DTC block as required by carrier operating rules. The dispatcher released the block.
- The dispatchers record of train movements failed to identify station names and distances between stations as required by Federal regulations.

Boone, IA

- Radio procedures were excellent when the dispatchers were conducting DTC operations. However, those procedures were very poor at other times.

- Dispatchers were twice observed improperly annulling restricting orders.

- Dispatchers were observed not using the specified forms of train orders when electronically transmitting train orders and other mandatory directives to train crew members at their reporting location.

IV. OPERATIONAL TESTING PROGRAM

All railroads are required to conduct observations and tests on dispatchers to insure that they are knowledgeable of, and understand how to comply with, the operating rules and safety critical instructions. The CNW reported to the FRA inspectors that, in 1987, the carrier had conducted 25 tests on dispatchers at West Chicago. The tests were the observation type and were made by the chief dispatcher. There were six failures which represents a failure rate of 24 percent. There were no records available of tests that had been conducted on the dispatchers at Boone or Chadron.

It is apparent that the application of the operational tests and inspections program for train dispatchers is insufficient. Tests were conducted only in the West Chicago office. The number and scope of those tests were not sufficient for CNW to determine that the dispatchers know how to apply the operating rules.

V. ENVIRONMENT AND WORKLOAD

The working environment at each dispatching office was adequate. In the past, concern had been expressed that the workload on some positions was excessive. A consolidation of offices and an increase in the number of dispatching positions appears to have resolved those concerns. The workload appears to be evenly distributed so as to prevent dispatchers from being overly burdened. Morale was high. The dispatchers appeared to be well qualified.

The environmental considerations of lighting, heating, cooling, and ventilation were adequate. Emergency response plans were available which provide evacuation procedures for each office. Telephone directories are present and indexed for emergency response agencies on line of road.

VI. COMMUNICATIONS

The CNW has an assigned radio channel dedicated to train dispatchers and other employees to transmit and receive mandatory verbal directives, instructions, and information regarding on-track movements. A separate channel is assigned maintenance-of-way and signal department personnel. Conditions noted by FRA were as follows:

- o A dispatcher was required to repeat DTC instructions to a train crew several times because of radio malfunction.

- o The radio system has no provision to give priority to incoming emergency calls.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern CNW-01: The CNW recorded only 25 efficiency tests system wide on dispatchers in 1987. Tests that were recorded were of the observation type by the chief dispatcher and resulted in six failures. The CNW efficiency testing program does not include dispatchers at a level sufficient to determine that they are performing their duties in accordance with carrier rules.

Recommendation: The carrier should immediately implement a quality efficiency testing program. The program should include notification to the dispatchers when they have been tested, and the result of each test.

Concern CNW-02: Radio procedures were poor when train crews communicated with dispatchers.

Recommendations: The carrier should monitor compliance with radio rules and instruct employees on proper radio procedures.

CONCERN CNW-03: The radio system does not have the capability to identify emergency calls.

Recommendation: The carrier should develop a system that will enable the dispatcher to recognize an emergency call.

Concern CNW-04: Physical characteristics familiarization trips are at the discretion of the chief train dispatchers of the three dispatching offices. The assessment disclosed that the carrier encourages dispatchers to make familiarization trips but there does not appear to be a schedule. The FRA found that not all dispatchers make regular trips.

Recommendation: The CNW should develop and implement a uniform policy favoring familiarization trips.

Concern CNW-05: Dispatchers failed to record the weather on the train sheet as required by Federal regulations.

Recommendation: The carrier supervisor should monitor the dispatcher train sheet and ensure that all required information is registered properly.

Concern CNW-06: Train sheets did not show the distance between stations as required by Federal regulations.

Recommendation: The carrier should examine its train sheets to ensure stations and distances between stations are proper.

Concern CNW-07: Dispatchers at West Chicago released a DTC block although the train crew member failed to correctly repeat the release. Dispatchers at Boone were observed improperly annulling train orders and using train order forms that were not provided for in the operating rules.

Recommendation: CNW should audit dispatcher procedures to ensure that they use the proper forms of train orders, annul train orders in the manner prescribed and require other employees to use the proper procedures when releasing on-track authority.

CHAPTER 6- CONSOLIDATED RAIL CORPORATION

I. INTRODUCTION

The Consolidated Rail Corporation (CR), is headquartered at Philadelphia, Pennsylvania, and operates over 11,812 track miles in 14 states, the District of Columbia, and two Canadian Provinces. The railroad extends roughly from Boston, MA in the northeast and Alexandria, VA east, to Chicago, IL, and St. Louis, MO, in the midwest.

FRA's assessment of the CR dispatching offices was conducted in March and April 1987. Since that time changes have been made in the location, structure and staffing of the dispatching offices. This report addresses the state of the offices at the time of the assessment.

Conrail is comprised of four regions. Dispatching offices are located at each division headquarters. Following is a table that illustrates the regions and divisions, and the location of each regional and division headquarters.

TABLE CR-I

REGION	REGIONAL HEADQUARTERS	DIVISIONS	DIVISION HEADQUARTERS
Central	Pittsburgh, PA	Allegheny	Altoona, PA
		Columbus	Columbus, OH
		Pittsburgh	Pittsburgh, PA
		Southwest	Indianapolis, IN
		Youngstown	Youngstown, OH
Eastern	Philadelphia, PA	Harrisburg	Harrisburg, PA
		New Jersey	Elizabethport, NJ
		Philadelphia	Philadelphia, PA
Northeastern	Selkirk, NY	Buffalo	Buffalo, NY
		Mohawk-Hudson	Utica, NY
		New England	Springfield, MA
		Southern Tier	Hornell, NY
Western	Detroit, MI	Chicago	Chicago, IL
		Cleveland	Cleveland, OH
		Michigan	Jackson, MI
		Toledo	Toledo, OH

The following table illustrates the number of dispatchers on the weekday shift at each office.

TABLE CR-I
TRAIN DISPATCHING OFFICES AND
DISPATCHER POSITIONS PER TRICK

LOCATION State	City	FIRST	SECOND	THIRD	TOTAL
IL	Chicago	3	3	3	9
IN	Indianapolis	4	4	3	11
MI	Detroit	1	1	1	3
NJ	Elizabethport	3	3	3	9
OH	Cleveland	4	4	3	11
	Columbus	4	4	4	12
	Toledo	4	4	4	12
	Youngstown	3	3	3	9
PA	Altoona	3	3	3	9
	Harrisburg	4	4	4	12
	Philadelphia	3	2	3	8
	Pittsburgh	3	3	3	9
NY	Buffalo	3	3	3	9
	Hornell	2	2	2	6
	Selkirk	5	5	4	14
	Utica	2	2	2	6
SYSTEM TOTALS		51	50	48	149

II. STAFFING AND TRAINING

STAFFING

The manpower requirements of each office were evaluated. The availability of qualified relief dispatchers, excess service performed and overtime accrued were used in this evaluation. The training of new train dispatchers is related to the manpower requirements. With the decline in the availability of operators to fill vacancies, there is a critical need to train new dispatchers.

Organization

The dispatching function on each Conrail division is under supervision of the division chief train dispatcher who reports to the division superintendent.

Duties

The chief train dispatcher works the first shift, and assistant chief dispatchers are assigned to the other shifts. The chief dispatcher bears the responsibility for the overall operation of the dispatching office and the supervision of support personnel in the office. Operators, at outlying locations on the division, are responsible to the chief train dispatcher for all activities relating to dispatching functions. In the absence of the chief dispatcher the assistant chief dispatcher assumes his duties.

During the assessment Conrail had 23 assistant chiefs assigned to the first shift, 26 assigned to the second shift, and 25 assigned to the third shift.

Hours of Service

In 1986, CR reported 31 cases in which train dispatchers performed service in excess of that permitted by Federal statute. Of those incidents, 21 (68 percent) occurred at Hornell, six (19 percent) were at Youngstown and four (13 percent) occurred at Buffalo. The remaining 13 offices did not report any excess service during the year.

In 1986, train dispatchers at 15 of the 16 dispatching offices were required to work a total of 1035 rest days. 49 percent of the occurrences were at two offices, Altoona and Philadelphia, where dispatchers worked 248 and 267 rest days respectively.

Candidate Selection

Candidates for promotion to dispatcher are usually chosen from the operators craft.

TRAINING

FRA reviewed Conrail's initial and periodic dispatcher training in the areas of operating rules and timetable special instructions, new technology applications, and physical characteristics. The following is a synopsis of that review.

Initial Training

Candidates selected as dispatcher trainees were qualified on the operating rules and timetable special instructions when they performed service as operators. Knowledge of the rules and past performance are important factors in the selection process. After being chosen the candidate enters into on-the-job training under the supervision of experienced train dispatchers.

The carrier is developing a system plan for the initial training of dispatchers.

Periodic Training

Each year dispatchers and operators are required to attend a two day operating rule re-examination class conducted by the regional manager of rules. He is usually assisted by one or more division supervisors of operating rules. The program for this class was under revision during the period of this assessment and could not be adequately evaluated.

Previously a written examination prepared by the system rules department was administered at the class. A score of 85 per cent was required to pass the test.

FRA is of the opinion that dispatchers should have current and accurate knowledge of the physical characteristics of their dispatching territory. The awareness of the layout of the right of way and adjoining territory enhances dispatcher performance.

Training issues raised by FRA inspectors were:

All Offices

- Rule book changes which were effective on February 1. 1987 were distributed to each dispatcher. A system memorandum explaining the rule changes was included. No formal classes have been presented on the changes.

Harrisburg, PA

- The new equipment training provided to dispatchers was very informal. Twenty-four hours before the initial use each dispatcher was given eight hours of supervised instruction. The instructors were two

dispatchers who, through trial and error, became knowledgeable about the equipment. Most dispatchers interviewed felt that the training lacked the depth of instruction which might have been available from the designers, or the manufacturers, of the equipment.

III. OPERATING RULES AND PRACTICES

The dispatchers observed were evaluated for knowledge and application of Conrail operating rules and instructions and the Federal regulations.

In addition to regional timetables , dispatchers are governed by the **Conrail Rules of the Transportation Department** effective February 1, 1987. Conrail will adopt the operating rules of the **Northeast Operating Rules Advisory Committee** (NORAC) on October 1, 1988.

Operating Procedures

Following is an office by office synopsis of exceptions noted by FRA during the assessment:

Central Region

Columbus, OH

- The lack of an immediate visual recall system at the three manual block system dispatching desks has contributed to overlapping authorities. This matter is of primary concern to FRA. The current system requires dispatchers to commit critical on-track movement authority to memory.

- A dispatcher issued manual block authority to a train to proceed over an entire length of track. Later he contacted the engineer by radio and verbally instructed him to operate the train into the next forward siding. This directive was not reduced to writing as required by Federal regulations. After the train had been reported clear of the main track, the engineer was instructed to change the original authority. However, the manner in which the change was made was not consistent with the safety practices inherent in the carrier's train order rules.

- The weather was not recorded by dispatchers at six hour intervals as required by Federal regulations.

- Dispatchers were not ending radio transmissions with the words "over" or "out" as applicable.

Pittsburgh, PA

- The C desk is so positioned that the dispatcher must turn away from the train sheet and rely on his memory to enter information into the computer.

Indianapolis, IN

- The train movement sheet is not designed to permit easy reference to the precise location of trains in manual block system territory. Extra dispatchers, in particular, were experiencing difficulty when authorizing and protecting blocks by manual block system rules. Division officials apparently agreed with this conclusion and stated that they were in the process of creating a computer program to provide additional safeguards.

- Failure of dispatchers to enter information required by Federal regulations on the dispatcher's record of train movements.

- Dispatchers failing to use the words "over" or "out", as applicable, when ending radio transmissions.

Youngstown, OH

- Dispatchers have a train movement sheet which is not designed to permit easy reference to the precise location of trains in manual block limit territory. Red marking pens are used to show the locations of opposing trains.

- Train dispatchers were observed;

    1. Not determining if trains were moving or standing before issuing CT-401 authorities.

    2. Underscoring the information issued on CT-401 authorities before the employee receiving the authority had repeated it.

Eastern Region

Elizabethport, NJ

- The B desk dispatcher did not enter the names of the New Jersey Transit Railroad (NJT) conductors and engineers, and their times on duty, on the dispatchers' record of train movements. This is a requirement of 49 CFR 228.17.

- Dispatchers were observed not signing the transfer record as required by Conrail Operating Rule No. 910.

- Dispatchers were observed granting blocking device times on CT-401 authority before the time the blocking devices were actually applied to the control panel.

- Most radio transmissions monitored by FRA inspectors, wholly or in part, did not comply with Federal regulations and CR operating rules.

Northeastern Region

Hornell, NY

- Improper radio procedures by train crews operating within the Colony/Maybrook Districts was noted. Dispatchers did not require these crews to use proper procedures before they continued with the radio transmission.

Western Region

Chicago, IL

- Dispatchers in many instances were observed failing to listen to and underline data being transmitted from CT-401 authority.

Cleveland OH

- Dispatchers are:

    1. Using unauthorized abbreviations in mandatory directives.

    2. Failing to underscore instructions as required by CR operating rules.

    3. Failing to enter on the required form the time blocking devices were applied.

- The quality of the blocking devices appears to allow substantial chance of them being inadvertently displaced from the machine. Several times the blocking devices were knocked from the panel board, by the dispatcher, while performing normal duties.

- The supervisor of train operations and most dispatchers had not made the required ink changes in their rule books and timetable.

- Two dispatchers did not have the operating rule book and the timetable available, while on duty, as required by carrier operating rules.

Jackson, MI

- At Drawbridge Tower, FRA observed an operator call the dispatcher and "repeat" a CT-401 for a track authority that had never been issued or okayed by the dispatcher. The dispatcher merely acknowledged the CT-401 was "OK" and apparently permits this practice. The operator stated he was able to take "short cuts" such as this with certain dispatchers.

- Employees were issuing and receiving train orders in violation of CR Operating Rule 207 by failing to spell the names of stations and numerals. An operator involved advised FRA that train orders were always transmitted in this manner.

- Dispatchers in numerous instances were observed failing to listen to, and underline, CT-401's during repetition of those authorities.

- On two separate occasions the dispatcher was notified that the rear end marking device on a train was defective. The dispatcher permitted both trains to continue beyond a location where the rear end marking device could have been repaired or replaced. These events occurred during the time rear end marking devices were required to be displayed by each train.

Toledo, OH

- A dispatcher issued CT-401 block authority to a MW employee while a train was in that block. The "follow train" instruction was added to the information line after the MW employee inquired about the train.

- Dispatchers in numerous instances were observed failing to listen to, and underline, CT-401's during repetition of those authorities.

- A stamp indicating "FULFILLED" is occasionally marked on the dispatchers' record of CT-401's before the entire movement of the train issued the authority has been completed.

- FRA observed one incident in which a train was restricted to 10 mph by a wire bulletin. The dispatcher issued a CT-401, authorizing the train to

proceed through the same area at 25 mph. The original restriction had not been annulled or superseded.

IV. OPERATIONAL TESTING

The following table illustrates the carriers' record of operational tests conducted on dispatchers in each office.

TABLE CR-II
1986 OPERATIONAL TESTING DATA

LOCATION State	City	NUMBER OF TESTS	FAILURES	FAILURE RATE
IL	Chicago	1670	28	1.7%
IN	Indianapolis	2843	51	1.8%
MI	Detroit	1349	62	4.6%
NJ	Elizabethport	2354	108	4.6%
OH	Cleveland	3807	65	1.7%
	Columbus	2597	44	1.7%
	Toledo	4698	98	2.1%
	Youngstown	8202	112	1.4%
PA	Altoona	1114	38	3.4%
	Harrisburg	1599	76	4.8%
	Philadelphia	2895	59	2.0%
	Pittsburgh	281	4	1.4%
NY	Buffalo	3468	14	0.4%
	Hornell	1276	52	4.0%
	Selkirk	1276	5	0.4%
	Utica	1544	9	0.6%
	Totals	40973	825	2.0% (Average)

During the assessment, FRA inspectors observed dispatchers during 149 tours of duty. During those observations 25 exceptions were taken to the dispatchers' operating practices. In this example the rate of failure is 16.8 percent. It is apparent that the tests conducted by Conrail officials were of questionable quality. In 1986 Conrail conducted 870,602 CORPS tests on the system. Of the total tests 4 percent were reported to have involved dispatchers.

V. ENVIRONMENT AND WORKLOAD

FRA noted the following conditions which affected the performance of dispatchers.

All Offices

- Dispatchers are required to enter the "OS" record of all trains into the Train Management System (TMS) computer. TMS records actual, against scheduled, movement of freight trains. According to the dispatchers contacted by FRA, this duty is time consuming, distracting, and essentially clerical in nature. At offices where CAD systems have been installed, there is no interface between the CAD and the TMS computer. Often dispatchers were too busy to update the report and were criticized for failing to do so.

Central Region

Altoona, PA

- Dispatchers could not clear the signal governing southward movements at CP Drury from the siding to the main track.

- The computer was not programmed to permit application of track blocking on the main track at the southeast connection at Olean from No. 8 signal to No 12 signal.

- Train ID's displayed on the CRT screen are sometimes exchanged between trains when three or more trains occupy the limits of one block at the same time. The exchange takes place when the trains move from one block to another.

Columbus, OH

- The number of trains and other on-track movements handled on the Scotts Lawn Secondary requires constant concentration by the dispatcher. Disruptions necessary to conduct other duties often interfere with this concentration. The distractions create tension and the potential for dispatcher error. Track occupancy overlaps could occur as a result. Many of these interruptions are unnecessary. For example, FRA observed an assistant chief dispatcher instruct the dispatcher to communicate with a taxi cab while the dispatcher was in the process of handling a situation involving a hot journal. The assistant chief could have easily handled this chore himself.

- The Scotts Lawn Secondary dispatcher is also required to issue industrial switching instructions to train crews reporting on duty. The incidents occur at Columbus Buckeye yard where yardmasters are available to conduct these duties. In addition, dispatchers are required to complete form CT-2569. This appeared to be an unnecessary duplication of a chore handled by the conductor.

Youngstown, OH

- The North desk CTC machine at Granhan Interlocking will not permit applying a blocking device. The dispatcher must go to another dispatcher's console to apply blocking devices.

- Radio transmissions on loud speakers from 23 base radio stations are disruptive. On one occasion the dispatcher correctly required an Amtrak crew to repeat a radio transmitted train order three times before he could be sure that it had been correctly received. Radio transmission from other railroad radios continually interrupted that conversation.

- The workload of the East and North dispatchers is increased because they are required to assist in completing train air brake tests. Also, they must converse, by radio, with taxi drivers transporting crew members from the rear of a train to the locomotives.

Eastern Region

Harrisburg, PA

- There is a need for an intra-office communications system. Loud talking, even though head sets are in use, is a common and frequent occurrence between dispatchers. Assistant chief dispatchers shout instructions across the room. In one instance an assistant chief dispatcher was observed talking on the phone, using vulgar language which overrode all other conversations.

- Dispatchers radio communications were disrupted by automatic radio transmissions from wayside equipment failure detectors, transmissions from Amtrak radio channels, and radio directed switching movements broadcast into the open office.

Elizabethport, NJ

- FRA observed that four telephone lines were flashing, indicating incoming calls. The dispatcher was too busy to answer any of these calls.

Philadelphia, PA

- The chief dispatcher and the assistant chief dispatcher do not have the electronic capability of monitoring the actions of the dispatchers. Communication between them and the dispatchers is frequently accomplished by shouting across the room. Required monitoring of Amtrak radio channels and transmissions from the radio-equipped wayside detectors is disruptive.

Northeastern Region

Buffalo, NY

- Dispatchers and other transportation center employees work in a large undivided room. There are no sound absorbing devices in the room. Noise from the dispatcher's radio loudspeakers and the activities of the other transportation center personnel are disruptive.

- Dispatchers find it difficult to read train sheets because lighting is kept at a minimum level. The overhead lights reflect glare on the screens of the video display monitors.

Springfield, MA

- On the Boston Line between CP 83 and CP 92 frequent track circuit problems were observed by FRA.

Hornell, NY

- Dispatchers are required to issue train orders protecting speed restrictions that are in effect 72 hours or longer, when bulletin orders could be issued.

- The "A" desk is arranged with two consoles that are eight feet apart. The dispatcher must push himself quickly back and forth between them on a chair with rollers, in order to control and monitor train movements and keep train sheet records.

- There are 12 locations to which train orders are panafaxed by dispatchers. The workload increases because they must constantly redial when the lines are

busy. A speed dialing system would eliminate this problem.

Western Region

Chicago, IL

- An eastward freight train was shown on the dispatchers display to be at CP 497 when the train actually was located at CP 491.

- Track occupancy was shown on tracks in the Toledo terminal when the tracks were unoccupied.

Cleveland, OH

- In eight hours the third trick East/West dispatcher sat in his chair only two times to issue trains CT-401 authorities. The remainder of the shift was spent moving from desk to desk to operate the TCS equipment, answer phones and monitor radio transmissions. Additional duties require that he maintain two TCS train graphs and keep records of train movements on four train sheets. He must move between two desks that are 25 feet apart to accomplish these tasks.

Toledo, OH

- Train crew members reporting on duty two floors below the dispatching office are permitted to frequent the office. This situation poses distractions for the dispatchers.

VI. COMMUNICATIONS

On Conrail, dispatcher consoles are equipped with VHF radio channels, company telephones, and commercial telephones. Conrail radio channel number one is specified as the road operations radio channel. This channel is also used for automatic transmissions from wayside defective equipment detectors. Following are communication deficiencies noted during the assessment:

Youngstown, OH

- The North dispatcher's radio is congested by interference from the Cleveland dispatching office, from block operators on the Pittsburgh Division and from taxi drivers requesting the location of trains.

- Because block operators are no longer employed, the East and the North dispatchers have the sole

responsibility for the issuance on the radio of CT-401 authorities to direct manual block operations. On many occasions those critical functions were disrupted by radio transmissions from other radios.

Elizabethport, NJ

- All radio base stations must be monitored continuously because the dispatcher desks are not equipped with a frequency or tone selector.
- Several yard operations and MW workmen transmit on the dispatchers' radio frequency.
- Radio communication interference was heard coming from what was identified as Amtrak and Conrail train operations on the New Jersey, Harrisburg, Mohawk-Hudson and Southern Tier Divisions.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern CR-01: In several Conrail dispatching offices the dispatcher extra board was inadequate.

Recommendation: Conrail should reassess the staffing needs in these offices.

Concern CR-02: On Conrail dispatcher positions have historically been filled from the operator's craft. The elimination of operator positions has seriously depleted this source.

Recommendation: Conrail should consider formal training of employees from any craft in order to assure the extra list dispatcher positions in all offices are filled.

Concern CR-03: Because of the demands placed upon the present day dispatcher on-the-job training is not a practical method for training student dispatchers.

Recommendation: Conrail should establish a system dispatcher training school. A formal classroom approach would guarantee that students are uniformly taught the carrier operating rules, computer techniques, interpretations, procedures and Federal regulations.

Concern CR-04: Physical characteristic familiarization trips for dispatchers are not mandatory.

Recommendation: CR should adopt a policy regarding familiarization trips for train dispatchers.

Concern CR-05: At Harrisburg new operating equipment was installed and the dispatchers were not formally trained in it's use.

Recommendation: The carrier should formally instruct employees in the uniform application and function of new equipment before it is deployed.

Concern CR-06: Train dispatchers were not formally instructed on changes in the carrier's operating rules.

Recommendation: Dispatchers must be given formal instruction when operating rules are changed to insure that the revised rules are understood and correctly applied.

Concern CR-07: The current system requires that dispatchers commit to memory on-track movement authorities granted in manual block territory. The lack of an immediate visual recall system to warn dispatchers of overlapping authorities has contributed to such overlaps.

Recommendation: The railroad should develop and install a computer program which will warn dispatchers of potential overlapping authorities and provide immediate recall of the locations of trains and movement authorities in manual block territory.

Concern CR-08: At Columbus, OH, dispatchers transmitted manual block authority to an engineer by radio. The dispatcher did not transmit the authority in the carriers operating rule format or require the engineer to copy the directive in writing.

Recommendation: The carrier must ensure that all mandatory directives transmitted by radio are in compliance with Federal regulations.

Concern CR-09: Most radio transmission by dispatchers and other employees violated , wholly or in part, Federal regulations and CR operating rules.

Recommendation: CR must insist that all employees comply with the Federal regulations and carrier operating rules governing the use of the railroad radio.

Concern CR-10: At Pittsburgh the arrangement of the C desk work station is positioned so the dispatcher must turn away from the sheet containing the records of train movements and enter information into the computer from memory.

Recommendation: CR should arrange work stations at Pittsburgh so critical records, such as the train dispatcher's record of

train movements, can be referenced while data is being entered into the computer.

Concern CR-11: In various offices FRA inspectors took exception to dispatchers observance of the carrier's operating rules and procedures. Of particular concern is the manner in which dispatchers are issuing, cancelling and checking the repetition of CT-401 authorities. Also of concern was that dispatchers are granting CT-401 authorities for employees to occupy the main track before applying the blocking devices to the control machine.

Recommendation: Conrail should increase operational testing of dispatchers to ensure that they are complying with the operating rules.

Concern CR-12: At Cleveland blocking devices being used at the Lake Front position are ineffective.

Recommendation: Division officials should replace the ineffective blocking devices with ones that are effective.

Concern CR-13: Some dispatchers did not enter all of the required data on the record of train movements, including weather conditions at six hour intervals and the names of all conductors and engineers and their times on duty.

Recommendation: The carrier must audit train movement records to ensure that dispatchers are complying with 49 CFR 228.17.

Concern CR-14: On two occasions, dispatchers permitted trains to operate with defective rear end marking devices beyond a location where the defective device could have been repaired or replaced.

Recommendation: Conrail must ensure dispatchers comply with Federal regulations.

Concern CR-15: The quality and effectiveness of operational tests conducted on dispatchers by Conrail supervisors is questionable. The failure rate reported by Conrail does not correspond with the rate of failure noted by FRA inspectors.

Recommendation: The carrier must establish minimum participation levels for tests, and conduct tests regularly. Regional and division operating rules staff officers should periodically conduct thorough audits of operational tests conducted on dispatchers.

Concern CR 16: Dispatchers are not assigned interim breaks during their tour of duty.

Recommendation: Conrail should consider assigning dispatchers an interim break.

Concern CR 17: Apparent mechanical and/or software deficiencies do not permit the orderly function of some signals and some blocking devices. Inspectors also noted conditions affecting the proper display of train identifications.

Recommendation: These deficiencies should be corrected as soon as possible. The divisions should immediately notify train dispatchers in writing of reasons for these deficiencies, including methods to be used by the dispatchers pending correction.

Concern CR 18: Disruptions on the dispatchers radio channels create confusion during the transmission of mandatory directives.

Recommendation: Conrail should evaluate this problem and assign separate radio frequencies to each dispatching district if necessary for correction. The carrier must also enforce radio procedure regulations to insure that disruptions during safety sensitive transmissions are eliminated.

CHAPTER 7- CSX TRANSPORTATION

I. INTRODUCTION

CSX Transportation, headquartered in Jacksonville, FL, is one of three major freight rail carriers which operate primarily in the section of the United States east of the Chicago and St. Louis gateways, and one of two major freight carriers predominant in the southeastern section of the nation. Roughly, the railroad's boundary cities are Philadelphia, PA, in the east; Chicago and East St. Louis, IL, in the midwest; and New Orleans, LA, and Miami, FL, in the south. CSX was established through a series of mergers, the most recent of which was the operating merger of the former Seaboard System Railroads with the former Chessie System Railroads.

Currently consisting of nine operating divisions, CSX serves 19 states, the District of Columbia, and the Canadian Province of Ontario. The carrier is highly terminal intensive, with major hump classification yards in Birmingham, AL; Atlanta and Waycross, GA; Louisville and Russell, KY; Cumberland, MD; Hamlet, NC; Cincinnati and Toledo, OH; and Nashville, TN. Other terminals of varying size serve most of the major cities within the railroad's operating system. CSX operates import-export facilities at Mobile, AL; Jacksonville, Miami and Tampa, FL; Savannah, GA; Baltimore, MD; Wilmington, NC; Charleston, SC; and Newport News, VA. The CSX system consists of 24,821 track miles. In 1987 CSX operated 73,436,366 train miles, which included 16,347,395 yard switching miles. CSX also operated 38,180,562 passenger miles.

At the time of the FRA assessment, CSX was in the process of consolidating train dispatching functions into a single control center located in Jacksonville, Florida. While other major freight rail carriers have accomplished such consolidations on a regional basis, CSX was the first to begin implementation of the single control center concept. Because the transition brought about by the Jacksonville Control Center consolidation was taking place during the time frame of the FRA assessment, some CSX offices were not included in the field portion of the assignment.

Table CSX-I on the following page illustrates the locations of the CSX train dispatching offices and the number of dispatchers on each shift at the time of the FRA assessment.

TABLE CSX-I
TRAIN DISPATCHING OFFICES
AND POSITIONS PER SHIFT

LOCATION		FIRST	SECOND	THIRD	TOTAL
State	City				
AL	Birmingham	1	1	1	3
	Mobile	3	2	2	7
FL	Jacksonville[1]	10	10	10	30
	Jacksonville[2]	3	3	3	9
	Tampa	3	3	3	9
GA	Atlanta	5	5	5	15
	Savannah	3	3	3	9
	Waycross	1	1	1	3
IL	Chicago	1	1	1	3
IN	Evansville	3	3	3	9
	Peru	1	1	0	2
	Washington	2	2	2	6
KY	Corbin	3	3	3	9
	Louisville	2	2	2	6
MD	Halethorpe	4	4	4	12
MI	Grand Rapids	2	2	2	6
	Saginaw	2	2	2	6
NC	Raleigh	2	2	2	6
	Rocky Mount	2	2	2	6
OH	Akron	2	2	2	6
	Cincinnati	1	1	1	3
	Columbus	3	3	3	9
	Dayton	1	1	1	3
	Deshler	1	1	1	3
	Toledo	1	1	1	3
PA	Pittsburgh	2	2	2	6
	Punxsutawney	1	1	1	3
SC	Florence	5	5	5	15
TN	Bruceton	1	1	1	3
	Erwin	1	1	1	3
VA	Richmond	2	2	2	6
WV	Grafton	3	3	3	9
	Huntington	5	5	5	15
TOTALS[3]		82	81	80	243

[1] CSX System Control Center

[2] Tampa Division-this office was not consolidated into the System Control Center at the time of the assessment.

[3] Because the CSX dispatching consolidation was concurrent with the FRA assessment, these totals could be inaccurate.

Because of the planned consolidation of train dispatchers offices into a single control center at the CSX Jacksonville Control Center, FRA decided to broaden the assessment to include an extensive audit of this operation. The CSX dispatching consolidation was not complete at the time of this FRA audit, but enough of the system was in place to conduct an effective evaluation. Other major carriers are in the process of developing similar control centers, and the experience gained by FRA at Jacksonville will be used in planning and conducting future evaluations of these facilities.

The purpose of the Jacksonville evaluation was twofold:

(1) to compare the safety sensitive functions of the central computerized system against the traditional error detection and protection schemes employed by railroads under the Standard Code of Operating Rules and it's derivatives and;

(2) to broaden FRA's knowledge of technological applications to train dispatching functions.

At the time of this audit there were 10 functional train dispatching positions per shift at the Jacksonville center. This represented about 20 percent of the total dispatching territories to be included into the centralized facility, and about 35 percent of the dispatching work force envisioned by CSX. The following dispatcher locations had been transferred to Jacksonville at the time of the control center assessment:

- Evansville, IN;
- Erwin, TN (50 percent);
- Corbin, KY;
- Louisville, KY, and;
- Huntington, WV (partial)

At the time of the assessment, there was a proposed schedule for the transfer of all dispatcher locations to Jacksonville with the exceptions of Chicago, IL, and Toledo, OH. These dispatching offices are essentially engaged in control of major terminal operations. Transfer of the Cincinnati, OH, dispatching office, which is also a terminal dispatching center, has also been deferred by the carrier.

The FRA evaluation of this dispatching center consisted of one week of on-site inspections and evaluation followed by extensive analysis of the compiled information at Washington, D.C. A total of 19 specialists and inspectors from the Office of Safety's

Operating Practices and Standards Divisions participated in the assignment.

The analysis conducted by FRA involved a comprehensive review of the technical and practical aspects of Computer Assisted Dispatching (CAD), the methods used by the carrier to transmit and receive information, the organizational structure of the center including staffing requirements and capabilities, and the dispatcher training programs established by the center. Section II, below, chronicles the elements of that audit which are limited to the Jacksonville Control Center. Results of the staffing, training, rules and procedures and operational testing categories are common to all CSX dispatching functions and are included in those specific sections of the report.

II. JACKSONVILLE CONTROL CENTER

Overall, FRA found that the Jacksonville center represents significant progress toward utilizing current technology to improve railroad safety, and to assist train dispatchers with the organization and management of the railroads operational affairs. The physical facility has been carefully planned and soundly constructed with ample attention devoted to a wide spectrum of operating contingencies. The dispatcher controlled computer equipment was furnished and is maintained by a major computer manufacturer. The programs for the dispatcher controlled computer are developed and maintained by the prime contractor.

COMPUTER SYSTEMS

The Jacksonville Dispatching Center is divided into six zones, designated zones A through F respectively. At the time of the assessment, four of the six zones had been partially phased in. For computer control purposes these six zones are linked into three zone pair sets, which are designated zones A-B, C-D, and E-F. The CAD zones are controlled by three computers with each computer backed up by a fully operating redundant machine. Each computer pair will control about one third of the total dispatching territory. This dual computer system assures that control will be maintained in the event of equipment failure. The 33 dispatching locations on CSX property will be consolidated into 27 dispatching positions in the Jacksonville CAD building. This includes about 15,000 miles of main track with 43 data lines and 144 code lines from field locations.

The power for the system has several back up modes: two independent commercial AC supplies with an uninterruptable feed to the load and a standby AC generator with a back up battery supply. The CAD system is connected to the CSX main frame computer through a fiber optic cable backed up by a microwave capability. There are three back up links to support the primary data communication links to the various field locations. Current

technology interface equipment is used both at Jacksonville and at all field locations. In the short time available for FRA to actually observe the CAD system in operation, there were no power or data communication systems problems noted.

During the course of the assessment, FRA found it expedient for discussion purposes to divide the Computer Assisted Dispatching (CAD) system into it's two primary subsystems; the Traffic Control subsystem (TCS) which includes interlockings, and the Direct Traffic Control (DTC) subsystem.

Traffic Control Subsystem

The Traffic Control subsystem processes dispatcher commands to the remote signal system, and receives status indications from the field which are displayed on overhead projection screens. This information may be summoned in greater detail on the individual dispatcher's video display unit. Safety and protection of train movements is provided by the field equipment as in all other installations. Signals, track circuits, electric locks, and switches are interconnected to provide the conventional fail safe protection.

Although the clerical and administrative entries that are required from train dispatchers in order for the system to function are time consuming and cumbersome, the manual routing procedures of the subsystem are easy to understand and operate. However, FRA inspectors who observed operations on the floor of the center noted a marked lack of confidence and/or understanding from the dispatchers about the reliability of the automatic train routing features of the subsystem.

The traffic control subsystem also uses computer logic to automate other functions involved in train control, which relieves dispatchers for more productive planning and analysis tasks. These automated functions include train identification and tracking, recordkeeping, and reports. While FRA is not prepared at this time to endorse the quality and reliability of this aspect of the subsystem, FRA commends CSX's efforts to reduce the nonessential workload confronting train dispatchers. Technical perfection often cannot be achieved on a rigid timetable.

FRA did identify one aspect of the traffic control sub-system which compromises safety. Where Jacksonville based dispatching districts adjoin sections of the railroad controlled from locations other than Jacksonville, the system will permit one dispatcher to apply track blocking for track car and other on-track equipment movements while the adjoining dispatcher has the capability of operating trains onto the blocked section. In the newer computer assisted systems, this track blocking is a function of the computer processor and software programming.

The Jacksonville dispatching district for which this particular fault was identified connects to a district still controlled from Huntington, WV. The Jacksonville dispatcher can apply a track block for an on-track equipment movement but this block does not prevent the Huntington dispatcher from clearing signals for train movements onto the blocked section. Because of this condition, verbal communications between the dispatchers or control operators involved is vital to the safety of track car and other movements which may not shunt track circuits.

CSX is aware of this problem, and as a solution has instructed the dispatchers in Huntington to communicate with Jacksonville prior to clearing signals for train movements. These management instructions to the dispatchers are strictly verbal, and are not part of the dispatchers written instructions to his relief. Consequently, these instructions could be breached by an extra list dispatcher not familiar with the procedure. A preferable approach would be for the carrier to require the dispatchers involved to contact one another and arrange for blocking of the other dispatcher's control panel. This method has been utilized historically by the railroad industry, and offers a far higher degree of safety than the casual procedure now being used.

Direct Traffic Control Subsystem

The Direct Traffic Control subsystem represents a significant improvement which helps the dispatcher identify and track trains. In addition to providing a visual status report, the computerized operating rules logic portion of this subsystem identifies and often prohibits the train dispatcher from establishing conflicting or otherwise unsafe train and on-track equipment movements. FRA has long encouraged the railroad industry to adopt this type of technology to assist dispatchers in non-traffic controlled territory.

In ABS territory, the DTC subsystem provides the facility for direct traffic control but the protection for train movements is provided by the field signal system. The DTC rules provide a substitute for the historical timetable and/or train order authorities.

In non-signaled territory, the DTC subsystem provides the authority and the protection for train operation using the DTC rules. It is in this method of operation that computer assisted dispatching system failures could lead to unsafe conditions. To minimize the possibility of unsafe failures, CSX has used the following development philosophy:

- The hardware system is enhanced with back-up capabilities. The automatic switch-over to the back-up system was still being developed at the time of the FRA

audit. Since the back-up hardware will be on-line and functioning in parallel with the primary system, there will be no down time at the dispatchers' consoles due to power, computer, or individual communication mode failures. At the time of the FRA inspection, the back-up hardware was working but the automatic switch-over was not functioning. Switchover had to be performed manually.

- The installation and checkout of the CAD is being implemented by activating a small number of dispatching stations at one time. When a new area is to be activated, an inexperienced CAD dispatcher is trained with the assistance of an experienced person in an on-the-job training mode. During this training period, the area to be added to the system is given a fundamental exercise by computer simulation. Realistic scenarios are demonstrated to the CAD system and the new trainee.

- A matrix of the CSX DTC and on-track equipment (OTE) rules was developed which defines the existing rules in a language that is compatible with computer implementation. A control center supervisor assigns new trainees to check the new CAD area by inputing commands which would violate the DTC rules and result in conflicting train and OTE movements. If variances or problems are identified, a Field Observation Report Form is submitted. CSX then assigns the problem responsibility to the vendor or carrier personnel.

- When no further problems occur in the developing area of the CAD (generally a subdivision), that portion of the CAD is connected to operate in parallel with the existing dispatching center. Problem areas are again identified and reported on the Field Observation Report Form.

- When no further problem areas are identified the existing dispatcher center is closed down and all dispatching is transferred to the Jacksonville Control Center.

- Any problems that occur in the fully operational CAD are reported and reconciled by the same Field Observation Report Form.

Software Reliability and Safety Assurance

At the time of the FRA audit, CSX had not yet performed a formal safety analysis or followed a rigorous procedure for software quality assurance. Large projects of the U.S. Department of Defense, NASA, and the Federal Aviation Administration require that software be developed according to standards for quality assurance. The purpose of a systematic methodology is to organize the developmental tasks so that they can be controlled by the various specialists and managers who understand the technical details and rules that should control the logic flow.

CSX was using an informal approach to software specification and design. At this point in the development of the system, CSX worked with the vendor in configuration management to assure that changes, modifications and error corrections were compatible with all possible combinations of software logic. If an error in software design was found there did not seem to be a control that required the error to be corrected in all parts of the system or documented that the correction had been made.

Software problems can be of two basic types--design errors and hardware defects. Design problems can show up when a previously unused path through the logic is exercised or when a seldom used or unexpected set of inputs is encountered. Hardware defects should be detected by periodic verification checks. Software faults can be minimized by design redundancy and/or by a systematic test program that searches for any unacceptable design fault. Design redundancy requires that independent software designs be prepared by separate design teams and that the two programs be run concurrently. Outputs from the two programs must agree before the answer is executed. This type of redundancy was not used in the CAD system.

Even though the software for each track segment is developed separately, the test program for these individual segments should be complete. The assurance program should not permit skipping over tests because of the similarity to previously installed software routines. CSX should consider a formal safety and quality assurance program in lieu of the current informal test program.

A formal program is particularly important when vital logic is involved. An initial step in the formulation of a formal program would be to identify the vital elements of the software program.

For the most part, FRA found that the operation of the CAD facility in DTC territory increases protection and safety. A major improvement is that the DTC rules have been reduced to a matrix of logic that is programmed into the computer. As dispatchers manipulate the various requests for block occupancy,

the computer logic verifies whether the block can be authorized and if so under what restrictions.

During analysis, however, FRA found several potential conflicts not provided for in the rules matrix. Because the rules matrix does not search for all conflicts, the safety of the operation is still dependent on observation of the rules. FRA discovered that the DTC Conflict Check Matrix (which matches the software) did not correspond with the DTC Permit Conflict Checks Table which was presumably used by the railroad and vendor in determining if the software development was complete. Following are conflicts which are not checked, and differences noted by FRA.

- The system does not identify failure of the dispatcher to provide On Track Equipment (OTE) operators with information regarding block occupancy by trains. CSX Operating Rule 704 requires this information to be included on the OTE authority. Because of this software fault, dispatchers can issue authorities for OTE movements without identifying preceding trains in the limits of the authority. A conflict check is not executed.

- The system will permit OTE movements in both directions but will not provide conflict checks if subsequent OTE movements are authorized within the same blocks.

- The DTC Permit Conflict Checks Table provides for proceed block conditions (used in ABS territory) in one direction with or without rear flag protection. The Conflict Checks Matrix permits following movements only if rear flag protection is provided.

  For movements in one direction without rear flag protection, the conflict checks table has a question mark and the matrix defaults to the "no" condition in all circumstances, including prohibiting following train and OTE movements. This conflicts with the provisions of Rule 99.

  FRA Inspectors noted that when dispatchers authorized proceed blocks in one direction without the requirement for rear flag protection (in compliance with Rule 99), and later attempted to issue following OTE movement authorities, the computer would not permit such movements. These movements conform to CSX operating rules. Dispatchers stated they could not understand why the computer would not allow such movements. Furthermore, the dispatcher's workload was adversely influenced by this software fault.
  FRA found that special instructions of the Atlanta Division Timetable, Augusta Terminal, supported this

inconsistency. This portion of the railroad is not dispatched from the Jacksonville Control Center. These special instructions have the effect of standing the railroad's DTC rules on their head. They permit the issuance of absolute, clear and occupied blocks within signaled territory; and also prohibit the issuance of proceed blocks within signaled territory.

The CSX rule book states "Absolute Block, Clear Block and Occupied Block authority will be granted only in non-signaled territory and may be used for movements against the current of traffic." The rule book further defines a "Proceed Block" as the only block granted in signaled territory and states that trains will be governed by signal indication.

- The system permits authorizing of a proceed block in both directions, and the computer conflict matrix will protect such movements. The Permit Conflict Check Table indicates subsequent OTE movement authorities may be issued.

- Yard limits are identified on the CRT using the same color and track schemes as territory where yard limits are not in effect. The system does not provide conflict checking for yard limit movements. When issuing DTC and OTE directives, the dispatchers must remember not to include such limits in these authorities.

In the DTC mode, the vital steps in controlling train and OTE movements are: data storage and retrieval, decision making, transmission and reception of authority, and execution of that authority. In each of the steps there is an interaction between the computer and the dispatcher, and in each step there is some probability of error. Decisions on the movement and protection of trains, on-track vehicles, and work gangs are made by a combination of dispatcher and computer logic. The transmission and execution of authorities is primarily a human function.

The displays available to the dispatcher provide visual aids to keep track of the locations and movements of the existing track authorities. FRA noted a number of CRT displays used in DTC territory that were not distinct because they are positioned too far away from the dispatcher. CSX was aware of this problem and indicated the intent to redesign the layout to accommodate the dispatcher requirements.

Printer

CSX demonstrated a new printer that will be incorporated into the system. This type of printer will be used primarily for the transmission of the train bulletins and release forms (which are used in lieu of train orders and clearance forms). The printer uses a short form technique to verify that the received message is the same as the transmitted message. The new printers verify the number of lines in each message and the sum of the bit values for each character. If there is a discrepancy in the number of lines or in the check sum the printer will not accept the message and the transmitting station will recognize that there was an error in the transmission. The verification process is in effect a handshake between the sender and the receiver machines.

Since the information is verified before it is printed there is a small probability that the message could be corrupted in that time interval. As an additional check the person who receives the printed message must verify the number of lines.

This automation of the message verification should reduce the workload of the dispatcher significantly. At the time of the Jacksonville audit, control center management had requested corporate authority and funds to install 50 of these printers. This should have a positive effect on safety by reducing the probability of transmission errors. It was noted by FRA, however, that the software system neither assures the train bulletins are actually transmitted nor assures they are transmitted to the correct station.

Therefore, to be totally effective CSX must assure that train crews and other involved employees are properly instructed on the human requirements. These requirements should be included in the CSX Program of Instruction on Operating Rules and Timetable Instructions, and the CSX Operational Testing and Inspection Program.

OPERATING PRACTICES

FRA reviewed three methods of communicating information CSX uses which are exclusive to the Jacksonville Control Center. These informational communication methods are as follows:

- Train bulletins and release forms;
- Notices to Jacksonville based train dispatchers, and;
- Radio communications of DTC and OTE mandatory directives to train crews and on-track equipment operators, using the computer assisted dispatching system.

Following are results of the FRA analysis of these communication procedures:

Train Bulletins

The division instructions and general superintendent's circular which implement the train bulletin and release form method of information distribution are unclear. The divisions' bulletin instructions state that train crews must receive these documents, and the crews must contact the train dispatcher in the event they do not receive them. Action to be taken by the train dispatcher in this event is not specified.

The general superintendent's circular states "where required, the conductor and engineer must each obtain a legible copy of a train bulletin with a release form and must ascertain (with each other, if feasible) that the information thereon corresponds." FRA considers these documents of critical importance and cannot envision circumstances in which it not be required that each obtain a copy and compare the information.

Further, the instructions state that only one release form and train bulletin will be issued to a designated train at any one station. This does not appear to provide for interdivisional operations where more than one dispatching district is involved.

The train bulletins issued by the Jacksonville Control Center do not arrange messages in the sequential progression in which they must be fulfilled by the crews. These bulletins are often lengthy and the failure to sort the information in orderly sequence creates an unnecessary burden on crew members.

Notices to Jacksonville Dispatchers

The notices issued to Jacksonville based dispatchers contain safety sensitive information including operating rules interpretations. These notices are not defined in the CSX rule book. They are issued and retained in an unsystematic manner. This system of issuing notices to Jacksonville dispatchers should be reviewed.

At present, two sets of files are maintained at each dispatcher's console. One set is identified as the operations file, while the other is entitled a general file. FRA inspectors found operational items incorporated into the general file, and general items incorporated into the operations file. These notices are not identified by a numbering system to make it possible to verify that the file is complete. Many are not signed or otherwise equated with administrative authority. Some are not even dated. They are often non-specific and some are ambiguous. CSX should establish a control and review system for these

documents to assure they are orderly, credible, and easy to understand.

Transmission of Mandatory Directives by Radio

CSX has devised an elaborate set of operating rules to provide for Direct Train Control (DTC) movements. In addition, CSX has invested heavily to provide the Jacksonville dispatchers with computerized visual displays and automatic conflict checking. Even with these useful tools the primary requirement to assure safe train operations under this operational method depends entirely on a complete understanding between train crews and dispatchers.

Radios are normally used for these essential communications. Radio communications problems are posed not only by climatic conditions and interference from third party transmitters, but train dispatchers at the Jacksonville center could be confronted with the additional problem of understanding regional dialects from distant employees.

FRA is concerned that CSX has not devised a standard form, and that CSX does not require that standard verbiage be used for these vital communications. Since both the dispatchers and train crews would need identical forms, CSX should consider amending the present CRT format to provide the exact verbiage, and distribute pre-printed documents based upon that format to the field.

FRA has identical concerns regarding on-track equipment (OTE) movements. While CSX rule 704 requires authority for such movements to be written, there is no provision for communication of standard verbiage between train dispatchers and on-track equipment operators.

A form pertaining to the OTE movements is included in the center's Dispatcher Information System as a Train Message Entry. However, because it is difficult to correlate this form to the screen displayed form which drives the DTC conflict checking capability, it is not being used by the dispatchers. CSX should consider amending the software programming to encourage use of this form, and to assure the information is integrated into the conflict checking scheme.

WORKLOAD

FRA Inspectors noted that the workload of several Jacksonville Control Center dispatchers districts were so demanding that these dispatchers were working at or near their functional capacity. Some train dispatchers functioned at a rate which did not allow adequate time for analysis before making critical decisions.

Sound operating practices require carriers to ensure that train dispatchers working at or near their functional capacity are not burdened with non safety-critical duties. At the Jacksonville Control Center FRA identified certain non safety-critical duties being performed by dispatchers, as follows:

- The workload of train dispatchers is increased because they are required to enter train crew and train consist data into the computer. This data is available to other employees and should be entered by them.

- Unique station location numbers are used on the display screens. These numbers do not correspond to station names and mileposts, which requires the dispatcher to refer to divisional timetables for the proper correlation when placing speed or other restrictions.

- The automatic feature of the CAD is not always reliable. FRA noted dispatchers requesting automatic routing which was granted according to indications on the display screens. Later, without apparent reason, the CAD deleted the request and defaulted to manual routing. This condition may be the result of various incompatible command inputs by the dispatcher, and could therefore be a weakness in the training program.

- Train identification numbers frequently vanish from the display screens. When this condition occurs the dispatcher must manually re-enter the identification.

COMMUNICATIONS

While the Jacksonville Control Center utilizes an advanced computer assisted system, this system simply changes the method in which dispatchers monitor and execute radio, telephone, and dispatcher line communications. Relocating all dispatching functions to the Jacksonville Control Center will do nothing to alleviate the existing radio problems, although some division level operating officers did not appear to realize this. The existing communication systems of radios, phone and printer circuits, as well as the traffic control code lines are merely being extended to Jacksonville by four different modes: fiber optic cable; microwave; railroad owned lines; and dedicated leased lines. The individual dispatcher communication consoles, if used properly, can reduce workload and stress factors for dispatchers.

FRA staff noted communications problems encountered by dispatchers at the control center. On several occasions dispatchers were observed having difficulty communicating with employees via the radio system. These difficulties were the result of interference due to overlapping radio coverage and

insufficient volume. In order to eliminate interference it is important that the carrier expedite the proposed upgrading of its radio system. Segregated frequencies for operations which do not involve the train dispatcher and increased frequency capabilities for locomotive radios should be provided.

On two occasions FRA staff noted that communications failures resulted in a two-second blank on the dispatcher communication screen. It was necessary for the dispatcher to call up each channel separately and reset it to the monitor mode. This process occupied about two minutes of the dispatcher's time and occurred during periods when he was very busy.

FEDERAL RECORDKEEPING

Hours of Duty Records

The hours of duty records kept by the carrier for train dispatchers are not signed by the dispatchers, as required by 49 CFR 228.9.

Dispatchers Records of Movements of Trains

Random inspection carrier records for May, June, July and August 1988 reflect a considerable number of incomplete dispatchers records of train movements. Since uncompleted train sheets are not listed on the microfiche the records failed to show the movements of many trains. Examples of missing data include names of crew members, on and off duty times of crew members, distances between stations and times trains arrived, departed or passed reporting stations. Instances were noted where the train dispatchers entered fictitious names of crew members into the computer in order to complete a train sheet.

Blue Signal Protection

The Jacksonville Control Center does not, at present, have a procedure or a form (screen) for recording Federally required information for blue signal protection of workmen at remotely controlled switches as required by 49 CFR 218.30 (C) (1 through 4).

III. STAFFING

When the FRA Dispatching Assessment began, the CSX organization was basically the standard railroad structure in which the train dispatchers reported to a superintendent of operations through a chief dispatcher. Because of necessities brought about by the consolidation of dispatching into a system control function, that configuration was in the process of change when the assessment ended. The organizational relationship between the Jacksonville

Control Center and the various operating divisions was not clear when this report was completed.

Workload Management

CSX used assistant chief dispatchers to perform certain administrative functions at most of the dispatching offices assessed. This practice relieved regular train dispatchers of those duties so delegated. Because of the Jacksonville Control Center consolidation, which was concurrent with consolidation of operating divisions, this policy was in a transitional state. The consolidation of divisions reduced the number from 15 to 9.

At some field offices[4], chief and assistant chief dispatchers had been transferred to current divisional headquarters from their former headquarters. At other field offices, these positions had been transferred to the Jacksonville Control Center. As a result, some dispatchers were required to handle the administrative functions previously performed by assistant chief dispatchers. While this was not a systematic problem during the assessment, there were locations where dispatchers had workloads increased because of these additional duties.

The original staffing plan for the control center specified 164 employee positions. During the early implementation, management decided to create eight additional assistant chief train dispatcher positions and to increase the extra dispatcher list by two positions. This resulted in a large number of contractually mandated assignment changes (bids and bumps). It resulted in a total of 52 permanent changes not including interim bumps. Although the process was apparently somewhat disruptive to the transition, no safety concerns were raised. The net result was that additional dispatchers were able to bid on positions with jurisdiction over territory already familiar to them.

The labor organization representing the train dispatchers has taken the position that any job related duties previously assigned to their membership (which includes train dispatchers and assistant chief dispatchers) are subject to contractual negotiations, and can not be transferred to any other crafts of employees without mutual agreement. As the combining of positions into the Jacksonville Control Center continues, this could become a major problem. Individual dispatching districts are being increased markedly under the assumption that current technological advances will reduce workloads enough to allow these expansions. It is likely that these expansions depend in

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[4] For purposes of this report, a field office is defined as a dispatching office which has not been merged into the CSX Jacksonville Control Center.

large part on reduction of administrative duties in order that more time can be devoted to safety sensitive functions.

At the time of the assessment, CSX had five chief dispatchers headquartered in the Jacksonville Control Center. All of these officers were assigned specific managerial responsibilities at designated consoles within the center during the daylight shift. Second and third shifts, these consoles were manned by assistant chief dispatchers. While these chief and assistant chief dispatchers relieved the 10 regular dispatchers per shift of many administrative duties, there were other non-safety related duties which dispatchers were required to handle. The chief and assistant chief dispatchers themselves were busy and it is unlikely they will be able to handle all of the administrative duties now assigned to regular shift dispatchers.

Supplemental Employees

During the assessments of the individual CSX field offices, most such offices had extra employees available to provide relief during vacations and other temporary vacancies. This circumstance changed as a result of the Jacksonville consolidation. CSX found it necessary to temporarily assign dispatchers from positions awarded to them at Jacksonville to various field offices. It also became necessary to recall furloughed employees and re-assign them dispatching positions at field offices considerable distances from their previous stations.

In 1987, which was the period used by FRA for data purposes, it was found that CSX dispatchers were required to work on their assigned rest days on a total of 1161 occasions system wide. While the number varied from office to office, dispatchers at Florence, SC, Tampa, FL and Savannah, GA were required to work 223, 128 and 121 rest days, respectively, during this period. These three offices accounted for about 41 percent of the CSX total.

Consolidation of dispatching forces has created additional staffing problems for CSX. In the 10 week period between May 1, 1988 and September 15, 1988, train dispatchers at Jacksonville have worked on their assigned relief days on 196 occasions. This total did not include those occasions when assistant chief dispatchers have worked on assigned relief days.

The Jacksonville Center is among the first new generation dispatching offices in the country. Offices of this type rely on computer assistance to aid train dispatchers in the performance of their duties. The environment in which train dispatchers work is changing dramatically. New installations closely parallel air traffic control facilities in their use of computer screens and advanced communication systems. They also result in larger

dispatching districts. FRA believes that designers and administrators of new generation installations should consider the staffing and workload management policies at air traffic control facilities when establishing analogous policies.

Among the considerations should be a provision for periodic employee relief during a tour of duty. Sufficient personnel should be in place to allow train dispatchers to leave the work station to take meal and other periodic breaks or use the rest room. CSX is not in a position to address this consideration due to a system wide shortage of train dispatchers.

Implementation of the Jacksonville Control Center is being accomplished in phases. With the amount of territory assigned to the center at time of the FRA assessment, the staffing plan called for 10 first trick positions, 9 second trick positions, and 9 third trick positions. The workload at this point in the implementation had apparently exceeded projections to the extent that 10 positions were required for each trick. This had resulted in an ongoing depletion of the extra lists by about 3.2 positions. CSX did not identify to FRA any strategy to address this significant and long term staffing shortage.

Hours of Service Law

In 1987 the CSX reported to FRA 19 cases in which train dispatchers performed service in excess of that permitted by Federal statute. Of the 19 cases, seven occurred at Saginaw, MI and five occurred at Waycross, GA. No other CSX offices reported more than two cases of excess service during 1987.

It was further noted by FRA that extra list dispatchers at Louisville, KY were required to cover vacancies at Evansville, IN, a round trip distance of over 400 miles. Extra list dispatchers at Dayton, OH were required to cover vacancies at Deshler, OH, a round trip distance of over 200 miles.

The Federal Hours of Service Law for train dispatchers and train order operators did not envision railroads requiring or permitting this category of employees to travel such considerable distances before performing duties. The law therefore does not specifically require that time spent in travel to the first duty station by this class of employee be considered time on duty, and time spent returning from the outlying duty station to the extra board headquarters to be considered as deadhead (neither on nor off duty) time.

By requiring or permitting extra list dispatchers to travel such long distances, CSX has effectively assigned them to be on duty for periods of up to 14 hours in any 24 hour period, instead of limiting their service to no more than nine hours in any 24

period as specified in this Federal statute. These offices are now closed and the problem no longer exists.

FRA considers such actions to be contrary to the spirit and intentions of the law, and intends to determine if such practices exist elsewhere in the industry. If there is evidence a problem exists, FRA will seek remedy from Congress.

Candidate Selection

Prior to consolidating dispatching operations, the CSX policy was to offer promotion to train dispatcher positions to employees with experience as train order and interlocking operators. The current policy is to extend this offer to all employees, regardless of prior craft.

Of the 32 CSX offices, 14 required dispatcher candidates to take a written rules examination prior to training on a position. Six offices required dispatchers to take physical exams prior to training. After completion of the training period, all but three of the offices require these new dispatchers to complete a written and oral operating rules examination. These three offices (Raleigh and Rocky Mount, NC, and Florence, SC) only required dispatchers to take a verbal rules examination.

IV. TRAINING

During the assessment, FRA reviewed initial and periodic dispatcher training in the areas of operating rules and timetable special instructions, new technology applications, and physical characteristics qualifications. Following is a synopsis of that review.

Initial Training

The FRA assessment disclosed that training of dispatchers on the CSX system was inconsistent before the Jacksonville Control Center opened. Training was a division level responsibility and was in most cases delegated to each division's chief dispatcher. In 5 of the 33 CSX dispatching offices, the chief dispatchers stated the training was a combination of classroom and on-the-job. In all other locations, training was exclusively on-the-job type. Although the former Chessie System had developed a relatively comprehensive training program manual, this manual was not widely used.

FRA's examination of the Jacksonville program indicated that training procedures are substantially improved over previous practices employed by CSX. Training on the functions and operations of the computer assisted dispatching system is performed by the Assistant Manager- Dispatching System. He has

been assisted on a part time basis by a chief dispatcher from a division which has not yet been transferred to Jacksonville.

The training duties of the Assistant Manager- Dispatching System are performed collaterally with other responsibilities regarding the dispatching system. These other duties include updating, refining, and loading data into the system. Training on the physical characteristics and field operations is under the jurisdiction of the Director-Manpower Control. Except for on-the-job training and field training, all training is conducted in a room adjacent to the control center.

There were no new train dispatchers hired as a result of the system consolidation. Some experienced train dispatchers did not elect to accept transfer to the control center. Others did not possess sufficient seniority to obtain a position. As a result, all employees trained at the control center are experienced and fully qualified train dispatchers.

Train dispatchers on CSX are members of the American Train Dispatcher's Association. The collective bargaining agreement between the carrier and the union provides for 60 days of 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 train dispatchers have received up to 90 days of training.

Prior to the consolidation, some offices were equipped with centralized traffic control and/or earlier versions of the computer assisted dispatching system. Some offices had neither. The Assistant Manager- Dispatching System stated that the type and length of training provided to a dispatcher were generally uniform, regardless of the systems in place at his former office location. The computer portion of the training program is fifteen 8-hour days in length.

Day 1 of the training program is a classroom type discussion. The subject is a description of the traffic control system functions of the computer. The course textbook used contains a 39 page chapter on this subject. There are 95 separate items for discussion in the chapter.

Day 2 of the training program is a classroom type discussion. The subject is the computer aided control system. The course textbook contains a 21 page chapter on the subject. There are 23 items and examples for discussion in this chapter.

On days 3 and 4, the lecture and discussion is on the computer information system interface. The textbook chapter on this subject is 128 pages in length and covers such subjects as the train sheet, Direct Traffic Control System (DTC) functions, train

messages and train bulletins. As described earlier in this report, train messages and train bulletins are communications used in train operations which are similar in form and function to traditional train orders.

With two exceptions, days 5 through 10 are devoted to hands-on practice work with a computer simulator and on-the-job training with experienced dispatchers on the actual system in service. The two exceptions are a two hour training session on the carrier's computer assisted centralized advanced communication system which is presented during day five and a rules instruction class and examination which is conducted during day nine.

After the 10th day dispatchers are presented with 3 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 5 days before a cut-in of additional territory takes place the dispatchers return to the center for a refresher course. This refresher course constitutes days 11 through 15 of the training. It consists of additional time on the computer simulator and on-the-job training.

The rules examination administered on day 9 is a 50 question written test which requires a minimum passing grade of 80 percent. FRA reviewed the written test and noted the following:

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

There is no written test or practical examination given to formally evaluate the train dispatcher's knowledge of the computer assisted dispatching system before he is released from the computer portion of the training program. After FRA indicated the carrier should reconsider this aspect of the training program, CSX began preparing a 100 question test. For the record, FRA did not imply that a formal question and answer test was necessary or recommended. The objective should be to assure the training is arranged properly and sufficiently practiced so that the trainee develops the techniques necessary

to identify and act on priority levels of conflicting tasks inherent in the job requirements.

In addition to the rules training and computer training described above, dispatchers are also provided with field training. This training is targeted to 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 Director-Manpower Control, the carrier's policy on field training is that train dispatchers will ride over the main lines on the territory to be dispatched before they are allowed to dispatch trains. Some heavily trafficked branch lines are also ridden. Train dispatchers may ride either trains or hi-rail cars. Records are kept indicating the times and dates of such qualification trips. FRA interviewed about 30 of the dispatchers working at the control center. Two dispatchers stated that they had never ridden over the territory they dispatch; four stated that they had not ridden over portions of the territory they dispatch.

There is no written or oral examination to determine whether the dispatcher has attained a sufficient level of competence on the field portion of the 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 dispatcher, and other carrier management employees mutually agree that a dispatcher possesses a sufficient knowledge of the field operations, he is permitted to work alone. According to the carrier, the success of this method is indicated by the fact that 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 the performance of their duties. Results of the interviews indicate that the train dispatchers were generally comfortable with the level of training provided on the computer system. Some train dispatchers indicated that they could benefit from additional field training. However, FRA's evaluation of the performance of the dispatchers did not indicate any patterns of exceptions which could be attributed to inadequate training.

In order to ease the stress of the transition for train dispatchers, the Director- Manpower Control stated that the carrier has extended itself well beyond the 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 were accommodated to prevent relocation during the school year.

During evaluation of the Jacksonville Control Center Training Program, FRA identified the following items of concern:

- Although the "students" who arrive at the center are all skilled train dispatchers, those portions of the operating rules which applied on the employees former districts often vary substantially from the rules in effect on their newly awarded positions. Since instruction on the operating rules is a one day event, it is important to measure the strengths and weaknesses of each "student" so as to teach to the needs of the individuals within the class. CSX does not have a pre-admission evaluation test with which to measure these needs.

  An example which illustrates such a need is the use of the various Rule 707 authorities. For example, authority 707(c) is not being used at the Jacksonville center, even though this authority provides a higher level of protection to work forces than other types of authorities.

- According to responsible officers, the operating rules class and test is administered to all new control center train dispatchers. Interviews with train dispatchers on the control center floor indicated that this practice has not always been followed.

- The operating rules test program permits train dispatchers to incorrectly answer up to 20 percent of all questions and still successfully complete the course. CSX does not prioritize those rules which are critical to safety (and which, if misapplied, could result in serious accident) into a "must pass" category.

- Train dispatcher "students" are not required to perform a practical demonstration of their acquired skills using the computer console prior to being released for service. CSX is commended for incorporating a train movement simulator into the training program, but the potential advantages of this system have barely been explored.

  With embellishment, the system could be programmed to simulate many actual field conditions. The instructor

would then have the opportunity to observe a student's reactions and responses to actual field conditions and objectively evaluate the employee's readiness to assume responsibility. Such a device would have substantial ongoing value as a tool to enhance the dispatchers' emergency response preparedness, and would improve the dispatchers' reaction time and skills for managing practical situations such as accidents and equipment failures.

- o CSX has established a policy that requires all train dispatchers to ride each main line and those branch lines where high traffic density exists. Interviews with dispatchers at the center disclosed that not all dispatchers were given this exposure.

- o Although CSX requires each train dispatcher to ride the major rail lines within his district, the carriers goals and objectives are unclear. CSX should evaluate the purpose for which this activity is conducted and inform participating train dispatchers. The carrier would then have a standard from which to measure and evaluate the "student's" achievements.

Periodic Training

CSX requires train dispatchers to attend operating rules classes and, presumably, to pass written examinations in order to retain their qualifications. There was a wide variance from office to office regarding this requirement. Some offices indicated dispatchers are required to attend rules classes every year, while others required dispatchers to attend every other year. The number of test questions varied between 25 and 300, and passing scores varied between 75 and 90 percent. At Atlanta and Waycross GA, dispatchers were not required to take written rules examinations.

The carrier was also inconsistent regarding qualification of dispatchers on the physical characteristics of the territory within the dispatching district. Nine offices surveyed stated they required dispatchers to qualify each year, four stated they required this every two years, and 10 offices stated there was no plan or schedule for such qualification trips.

IV. RULES AND PROCEDURES

OPERATING RULES

In order to effectively evaluate the relationship of the Jacksonville Control Center and other dispatching offices to field operations, FRA reviewed the procedures and practices

adopted at the center, and then examined the systems in place to control train and OTE movements at the division level.

This included a review of the methods used to provide employees with the information necessary to conduct safe movements of trains and on-track equipment. FRA found the CSX uses the following documents and publications to provide this information:

1. Operating Rule Book.
2. Division Timetables.
3. Division (District) Bulletins.
4. General Superintendent Circulars.
5. Train Bulletins and Release Forms.
6. Train Orders and Clearance Forms.
7. Direct Train Control (DTC) Movement Authorities.
8. On-Track Equipment (OTE) Movement Authorities.
9. Notices issued by Jacksonville Control Center Management to Jacksonville based train dispatchers.

FRA reviewed the progressive flow of these informational texts, and concluded the burden they place on employees involved in operations is tremendous. Employees are required to have in their possession and be familiar with a rule book of about 250 pages, one or more divisional timetables each about 200 pages in length, divisional/district re-issue bulletins which are issued quarterly and are often 30 or more pages in length, each periodic bulletin issued after the re-issue bulletins become effective, and train bulletins with release forms which contain as many as 50 items. In addition, they must receive and review train orders, messages and clearance forms where applicable.

The burden on employees could be greatly reduced by more effective planning. CSX has adopted a loose leaf type operating rule book which readily permits the insertion of revised rules. Yet FRA found that permanent changes in the operating rules are often carried on divisional bulletins for long periods of time.

Timetables are currently printed in a soft bound format. A change to loose leaf timetables would permit many informational items to be inserted directly into this publication. This would permit a reduction of the amount of information now included in superintendent's bulletins.

Superintendent's Bulletins

The divisional bulletins are not well organized. The Corbin Division, Kentucky District bulletins issued to become effective at 12:01 a.m., July 1, 1988 will be used to illustrate FRA's concern:

- Bulletin No. 101 was a re-issue bulletin, which is required to be issued quarterly in accordance with CSX

policy. This bulletin consisted of 22 pages and was divided into a general section which pertains to all sub-divisions, followed by specific information applicable only to each of the eight sub-divisions.

However, because this bulletin did not include all the required information, Bulletin No. 101-A was issued to become effective at the same time. This bulletin consisted of an additional eight pages.

The Kentucky District consists of eight subdivisions. Three of the eight sub-divisions are the Cincinnati, Corbin, and Louisville Terminals. With the exception of these terminal sub-divisions, the entire Kentucky District is dispatched from the Jacksonville Control Center. Logically, most trains operating within this district originate or terminate within these major terminals.

The train bulletin and release form method of information dissemination is therefore in effect throughout this district, other than within the terminal limits. Of the 30 total pages of these two bulletins, 10 were devoted to instructions implementing the train bulletins and release forms. This occurred because the division issued these instructions separately for each of the five line of road subdivisions instead of issuing the instructions once in the general section of the bulletin.

Although the division issued the instructions separately for each sub-division within the Kentucky District, two subsequent bulletins pertaining to these train bulletins and release forms were issued to <u>all</u> sub-divisions and simply addressed "to: all concerned." One of these subsequent bulletins had sample copies of these documents with explanations, and the other amended the train bulletin by adding a new item.

By increasing the frequency of issue for superintendents summary bulletins from a quarterly to a monthly summary, the number of bulletins in effect at any given time would be substantially reduced. This would also provide CSX with an opportunity to consolidate and sequentially categorize the required information.

FRA also found that CSX uses an inordinate number of operating methods. The primary methods are TCS, ABS, Interlocking, and Direct Train Control, but the following methods of operation are also used by CSX. Quotation marks are used to designate direct paraphrases from the CSX Operating Rules:

- **Rule S-97:** "Trains must be authorized to run by Form S-G (Running Orders) or S-H (Work Engine) train order in train order territory.

- **Rule S-145:** "In territory specified by special instruction, Clearance Form A will be used to authorize a train to occupy a section of main track and to move in either direction, without flag protection, within the specified track limits. Only one train at a time will be authorized to occupy the section of main track."

- **Rule S-146:** "In territory specified by special instructions, an Absolute Block Register will be used to authorize a train or on-track equipment to occupy the main track and to move in either direction without flag protection."

- **Rule D-151:** "On those portions of the railroad and on the tracks designated in special instructions, trains are authorized to operate with the current of traffic. When two main tracks are in service, trains must keep to the right."

In addition, CSX operates trains on tracks that were previously main tracks using two other methods of operation, as follows:

- **Rule 105:** "Trains may use tracks, other than main tracks, signaled tracks or controlled sidings, without permission." CSX Rule 48 permits speeds of up to 25 miles per hour for these movements. Upon examination of CSX timetables, FRA found special instructions which amended this rule by requiring train crews to obtain permission from dispatchers or yardmasters prior to occupying such tracks.

- **Industrial Spur:** When specified by timetable special instructions, trains crews are authorized to operate with exclusive track occupancy. Occupancy is determined by the position of the derail at the entrance to such tracks. FRA examination of CSX timetables disclosed that speeds up to 40 miles per hour are authorized on these spurs.

FRA believes it is unnecessary to utilize all these operating methods. Further, such use--particularly when combined with the communication of information techniques described earlier--can lead to confusion by employees engaged in train operations.

Based on discussions with Jacksonville Control Center Management, it is FRA's understanding some of these methods of operation will be changed to DTC as the various line segments involved come

under the control of the Jacksonville Center. Apparently, CSX recognizes the considerable time, expense, and training problems which would be encountered if it were necessary to familiarize dispatchers with these methods of operation. Further, development of a rules logic matrix required to make these operating methods compatible with computer system implementation would be extremely difficult. The same wisdom should be applied to the present operating environment.

Yard Limits

In addition to the varied operating methods mentioned here, FRA found that the CSX yard limit rule (93) is ambiguous. The rule requires trains to comply with the FRA mandated rule (49 CFR 218.35) except within signaled territory. Movements on signalled tracks are made in accordance with the signal system rules that are in effect. This note apparently applies to interlockings and main tracks governed by a traffic control signal system. From a practical perspective, CSX has two yard limit rules in effect. These two rules are effective concurrently at some locations.

It is FRA's judgement that the yard limit rule has no practical application where interlocking rules and traffic control signal system rules are in effect. The rule is therefore likely to confuse employees. To compound the problem, many divisional timetables contain special instructions which modify this rule in various manners.

The consolidation of train dispatchers' positions at Jacksonville is likely to further confuse employees. This is particularly true when accompanied by the elimination of yardmasters and merging of their duties into train dispatching positions. In some cases, the consolidations have resulted in areas where two dispatchers share common authority for train and OTE movements within yard limits.

OPERATING PROCEDURES

Following is an office by office synopsis of operating procedures exceptions taken by FRA during the assessment. The Jacksonville Control Center is not included, as those exceptions were included in the section of this report pertaining to that operation:

AL Birmingham

- Dispatchers and other employees frequently failed to properly identify their station when transmitting by radio. They further failed to use the words "over" and "out" as required. Maintenance of way employees were the most frequent violators of radio rules.

FL Jacksonville (Tampa Division)

- A dispatcher being monitored transmitted a speed restriction (train order) by radio and the transmission was not in compliance with Federal and carrier rules.

- An assistant maintenance foreman was heard requesting track and time authority on a portion of the main track governed by traffic control rules. The foreman did not copy or repeat back to the dispatcher the authority granted. Later, this foreman failed to inform the dispatcher when he had completed his work and was clear of the main track. Because of this, the dispatcher could not permit any trains to enter the limits until this employee, several hours later, was located by his immediate supervisor and instructed to contact the train dispatcher and release his authority. It was evident this employee had not been properly instructed in carrier rules and procedures for obtaining and releasing track authority. This episode created unnecessary tension for the dispatcher.

Tampa

- Trains operating within Yard Limits in the Phosphate District are required or requested to maintain maximum authorized speed or full throttle with extremely heavy trains in order to manage steep ascending grades. Train crews are in effect being motivated to violate the yard limit rule (CSX Rule 93 and FRA Rule 49 CFR 218.35) since it is unlikely they could stop within one-half the range of vision as required.

  Dispatchers indicated this situation is exacerbated because preceding trains are sometimes instructed to leave main track switches in reverse position at locations where this is not permitted by railroad special instructions. The dispatchers stated they are instructed by carrier officers not to protect these following movements in such situations as required by CSX Rules 104 (f) and 593. At the same time, these dispatchers said they feared reprisals if they fail to protect such movements and an accident occurs.

GA Atlanta

- Train dispatchers assigned to the A and B Desks do not record track time and authority on written or CRT screen forms as required. These movements are protected by blocking signals (also required by carrier rules), which causes the signals to display a blue color on the screen. The times the signals are blocked

are logged by the computer, but the computer does not identify the names of the employees granted track authority by the dispatchers.

In the event of a power failure, the screen goes dark. There is no back-up power supply. When power is restored, the screen does not display the signals previously blocked by the dispatcher. These blocks are, in effect, automatically cancelled by the computer. Signals previously displayed for train movements, however, can be recalled and will display the aspects that were displayed prior to the power failure. According to the dispatchers, situations such as described above have occurred on at least two occasions. During such occurrences, the dispatchers do not advance trains further until all employees granted track time have surrendered their authority. These track releases are then checked against the computer printout.

Dispatchers stated that on one such occasion--after a power loss and subsequent restoration--a train received a false indication which could have resulted in a collision. This false indication was discovered by the dispatcher and train crews involved. CSX officers are aware of this problem but do not think there is much cause for concern.

- Prior to going on duty, relieving train dispatchers inspect the train order book and record all outstanding orders at each station using a special form which has been in existence for many years. When trains are subsequently cleared at these train order stations, the dispatcher will underline the orders on this form and clear the train without referring to the train order book.

Savannah

- FRA noted an insufficient supply of effective blocking devices. This created a condition in which dispatchers found it necessary to resort to the use of sheets of paper to secure signals and switches when providing protection for on-track equipment and trains.

IL Chicago

- It was noted during the assessment that CSX had failed to designate that yard limits (Rule 93) were in effect by timetable or other instruction. Yard limits are in effect on the Barr, Blue Island, Alternate, and Chicago Heights Subdivisions.

IN Evansville

- Dispatchers were observed issuing DTC authorities to moving trains and the person copying the authority was operating the controls of a moving locomotive. Although local CSX officials state this is permitted under their rules, it is a violation of FRA's 49 CFR Part 220, Radio Standards and Procedures.

- Inspection of train order books disclosed that one such book contained illegible train orders, and train orders containing erasures and alterations. One instance was found in which the dispatcher failed to record the time a train order was repeated by the receiving employee. Numerous instances were noted in which dispatchers failed to underscore each word and numeral of orders as they were repeated. Further, dispatchers were using unauthorized abbreviations on train orders.

Washington

- Dispatchers were observed issuing DTC authorities to moving trains and the person copying the authority was operating the controls of a moving locomotive. Again, this is in violation of FRA's 49 CFR Part 220, Radio Standards and Procedures.

KY Louisville

- One instance was noted in which an employee who was granted authority to occupy a segment of main track in turn gave another employee permission to occupy the track under the original authority. The second employee then reported clear to the dispatcher and requested that the dispatcher contact the employee who had been granted the authority and advise him that the second employee was clear of the track. Such lenient practices could result in misunderstandings, oversights, and accidents.

- Dispatchers occasionally request that a signal maintainer line a manually operated crossover switch in traffic control territory, in order to expedite train movements.

MI Saginaw

- The Detroit Division timetable did not indicate what rules were in effect at Ludington, MI, Yard. When division officers were contacted, they advised this was

an oversight and that it would be covered immediately in a superintendent's bulletin.

- FRA disclosed a continuing violation of CSX Rule 707 (c) on the Ludington Subdivision between milepost 134 and 134.2. At the time of this disclosure, this deficiency had been occurring almost daily for about three months. A contractor was conducting bridge repairs, which required frequent crossing or fouling of the main track with equipment. CSX had provided a maintenance of way foreman to provide protection each day the contractor worked. At the beginning of each day, this foreman would contact the train dispatcher and take the track out of service, releasing it for service at the completion of the work day.

  Instead of taking the track out of service in accordance with Rule 707 (c), the dispatcher would issue a 10 mile per hour speed restriction to trains, and another train order stating "between 0730 and 1730 hours, trains using the main track between milepost 134 and 134.2 must ring bell and sound horn frequently and look out for equipment crossing the main track. When the train crews were enroute to this area, the dispatcher would contact them by radio and instruct them verbally to "contact foreman--(name) before operating through that territory."

  There would only be documentation indicating the track was out of service if the dispatchers recorded this information on the train sheet in the "unusual conditions" section. The dispatchers did not always record this information.

  When contacted regarding this rules violation, CSX division officers stated they were unaware this was occurring. They immediately informed the dispatchers and track foremen that Rule 707 (c) authority would be used in the future.

- It was disclosed that some blocking devices for one of the CTC machines at this location were ineffective. Although designed to open a circuit and display a red light on the dispatchers' panel, some of these devices did not function as intended. Inspection disclosed the tips of these devices were not long enough to energize the electric field.

- It was noted that the maintenance of way department consistently failed to use temporary speed signs when placing speed restrictions, although required to do so by CSX Rule 43. A track foreman regularly assigned to

this territory stated there were no such signs in the Saginaw area to his knowledge.

OH Akron

- The assessment disclosed that train dispatchers issue train orders by radio in a manner not consistent with Federal requirements. In one instance, a train dispatcher was observed transmitting orders to the engineers of two trains while these engineers were operating the controls of a moving engine.

- Failure of the carrier to install remotely controlled switches at the Deshler, OH, Interlocking created problems for dispatchers. This was particularly true when this situation existed in conjunction with failure to equip trains with cabooses or operative end-of-train devices. Because employees are not located on the rear of most trains, the carrier has amended Rule 104-F at Deshler to permit train crews to leave main track switches and associated derails in other than normal position when so instructed by the train dispatcher.

  In order to facilitate movements of northward Toledo Subdivision trains (which are required to change direction and operate westward on the Willard Subdivision) while at the same time maintaining normal operations for westward trains originating east of Deshler, the dispatchers frequently operate the former mentioned trains against the established current of traffic. This method of operation results in only one of the two main tracks being affected by these open switches. This in turn permits the dispatcher to operate other westward trains with the established current of traffic without requiring the train crews to stop and restore the crossover switches to normal position.

  However, unless the trains being operated against the current of traffic have a caboose or operative end-of-train device, the established DTC blocks (against the current of traffic) cannot be reported clear. As a result, these trains must usually be operated all the way to Garrett, IN (a distance of about 66 miles), before there is an employee available to advise the dispatcher that the train is intact and clear of the block. The stress factor associated with such movements was readily apparent. The dispatchers assigned to this desk expressed serious safety concerns regarding this operation.

Cincinnati

- Inspection of train order books and discussion with dispatchers disclosed violations of CSX Rule 214. This train order rule was not being applied to trains operating from the Louisville, KY area through the Latonia, KY, Interlocking toward Cincinnati. A 10 mile per hour speed restriction was in effect on the northward main track through the Latonia Tunnel, and there was no open train order office at this location. In order to comply with carrier rules, the DeCoursey or KC Junction operator would be required to notify the dispatcher this order had been transmitted by radio and the dispatcher would be required to indicate this method of delivery in the train order book. Alternate methods of protection would include transmission of the train order to the Louisville, KY operator for his delivery to trains, or issuance of the restriction on a bulletin order. None of these provisions were being fulfilled.

Dayton

- At this field office, FRA noted deficiencies in the CSX DTC method of operation. Although there are pre-printed forms for use by train crews, and recommended verbiage in the radio rules, the use of neither is required. FRA monitored radio communication of one such authority in which the engineer of the train involved failed to properly identify his train, a serious offense given the potential consequences. The dispatcher took no exception to this failure by the engineer.

- Discussions with dispatchers and evaluation of the carrier rules disclosed there is no standard format in use by train dispatchers when issuing authorities for track car movements. A maintenance of way officer and trainmaster indicated that standard verbiage forms are used by employees receiving such authorities, but it was apparent the dispatchers were issuing these authorities by rote. This situation creates the potential for misunderstanding.

- Train dispatchers were sometimes issuing train orders by radio in a manner not consistent with Federal requirements and carrier rules. In one instance, a dispatcher was observed annulling a train order by radio without issuing an annulment order. It was further disclosed that speed restrictions were sometimes issued by radio using an "informational" format, i.e.--the restrictions were not entered in the

train order book and records indicating delivery to affected trains were not maintained.

- o Observations and inspections of records disclosed dispatchers are not recording all Federally required information on the dispatchers' records of train movements. There were consistent failures to enter unusual events affecting train movements, and the names of engineers and conductors and their times on duty were not recorded for trains operating on the main tracks within yard limits.

- o A train dispatcher was observed issuing authority for movement on a track car in DTC authority using CSX Rules 120-132 inclusive, which apply only to trains. This dispatcher also entered this track car authority on the train sheet in the blocks reserved for DTC train movements instead of the blocks reserved for track car movements. When asked why he did this, he stated this was permissible under carrier rules. When asked to identify the rules, he could find no such rules or special instructions permitting use of this procedure.

- o It was disclosed that DTC block forms were not used to record DTC train movements within the Arcanum Block of the Dayton and Union Subdivision. There was no space on the train sheet provided for this purpose. A train dispatcher on the previous shift had authorized a train movement in both directions with an Absolute Block. This train was still occupying the main track under this authority when the dispatcher was relieved. The relieving dispatcher experienced considerable difficulty finding this authority. He finally found it in the train order book on the page used to verify and record clearance forms issued by block operators.

PA Punxsutawney

- o It was noted by FRA that train orders transmitted by electronic data facsimile machines were sometimes illegible.

- o Dispatchers were inconsistent in the application of CSX Rule 234-A, permission by a stop signal. Some dispatchers required assurance the train had stopped at the signal before issuing this authority, while other would issue the authority without this knowledge. It was further noted some dispatchers did not use the verbiage required by CSX Rule 346 when granting such permission.

- Neither of the two clocks in this office was identified as a standard clock as required by carrier rules.

WV Huntington

- FRA noted serious concerns at certain locations where two train dispatching districts interconnected. At these locations, one dispatcher may apply a track block to a portion of the district under their control, and the adjoining dispatcher can remove these blocks without the knowledge of the dispatcher who applied them. After removing the track block, the second dispatcher can then display signals for trains. The problem apparently results because all dispatching districts at this field office share the same computer processor, and this processor fails to recognize that more than one dispatcher may have blocking established at these contiguous locations.

  When the division signal supervisor was contacted regarding this condition, he advised he had been aware of this situation for some time but didn't think it was unsafe provided the dispatchers communicated with one another when the track blocks were removed. After a lengthy discussion, he acknowledged a problem could exist if the dispatchers failed to communicate.

  Since the field audit of this office was conducted, one of the dispatching positions involved has been transferred to the Jacksonville Control Center. This problem, which can be corrected by improved operating practices or software changes, now exists between the Jacksonville and Huntington offices.

- CSX was permitting dispatchers to transmit and receive train orders and work authorities without fully complying with the requirements. There were occasions when the dispatchers and receiving employees only partially repeated these authorities.

- CSX was permitting dispatchers to issue mandatory directives via radio to train crews while treating these directives as if they were mere informational messages. In one instance, a train operating on the Number One Main Track was instructed to be on the lookout for a work train unloading rail on the Number Two Main Track, as it's boom could be obstructing the Number One track at a known location. CSX rules require that train orders be issued in such instances, and Federal regulations require such mandatory directives to be communicated by radio in accordance with train order rules.

- The only record retained by train dispatchers to log DTC and OTE authorities was sheet of paper which was taped to the train sheets.

V. OPERATIONAL TESTING PROGRAM

As indicated in Section One, all railroads including CSX are required to conduct tests and inspections of their employees. The purpose of these tests and inspections is to determine the extent of employee knowledge of and compliance with the carrier's operating rules and special instructions.

During analysis of the data gathered during the assessment, FRA noted the following inconsistencies regarding the number of operational tests conducted at various offices compared to the number of dispatchers disciplined for carrier rules violations:

LOCATION STATE	CITY	# TESTS CONDUCTED	# FAILURES	# DISPATCHERS DISCIPLINED
AL	Mobile	0	0	3
FL	Jacksonville	14	2	2
	Tampa	11	1	11
IN	Washington	36	4	4
OH	Dayton	5	0	1

FRA determined the average annual number of tests per dispatcher for each office by dividing the number of tests conducted by the number of desks per office. This formula does not consider such factors as the regularly assigned relief positions, the extra list dispatchers, and the assistant chief dispatchers. If those employees were factored in, the already low number of tests per dispatcher would have been even lower.

Table CSX-II, which follows, illustrates the number of dispatchers per office, the number of operational tests and inspections conducted, the number of failures, the total failure rate, and the average annual number of such tests and inspections per dispatcher. Since FRA began the dispatching assessment on CSX in July, 1987 and did not complete the field portions of the assignment until September, 1988, the statistics shown indicate different evaluation periods. The periods represented begin in January, 1986 and end in August, 1988, depending on the time frame in which a particular office was assessed. For the period January, 1986 until March, 1987 statistics were furnished by the division chief dispatchers. In April, 1987, CSX implemented a computerized operational testing program, and the statistics used were gleaned from the carrier's data base. Seven of the 33 CSX offices were not included in the field audits.

TABLE CSX-II
OPERATIONAL TESTING DATA

LOCATION State	City	#DISPATCHERS POSITIONS	#TESTS	#FAILURES	%FAILURES	#TESTS PER DISPATCHER
AL	Birmingham	3	36	0	0	12
	Mobile	7	0	0	0	0
FL	Jacksonville[5]	30	122	6	4.9	4.1
	Jacksonville[6]	9	14	2	14.3	1.6
	Tampa	9	11	1	9.1	1.2
GA	Atlanta	15	216	17	7.9	14.4
	Savannah	9	583	37	6.4	64.8
	Waycross	3	94	1	1.1	31.3
IL	Chicago	3	0	0	0	0
IN	Evansville	9	287	14	4.9	31.9
	Washington	6	36	4	11.1	6
KY	Louisville	6	0	0	0	0
MI	Grand Rapids	6	252	0	0	42
	Saginaw	6	140	4	2.9	23.3
NC	Raleigh	6	0	0	0	0
	Rocky Mount	6	125	0	0	21
OH	Akron	6	111	0	0	18.5
	Cincinnati	3	19	2	10.5	6.3
	Columbus	9	71	0	0	7.9
	Dayton	3	5	0	0	1.7
PA	Pittsburgh[7]	6				
	Punxsutawney	3	2	0	0	0.7
SC	Florence	15	300	37	12.3	20
TN	Bruceton	3	45	0	0	15
VA	Richmond	6	1916	55	2.8	319.3
WV	Huntington	15	71	0	0	4.7

The CSX program of operational tests and inspections is contained in a carrier issued booklet titled "Efficiency Tests Form 120 ROP." This is a detailed publication more than 120 pages in length. It states that the objectives of the operational testing and inspection program are:

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[5] CSX System Control Center

[6] Tampa Division-this office was not consolidated into the System Control Center at the time of the assessment.

[7] Information not available from carrier at the time this office was assessed. CSX stated they did not know if the information was in Baltimore, MD or Jacksonville, FL.

- To eliminate human-failure accidents;
- To improve employee compliance with Operating Rules;
- To determine the degree of compliance or failure to comply with the operating rules, and;
- To determine on what rules and in what areas concentration is needed to improve employees' knowledge of the operating rules and special instructions.

Form 120 ROP applies on the entire CSX system and applies to all employees subject to the operating rules. Testing for all classes of employees except train dispatchers at the Jacksonville Control Center is a division responsibility. Testing for train dispatchers at the control center is the responsibility of the management staff at the center.

FRA noted that the instructions in Form 120 ROP have not been revised to reflect changes needed as a result of the centralization. For example, the plan of organization in Form 120 ROP indicates that the officer responsible for the execution of the testing program is the Superintendent Operations. This position exists only at the division level and not at the control center. There are seven classifications of transportation officers required to conduct tests. Only one such category of officer, that of chief train dispatcher, is located at the Jacksonville Control Center.

The program establishes two different types of efficiency tests: casual observations and surprise tests. A casual observation is the routine observation by an officer during normal supervisory functions for compliance with rules and instructions. A surprise test is a planned procedure, conducted by a team of at least two officers to evaluate compliance with rules and instructions without the employees' knowledge.

Although records and interviews with officers indicate that surprise tests were conducted on train dispatchers at the control center, these same interviews indicated that tests are not ordinarily conducted by a team. As a result it appears that tests reported as surprise tests do not meet the carrier's definition of surprise tests. The program also requires each transportation department supervisor participating in the program to conduct 20 surprise tests and 10 casual tests per month.

To determine the impact of the opening of the Jacksonville Control Center on the testing program, FRA reviewed records of tests conducted before the facility opened. These records were compared with records of tests conducted after the control center opened.

During the period April 5, 1987 to December 31, 1987, the carrier's computer records indicate a total of 3089 tests conducted on train dispatchers. There were 136 failures for a failure rate of 4.4 percent. For the period January 1, 1988 to August 13, 1988 (the latest period available), 2367 tests were conducted. There were 75 failures for a failure rate of 3.1 percent.

During the 1987 period, 1741 or 56.4 percent of the tests were casual observations while 1348 or 43.6 percent were surprise tests. During the 1988 period, 1264 or 53.4 percent were casual observations while 1103 or 46.6 percent were surprise tests. During the 1988 period the railroad was in transition, consolidating the division dispatching offices into the control center at Jacksonville.

The following items were noted regarding the 1987 period:

- On the Huntington Division, a total of 616 tests were conducted and no failures were recorded.
- On the Detroit Division, 152 tests were conducted. There were 2 failures for a failure rate of 1.3 percent.
- On the Chicago Division, 196 tests were conducted. There were 5 failures for a failure rate of 2.5 percent.
- On the Baltimore Division, 466 tests were conducted. There were 18 failures for a failure rate of 3.8 percent.
- On the Corbin Division, 274 tests were conducted. There were 12 failures for a failure rate of 4.3 percent.
- On the Tampa Division, 86 tests were conducted. There were 4 failures for a failure rate of 4.6 percent.
- On the Mobile Division, 340 tests were conducted with 18 failures for a failure rate of 5.3 percent.
- On the Florence Division, 583 tests were conducted. There were 37 failures for a failure rate of 6.3 percent.
- On the Atlanta Division, 302 tests were conducted. There were 32 failures for a failure rate of 10.5 percent.
- On the Cincinnati Division, which was absorbed into other Divisions during the period, 65 tests were

conducted. There were 8 failures for a failure rate of 12.3 percent.

The following items were noted regarding the 1988 test period:

- On the Corbin Division 71 tests were conducted and no failures were recorded.
- On the Huntington Division 447 tests were conducted. There were 2 failures for a failure rate of 0.4 percent.
- On the Detroit Division 337 tests were conducted. There were 5 failures for a failure rate of 1.5 percent.
- On the Tampa Division 320 tests were conducted. There were 6 failures for a failure rate of 1.8 percent.
- On the Mobile Division 134 test were conducted. There were 3 failures for a failure rate of 2.2 percent.
- On the Baltimore Division 376 tests were conducted. There were 10 failures for a failure rate of 2.6 percent.
- On the Chicago Division 111 tests were conducted. There were 3 failures for a failure rate of 2.7 percent.
- On the Florence Division 380 tests were required. There were 11 failure for a failure rate of 2.9 percent.
- On the Atlanta Division 191 tests were conducted. There were 37 failures for a failure rate of 19.3 percent.

For the 1988 test period FRA noted the number of tests for compliance with Operating Rule G. Simply stated, this operating rule prohibits employees from reporting for duty or performing service under the influence of or in possession of alcohol or drugs. Rule G tests on train dispatchers by division, are tabulated as indicated on the followings page:

Division	Rule G Tests	Rule G percent of total tests
Chicago	0	0
Mobile	0	0
Corbin	2	2.8
Atlanta	6	3.1
Florence	13	3.4
Tampa	15	4.7
Huntington	87	19.5
Detroit	95	28.1
Baltimore	106	28.1

The Jacksonville Control Center opened on May 5, 1988. FRA reviewed carrier furnished computer generated test records for tests conducted from May 5 through August 13, 1988. A total of 122 tests were recorded. There were 6 failures for a failure rate of 4.9 percent. The following items were noted regrading the tests at the control center:

- The total of 122 tests conducted is substantially below the minimum level of testing specified in ROP 120.
- Of the 122 tests recorded, 31 or 25.4 percent were recorded as casual observations and 91 or 74.6 percent were recorded as surprise tests.
- There were 10 Rule G tests with no failures recorded.

At the time of FRA's assessment the control center was in an early implementation phase. FRA determined that sufficient time had not elapsed and sufficient data had not been collected to make valid statistical comparisons between the prior testing results and the current testing results. The examples noted are therefore provided for illustrative purposes only.

The CSX program allows for testing on all operating rules. This is commendable and preferable to a program which only provides testing for compliance with a limited number of rules. However, an all encompassing program also requires audits or internal controls to ensure that the most safety critical of rules receive a proportionate share of the testing effort. For a random check, FRA selected certain critical operating rules and noted the number of tests conducted for these rules. The rules selected

were among those with which a compliance failure by a train dispatcher could have serious or catastrophic consequences.

Rule 125 establishes procedures for canceling DTC authority after such authority has been granted to a train.
1987 tests/failures/rate:6/0/0
1988 tests/failures/rate:4/1/25 percent
Control center tests/failures/rate:0/0/0

Rule 126 establishes procedures for changing the type of DTC block granted to a train.
1987 tests/failures/rate:9/0/0
1988 tests/failures/rate:3/0/0
Control center tests/failures/rate:0/0/0

Rule 129B limits the conditions under which a following movement can be authorized when a leading movement has been relieved from providing rear end protection in DTC territory.
1987 tests/failures/rate:3/0/0
1988 tests/failures/rate:1/1/100 percent
Control center tests/failures/rate:0/0/0

Rule 129C establishes procedures for canceling relief from rear end protection.
1987 tests/failures/rate:2/0/0
1988 tests/failures/rate:1/0/0
Control center tests/failures/rate:0/0/0

Rule 131 governs the train dispatcher's actions in allowing a relief engine into an occupied DTC block to assist a standing train.
1987 tests/failures/rate:3/0/0
1988 tests/failures/rate:1/0/0
Control center tests/failures/rate:0/0/0

Rule 271 specifies information which the train dispatcher must communicate when two trains are authorized to work within the same limits in TCS territory.
1987 tests/failures/rate:1/0/0
1988 tests/failures/rate:2/0/0
Control center tests/failures/rate:0/0/0

Rule 275 specifies the action which a train dispatcher must take in TCS territory when authorizing movements over power-operated switches.
1987 tests/failures/rate:37/0/0
1988 tests/failures/rate:34/0/0
Control center tests/failures/rate:2/0/0

Rule 321 sets forth multiple requirements for the train dispatchers in the operation of switches, derails, movable point frogs and other appliances.
1987 tests/failures/rate:29/0/0
1988 tests/failures/rate:1/0/0
Control center tests/failures/rate:0/0/0

Rule 335 enumerates several controls and procedures when the train dispatcher provides protection to trains, work forces, and on track equipment.
1987 tests/failures/rate:11/0/0
1988 tests/failures/rate:2/0/0
Control center tests/failures/rate:0/0/0

Rule 338 requires the train dispatcher to examine the train sheet when a train desires to enter a DTC block.
1987 tests/failures/rate:14/0/0
1988 tests/failures/rate:3/0/0
Control center tests/failures/rate:0/0/0

Rule 346 specifies the actions to be taken by the train dispatcher before granting permission to pass a stop signal not located at a railroad crossing at grade.
1987 tests/failures/rate:40/0/0
1988 tests/failures/rate:66/0/0
Control center tests/failure/rate:0/0/0

Rule 347 specifies the action to be taken by the train dispatcher before granting authority to pass a stop signal at a railroad crossing at grade.
1987 tests/failures/rate:2/0/0
1988 tests/failures/rate:0/0/0
Control center tests/failures/rate:0/0/0

Rule 349 specifies the actions taken by the train dispatcher before authorizing a reverse movement in signal territory.
1987 tests/failures/rate:1/0/0
1988 tests/failures/rate:0/0/0
Control center tests/failures/rate:0/0/0

Rule 353 specifies actions to be taken by a train dispatcher before granting track and time authority.
1987 tests/failures/rate:0/0/0
1988 tests/failures/rate:0/0/0
Control center tests/failures/rate:0/0/0

Rule 353A specifies action to be taken by the train dispatcher when it becomes necessary to authorize more that one movement within track and time limits.
1987 tests/failures/rate:0/0/0
1988 tests/failures/rate:0/0/0
Control center tests/failures/rate:0/0/0

Rule 353B governs the handling of blocking devices when track and time authority have been granted.
1987 tests/failures/rate:0/0/0
1988 tests/failures/rate:0/0/0
Control center tests/failures/rate:0/0/0

Rule 540 lists the required actions by a train dispatcher in making or receiving a transfer.
1987 tests/failures/rate:354/39/11 percent
1988 tests/failures/rate:276/26/9 percent
Control center tests/failures/rate:12/0/0

According to the officer in charge, the only officers conducting tests on the train dispatchers working at the Jacksonville Control Center are the Chief Train Dispatchers. This represents a significant change from the pre-consolidation period. Trainmasters and other carrier officers reportedly could and did conduct tests on train dispatchers when the train dispatchers were located at field locations. Each chief train dispatcher is required to conduct 30 tests per month of which 10 are to be casual observations and 20 are to be surprise tests. Review of carrier furnished computer generated records indicate the following:

- During the month of May 1988 a total of 60 tests were conducted on train dispatchers at the Jacksonville Control Center.

- During the month of June 1988 a total of 7 tests were conducted on train dispatchers at the Jacksonville Control Center.

- During the month of July 1988 there are no records of tests conducted on train dispatchers at the Jacksonville Control Center.

- During the month of August 1988 a total of 55 tests were conducted on train dispatchers at the Jacksonville Control Center. Of the total 55 tests, 49 or 89 percent were conducted on August 11 and 12.

The carrier officer assigned to oversee the testing program of train dispatchers at the control center has not been furnished with summary reports of testing activity. The carrier's computer system allows any type of sorted and selected report to be furnished either periodically or on request. FRA believes a low level of interest in the statistical results of a testing program may indicate a less than high priority on the total program on the part of carrier officials.

The chief train dispatchers conducting tests at the control center do not receive written instructions on which rules to select for testing. Rules selected for testing are discussed verbally during the biweekly chiefs' meetings held at the center.

VI. ENVIRONMENT AND WORKLOAD

GENERAL

FRA found that the majority of train dispatchers offices on the CSX provide an adequate working environment. For the most part, individual dispatching districts were assigned in a logical and reasonable manner, and except for occasional peak periods, workloads are not so great as to compel dispatchers to work at the outside limits of their ability or skills in order to avoid delay.

INDIVIDUAL DISPATCHING OFFICES

During the assessment, FRA noted certain environmental and workload conditions that were confined to individual offices as follows:

AL Birmingham

- Entrance into the dispatcher's office is not restricted to authorized personnel only. Maintenance of way, signal department and other employees were observed entering the office on a frequent basis attempting to engage the dispatchers in idle chitchat. Employees also requested that dispatchers ascertain the whereabouts of other employees, and relay radio messages to employees.

  Further, since this dispatcher handles trains for the Mobile and Nashville Divisions, the dispatcher must work with trainmasters of each division. The Nashville Division Trainmaster spends a significant amount of time in the dispatcher's office in an attempt to expedite the train movements which are his responsibility. This in turn resulted in the Mobile Division Trainmaster questioning whether the dispatcher was expediting these Nashville Division movements at the expense of Mobile Division movements.

Mobile

- At this office, there were three dispatchers on first shift, and two each on second and third shifts. CSX operating rules require that engine numbers be used to identify trains. While this creates no problems on the first shift, the combining of two desks on the second

and third shifts created workload difficulties. These dispatchers were constantly shifting two separate train sheets when answering train crews on the radio in order to identify trains and their locations.

FL Jacksonville

- Crew dispatchers frequently request that on-duty train dispatchers notify train and engine service employees, via radio, of the status of their assignments. When FRA notified the carrier of this concern, the carrier stated this was sometimes the only method crew dispatchers had to contact train and engine service employees.

Tampa

- New operators at Orlando and Tampa, FL were not familiar with the physical characteristics of their assigned territories. This situation required train dispatchers to spend unnecessary time instructing these operators.

IL Chicago

- During the assessment, these dispatchers handled 124 trains and 4 track cars during a 24 hour period. Almost no extraneous duties were required of these dispatchers.

OH Cincinnati

- During the assessment, these dispatchers handled 135 trains and 13 track cars during a 24 hour period. Apparently because of carrier awareness of the workload on these positions, almost no extraneous duties were required of these dispatchers. Instead, these duties were assigned to two assistant chief dispatchers. Potential problems may exist at Chicago and Cincinnati if the assistant chief positions are transferred and their duties assigned to the regular dispatchers.

VII. COMMUNICATIONS

General

The CSX radio communications system is essentially a blend of three incompatible systems formerly used by the predecessor railroads. According to the carrier, still in place are the former Chessie, Louisville and Nashville, and Seaboard Coast Line systems. System level officers consider the former Chessie radio system the best of the three existing systems. Apparently, a

higher level of technology was utilized in part of this system, and the base stations are spaced more closely than those of the other prior railroads.

FRA found concerns throughout the CSX, regardless of the type of radio system which was in place. The former Chessie radio system functioned well where there were no major terminals, or where the base stations were far removed from those controlled by other train dispatchers. Where this was not true, there were problems. There were frequent false calls intended for dispatchers in other cities, and channels intended for road train use were used by yardmasters and terminal switching crews. Further, channels intended exclusively for communication with dispatchers were used by road crews engaged in such duties as adding or removing cars from their trains, and calling wayside signal indications. Thus, a system which provides effective communications for one geographic area is ineffective when applied to other, more congested areas.

Identical problems existed with the former Louisville and Nashville and Seaboard radio systems. In addition, these systems had a higher proportion of locations where communications were inadequate because of unsuitable spacing of wayside base stations.

CSX plans to modify the radio system by establishing separate channels for the following departmental usage: dispatcher, train "end to end", maintenance of way, special agents, mechanical, and yard operations (with separate channels for hump areas, bowl areas, and up to three channels for switching assignments). The frequencies of these channels will vary between divisions to keep overlapping of radio communications to a minimum at junction points and parallel lines.

CSX is in the process of making the following improvements to the existing communication systems:

- The dispatcher controlled systems are being updated with current technology equipment. Some of the existing equipment is 20 years old. This work has been approved and completion is anticipated during the first quarter of 1989.

- Authority to install 97 channel radios on all locomotives and mobile equipment has been requested of the carrier's top management. If approved and implemented, this should eliminate the problem of overlapping of radios at junction points and parallel lines because of the capability for use of different road channels for each subdivision at these locations.

- A commercial "800" telephone number is being installed for train crews and maintenance of way crews to contact the dispatcher by phone when all other means have failed.

- Portable phones are being provided to signal maintainers for contacting the control center from any point on all traffic control code lines.

CSX has eliminated the practice of transmitting defect detector data by voice directly to the dispatchers. These detectors notify the train crews of the results of the defect inspection by radio. A member of the train crew then notifies the dispatcher of any pertinent information that may be necessary. This eliminates interruptions on the radio every time a train passes a detector.

Technical

The dispatcher controlled computer equipment in Jacksonville is interfaced at Jacksonville with the various communication links to the former dispatcher locations. The control lines and carrier equipment between the control center and the former dispatcher locations are monitored and maintained by railroad communication technicians who are on duty at all times. If one of these communication links fails, the interfaced equipment is manually switched in Jacksonville and at the field location by the technician on duty in Jacksonville. The equipment is manually transferred by a switching arrangement in Jacksonville and by dialing a transfer number at the field office, which eliminates the need for an additional employee at each field location. There are as many as three back up links to the field locations. The normal route is by fiber optics. If this circuit fails the next choice is by microwave, and if this fails, by railroad owned or leased lines.

The fiber optic cable extends on the east coast from Miami to Baltimore, then to Pittsburgh and Chicago with a branch to Pensacola, Mobile and New Orleans. Another branch extends to Atlanta, Birmingham, Nashville and Memphis. This fiber optic cable is all on CSX property except between Richmond and Washington where the cable is located on the Richmond, Fredericksburg and Potomac Railroad and between Washington, DC and Baltimore where CSX leases a circuit.

The microwave system extends from Jacksonville to Saginaw, MI with connections to Atlanta, Birmingham, Memphis, Nashville, Louisville, Cincinnati, Huntington, Philadelphia, Fostoria (OH) and Toledo on the carrier's property. CSX leases a microwave circuit between Memphis, Evansville and Louisville. In addition, the carrier shares a microwave system with the Norfolk Southern

Corporation between St. Louis and Buffalo with a connection into Chicago.

Radio Procedures Deficiencies

At most offices assessed, there were frequent radio rule exceptions noted. Many exceptions were extremely serious in nature including failure of the dispatchers and train crews to comply with 49 CFR 220.61 (transmissions of train orders by radio), and failure to assure on-track authorities are properly transmitted and repeated. These deficiencies also included occasional failure of train dispatchers to properly identify their stations, frequent failure of other employees to properly identify their stations, failure of the train dispatchers to require employees to use proper identification, and failure to use the words "over" and "out" when required.

Radio Communication Deficiencies

Following is an office by office synopsis of exceptions to communications, other than radio procedures, noted during the assessment:

AL Mobile

- All of the radio channels used by the dispatchers are cluttered with non-dispatching transmissions, often from maintenance of way and signal department employees. This creates problems for the dispatchers, especially when issuing block and track time authorities. There were times when it was necessary for the dispatcher to repeat slow orders, block authorities, and track time authorities to trains.

GA Savannah

- Yardmasters and switch crews use the same frequency as dispatchers. Dispatchers must frequently ask train crews and on-track equipment operators to call them on the telephone in order to issue instructions and mandatory directives.

Waycross

- All of the radio channels used by the dispatchers are cluttered with non-dispatching transmissions. FRA overheard transmissions involving the maintenance of way department, signal department, mechanical department, Rice Yard switching operations, and interference from distant CSX dispatching offices. This interference is particularly bad on the first shift. There were times when the dispatcher would have

to repeat speed restrictions and track authorities two or more times. CSX division officers are aware of this problem and stated it would be solved when these dispatchers are transferred to the Jacksonville Control Center. Since the same field communication equipment will be in place after this transfer, FRA fails to perceive how this will solve the problem.

IL Chicago

- Although six other railroads must operated over CSX trackage for interchange purposes, the CSX dispatchers do not have the capability of communicating with the train crews of these carriers by radio. All necessary communications are by either dispatcher or commercial telephone. This inability to communicate directly by radio could create serious problems during emergency situations.

KY Louisville

- The excessive number of radio communications which occur on the dispatcher's channel resulted in frequent interruptions of dispatchers attempting to issue mandatory directives. Dispatchers would complete these directives by mere presumption that the employee had repeated the directive properly.

OH Akron

- There were frequent false radio calls on the Chicago Line Dispatchers' console. These calls were intended for train dispatchers located in Chicago, IL; Washington, IN; Grand Rapids, MI; and Columbus, OH.

  Further, although this channel (Channel One) was intended to be for the exclusive use of the train dispatcher, yardmasters and other employees in the Chicago Terminal area frequently use the assigned road channel (Channel Two) for communication purposes. Because of this radio congestion, road train crews switched to the dispatchers' channel to communicate when performing such duties as adding or removing cars from their trains, and to call wayside signals in accordance with carrier rules. These line of road communications were intended to be conducted on Channel Two. Use of Channel One diminished the capability of the dispatcher to conduct effective radio communications.

Cincinnati

- Monitoring of the dispatchers' road radio channel disclosed that the CSX permitted a contract taxi service to use the channel for communications between the taxi service supervisor and it's drivers. These transmissions were very frequent and disrupted radio transmissions relating to the safety of railroad operations. The practice was not consistent with good operating practices, and appeared to conflict with Carrier Rule 418.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern CSX-01: At the time of FRA's Jacksonville Control Center audit, CSX had not performed a formal safety analysis and had not followed a rigorous procedure for software quality assurance. Instead, the carrier was using an informal approach to software specification and design. If an error in software design was found there did not seem to be a control which required that the error be corrected in all parts of the system, and that correction of the error be documented.

Recommendation: CSX should establish a formal program of software analysis. They should organize the developmental tasks so that they can be controlled by the various specialists and managers who understand the technical details and rules that should control the logic flow.

Concern CSX-02: At present, the software for each track segment at the control center is developed separately, but the test program for these individual segments is not complete.

Recommendation: The assurance program should not permit skipping of tests because of similarity to previously installed software routines. CSX should consider a formal safety and quality assurance in lieu of the current informal test program.

A formal program is particularly important when vital logic is involved. An initial step in the formulation of a formal program would be to identify the vital elements of the software program.

Concern CSX-03: During analysis, FRA found several potential conflicts not provided for in the control center's DTC software rules matrix. Because the rules matrix does not search for all conflicts, the safety of the operation is still dependent on observation of and compliance with the operating rules by train dispatchers.

Further, FRA discovered the DTC Conflict Check Matrix (which matches the software) did not correspond with the DTC Permit Conflict Checks Table (which was presumably used by the railroad

and vendor in determining if the software development was complete).

Recommendation: CSX should immediately work with the software vendor to assure the programming searches for all conflicts as intended, and to establish a software confirmation program.

Concern CSX-04: Where Jacksonville based dispatching districts adjoin certain sections of the railroad controlled from locations other than Jacksonville, the system will permit one dispatcher to apply track blocking for track car and other on-track equipment movements while the adjoining dispatcher has the capability of operating trains onto the blocked section.

The Jacksonville dispatching district for which this particular fault was identified connects to a district still controlled from Huntington, WV. The Jacksonville dispatcher can apply a track block for an on-track equipment movement but this block does not prevent the Huntington dispatcher from clearing signals for train movements onto the blocked section. The Huntington dispatcher has no knowledge the block has been applied unless notified verbally by Jacksonville. Because of this condition, verbal communications between the dispatchers or control operators involved is vital to the safety of track car and other movements which may not shunt track circuits.

CSX is aware of this problem, and has instructed the dispatchers in Huntington to communicate with Jacksonville prior to clearing signals for such movements. These management instructions to the dispatchers are strictly verbal, and are not part of the dispatchers written instructions to his relief. These instructions could be breached by an extra list or other dispatcher not familiar with the procedure.

Recommendation: As a short term solution, a preferable approach would be for the carrier to require the dispatchers involved to contact one another and arrange for blocking of the other dispatcher's control panel. This method has been utilized historically by the railroad industry, and offers a far higher degree of safety than the casual procedure now being used. As a long term solution, the carrier should have the software programming revised to prevent such occurrences.

Concern CSX-05: At the control center, FRA noted a number of CRT displays used in DTC territory that were not distinct because they are positioned too far away from the dispatcher.

Recommendation: The carrier should redesign the layout of these cubicles to accommodate dispatcher needs. CSX was aware of this problem and indicated the intent to make the needed corrections.

Concern CSX-06: CSX advised FRA of it's intent to install new printers for the transmission of train bulletins and release forms, which are issued from the control center to supplant train orders and clearance forms. While the new printers should have a positive effect on safety by reducing the probability of transmission errors, the end check is strictly a human function.

Recommendation: These requirements should be included in the CSX Operating Rule book. Further, they should be included in the carrier's Program of Instruction on Operating Rules and Timetable Instructions, and the CSX Operational Testing and Inspection Program. Train crews and other involved employees must be properly instructed on the human requirements.

Concern CSX-07: Although these new printers have the capability of executing an elaborate error checking scheme, the current software routines neither assure that train bulletins are actually transmitted, nor that they are transmitted to the correct location.

Recommendation: CSX should develop programming which assures train bulletins and release forms are properly transmitted and received.

Concern CSX-08: The division instructions and general superintendent's circular which implement the train bulletin and release form method of information dissemination are unclear. The divisions' instructions state that trains must receive these documents, and that train crews must contact the train dispatcher in the event they do not receive them. Action to be taken by the train dispatcher in this event is not specified.

The general superintendent's circular states "where required, the conductor and engineer must each obtain a legible copy of a train bulletin with a release form and must ascertain (with each other, if feasible) that the information thereon corresponds."

Further, the instructions state that only one release form and train bulletin will be issued to a designated train at any one station. This would not appear to provide for interdivisional operations where more than one dispatching district is involved.

Recommendation: Given the critical importance of these documents, CSX should re-write the implementing instructions, removing ambiguous and discretionary verbiage. These instructions should be included in the **CSX Operating Rule Book.**

Concern CSX-09: The train bulletins issued by the Jacksonville Control Center do not arrange messages in the logical sequential order required by the train crews. These bulletins are often lengthy and the failure to sort the information in orderly sequence creates an unnecessary burden on crew members.

Recommendation: CSX should develop programming that will sort the messages contained in these bulletins in the order they will be encountered by train crews on the line of road.

Concern CSX-10: The notices issued to Jacksonville based dispatchers contain safety sensitive information including operating rules interpretations. These notices to dispatchers are not defined in the CSX rule book. They are issued and retained in an unsystematic manner.

Recommendation: The current system of issuing notices to Jacksonville dispatchers should be reviewed and changed to assure reliability.

Concern CSX-11: CSX has devised an elaborate set of operating rules to provide for Direct Train Control (DTC) movements. In addition, CSX has invested heavily to provide the Jacksonville dispatchers with computerized visual displays and automatic conflict checking. Even with these useful tools the primary requirement to assure safe train operations under this operational method depends entirely on a complete understanding between train crews and dispatchers. Radios are normally used for these essential communications.

FRA is concerned that CSX has not devised a standard form, and that CSX does not require that standard verbiage be used for these vital communications.

Recommendation: CSX must assure these crucial directives are transmitted and repeated as required by Federal regulations. The railroad should consider amending the present CRT format to provide the exact verbiage, and distributing pre-printed documents based upon that format to the field.

Concern CSX-12: FRA has identical concerns regarding on-track equipment (OTE) movements. While CSX rule 704 requires authority for such movements to be written, there is no provision for communication of standard verbiage between train dispatchers and on-track equipment operators. Such a form is included in the center's Dispatcher Information System as a Train Message Entry, but because there is no easy way to correlate this form to the screen displayed form which drives the DTC conflict checking capability, it is not being used by the dispatchers.

Recommendation: CSX should consider amending the present programming to require use of this form, and to assure the information is integrated into the conflict checking scheme.

Concern CSX-13: FRA Inspectors noted that the workloads of several Jacksonville Control Center dispatcher districts were so heavy that these dispatchers were working at or near their

functional capacity. Some train dispatchers functioned at a rate which did not allow them adequate time to contemplate before making critical decisions. Sound operating practices require carriers to ensure that train dispatchers working at or near their functional capacity are not burdened with non safety-critical duties.

Recommendation: The carrier should carefully review all extraneous duties performed by dispatchers. Where necessary, software routines should be changed to function as intended. Where the workloads can be reduced by delegation to other employees or integration of information from the carrier's mainframe computer, this should be accomplished.

Concern CSX-14: The Jacksonville Control Center does not, at present, have a procedure or a form (screen) for recording Federally required information for blue signal protection of workmen at remotely controlled switches as required by 49 CFR 218.30 (C) (1 through 4). Also, recordkeeping deficiencies at the center were noted regarding dispatcher's hours of duty records and dispatcher's records of train movements.

Recommendation: CSX must assure that train dispatchers providing employees with blue signal protection are recording this information as required by FRA. Further, the carrier must take the action necessary to assure compliance with Hours of Service recordkeeping requirements as specified in 49 CFR Part 228.

Concern CSX-15: Consolidation of dispatching into the Jacksonville Control Center has created staffing problems for CSX. In the 10 week period between May 1, 1988 and September 15, 1988, train dispatchers at the center have worked on their normal relief days on 196 occasions. This total did not include those occasions when assistant chief dispatchers have worked on normal relief days.

Implementation of the Jacksonville Control Center is being accomplished in phases. With the amount of territory assigned to the center at time of the FRA assessment, the staffing plan called for 10 first trick positions, nine second trick positions, and nine third trick positions. The workload at this point in the implementation had apparently exceeded projections to the extent that 10 positions were required for each trick. This had resulted in an ongoing depletion of the extra lists by about 3.2 positions. CSX did not identify to FRA any mechanisms to address this significant and long term staffing shortage.

Further, CSX found it necessary to temporarily shift dispatchers from positions at Jacksonville to various field offices. It further became necessary to recall furloughed employees from various locations and re-assign them dispatching positions at

field offices considerable distances from their previous assignments.

Recommendation: The carrier should review the current staffing plan and make changes as necessary to assure an adequate dispatching staff.

Concern CSX-16: This center is among the first new generation dispatching offices in the country. Offices of this type rely on computer assistance to aid train dispatchers in the performance of their duties. They also result in larger dispatching districts.

Recommendation: CSX should review the staffing and workload management policies at the center. Among the considerations should be a provision for periodic employee relief during a tour of duty. Sufficient personnel should be in place to allow train dispatchers to leave the work station to take meal and other periodic breaks or use the rest room.

Concern CSX-17: The operating rules test given to train dispatchers at the control center is not unique to that office. It is the same test given to train dispatchers and operators throughout the CSX system. The Jacksonville Control Center provides a radically different environment for train dispatchers. The application of many operating rules, especially those regarding DTC operations, are unique to the centralized office.

Recommendation: The carrier should devise a rules examination which addresses the unique aspects of the centralized control center. The carrier should review the 80 percent passing grade and determine if it is sufficient.

Concern CSX-18: Train dispatchers at the Jacksonville Control Center are not given a practical test of their proficiency on the computer prior to being released for service.

Recommendation: In order to ensure that train dispatchers possess a sufficient level of knowledge, skills and abilities on the computer assisted portion of their duties, the carrier should adopt some type of formal evaluation. If a written test can be devised to address these areas, it should be considered. An alternative would be a formal practical demonstration on the computer by the train dispatchers. Employing this method, the examiner would present the train dispatchers with realistic simulated conditions which they could be expected to encounter while dispatching trains. A structured and formal simulation would ensure that each dispatcher is proficient in the newly acquired skills. It would simultaneously provide the carrier with information on those aspects, if any, where training should be adjusted to ensure proper understanding.

Concern CSX-19: The CSX policy is that all train dispatchers ride each mainline and high traffic density branch before dispatching trains. During interviews, FRA noted that six dispatchers stated that they had not ridden over all the territory under their jurisdiction.

Recommendation: The carrier should review its records and conduct appropriate interviews to determine the extent of compliance with the company policy. Any deviations, errors, or omissions should be promptly corrected.

Concern CSX-20: There is no formal evaluation or test conducted to determine the effectiveness of the field portion of a dispatcher's training before he is placed in service with a helper. There is also no standard, formal, documented method of evaluating when the helper's services are no longer required.

Recommendation: The carrier should consider a uniform, comprehensive, standardized and documented means of establishing a train dispatcher's familiarity with that portion of the railroad over which he will dispatch trains.

Concern CSX-21: CSX requires train dispatchers to attend operating rules classes and to pass written examinations in order to retain their qualifications. There was, however, a wide variance from office to office regarding this requirement. Some offices indicated dispatchers are required to attend rules classes every year, while others required dispatchers to attend every other year. The number of test questions varied between 50 and 100, and passing scores varied between 75 and 90 percent. At Atlanta and Waycross GA, dispatchers were not required to take written rules examinations.

The carrier was also inconsistent regarding qualification of dispatchers on the physical characteristics of the territory within the dispatching district. Nine offices surveyed stated they required dispatchers to qualify each year, four stated they required this every two years, and 10 offices stated there was no plan or schedule for such qualification trips.

Recommendation: Top management of CSX should establish uniform standards for the periodic training of train dispatchers. These standards should include training not only on operating rules and special instructions, but also on physical characteristics qualifications. The training practices of the various divisions should then be monitored to assure compliance with these standards.

Concern CSX-22: After review of the substantial number of informational texts used by CSX to distribute information to employees engaged in train operations, FRA concluded the burden they place on these employees is enormous. Employees are

required to have in their possession and be familiar with a rule book of about 250 pages, one or more divisional timetables each about 200 pages in length, divisional/district re-issue bulletins which are issued quarterly and are often 30 or more pages in length, each periodic bulletin issued after the re-issue bulletins become effective, and train bulletins with release forms which contain as many as 50 items. In addition, they must receive and review train orders, messages and clearance forms where applicable.

Recommendation: The burden on employees could be greatly reduced by more effective planning. CSX has adopted a loose leaf type operating rule book, which readily permits the insertion of revised rules. Yet FRA found that permanent changes in the operating rules are often carried on divisional bulletins for long periods of time.

Timetables are currently printed in a soft bound format. A change to loose leaf timetables would permit many informational items to be inserted directly into this publication. This would permit a reduction of the amount of information now included in superintendent's bulletins.

Concern CSX-23: FRA found the CSX Superintendent's Bulletins are not well organized. These bulletins are often lengthy, and are not arranged in logical sequence.

Recommendation: By increasing the frequency of issue for superintendents summary bulletins from a quarterly to a monthly summary, the number of bulletins in effect at any given time would be substantially reduced. This would also provide CSX with an opportunity to consolidate and sequentially categorize the required information.

Concern CSX-24: FRA also found that CSX uses an inordinate number of operating methods. CSX uses six methods of operation in addition to the primary methods of TCS, ABS, Interlocking, and Direct Train Control. FRA believes it is unnecessary to utilize all these operating methods. Further, such use, particularly when combined with the communication flow techniques described earlier, can lead to confusion by employees engaged in train operations.

Recommendation: It is FRA's understanding some of these methods of operation will be changed to DTC as the various line segments involved come under the control of the Jacksonville Center. Apparently, CSX recognizes that considerable time, expense, and training problems which would be encountered if it were necessary to familiarize dispatchers with these methods of operation. Further, development of a rules logic matrix required to make these operating methods compatible with the computer system would

be extremely difficult. The same wisdom should be applied to the present operating environment.

Concern CSX-25: FRA found that the CSX yard limit rule (93) is ambiguous. The rule requires trains to comply with the FRA rule (49 CFR 218.35) except within signaled territory. It is FRA's judgement that this rule has no practical application where interlocking rules and traffic control signal system rules are in effect. The rule is therefore likely to confuse employees. To compound the problem, many divisional timetables contain special instructions which modify this rule in various manners.

Recommendation: CSX must amend their current yard limit rule to coincide with the Federal rule. Further, the timetable special instructions used to modify this rule should be carefully reviewed, and all such instructions eliminated where warranted.

Concern CSX-26: FRA found that train crews operating within Yard Limits in the Phosphate District of the Tampa Division are being required or requested to maintain maximum authorized speed or full throttle with extremely heavy trains in order to manage steep ascending grades. Train crews are in effect being motivated to violate the yard limit rule (CSX Rule 93 and FRA Rule 49 CFR 218.35) since it is unlikely they could stop within one-half the range of vision as required.

Dispatchers indicated this situation is exacerbated because preceding trains are sometimes instructed to leave main track switches in reverse position at locations where this is not permitted by railroad special instructions. The dispatchers stated they are instructed by carrier officers not to protect these following movements in such situations as required by CSX Rules 104 (f) and 593. Yet these dispatchers said they feared reprisals if they fail to protect such movements and an accident occurs.

Recommendation: CSX should evaluate use of the yard limit rule on this district. If it is necessary to operate trains in this fashion, an alternate method of operation should be used. Crew members and dispatchers should not be required, permitted, or encouraged to violate established rules and special instructions.

Concern CSX-27: It was noted during the assessment that CSX had failed to designate that yard limits (Rule 93) were in effect on the Barr, Blue Island, Alternate, and Chicago Heights Subdivisions.

Recommendation: CSX must designate yard limits in timetable or other instructions as required by 49 CFR 218.35.

Concern CSX-28: At most offices assessed, there were frequent radio rule exceptions noted. Many of these exceptions were extremely serious in nature including failure of the dispatchers and train crews to comply with 49 CFR 220.61 (transmissions of train orders by radio), and failure to assure on-track authorities are properly transmitted and repeated. These deficiencies also included occasional failure of train dispatchers to properly identify their stations, frequent failure of other employees to properly identify their stations, failure of the train dispatchers to require employees to use proper identification, and failure to use the words "over" and "out" when required.

Recommendation: CSX must more closely monitor employees engaged in radio communications, and take the actions necessary to assure compliance with Federal and carrier rules.

Concern CSX-29: Train dispatchers assigned to two desks at the Atlanta field office do not record track time and authority on written or CRT screen forms as required by carrier rules. These movements are protected by blocking signals (also required by carrier rules), which causes the signals to display a blue color on the screen. The times the signals are blocked are logged by the computer, but the computer does not identify the employee granted track authority by the dispatchers.

In the event of a power failure, the CRT screen goes dark. There is no back-up power supply. When power is restored, the screen does not display the signals previously blocked by the dispatcher. These blocks are, in effect, automatically cancelled by the computer.

Recommendation: The carrier must review the procedures at these desks and either require dispatchers to use hand written forms, or develop the software necessary to provide a suitable form on the dispatchers' computer display screens.

Concern CSX-30: Inspection of train order books at Evansville, IN disclosed that one such book contained illegible train orders, train orders with erasures and alterations, and other deficiencies.

Recommendation: CSX should periodically inspect documents used by train dispatchers to assure compliance with carrier rules and procedures. These inspections should be made in accordance with the railroad's program of operational tests and inspections.

Concern CSX-31: At Louisville, KY, one instance was noted in which an employee who was granted authority to occupy a segment of main track, in turn gave another employee permission to occupy the track under the original authority. The second employee then reported clear to the dispatcher and requested that the

dispatcher contact the employee who had been granted the authority and advise him that the second employee was clear of the track.

Recommendation: The carrier should implement standard instructions to maintenance of way employees which would eliminate the possibility of such second hand information.

Concern CSX-32: Dispatchers at Louisville, KY occasionally requested that a signal maintainer line a manually operated crossover switch in traffic control territory in order to expedite train movements.

Recommendation: CSX should discontinue the practice of employees other than train crews and switchtenders handling manually operated main track switches.

Concern CSX-33: FRA noted a continuing violation of CSX Rule 707 (c) at the Saginaw, MI, office. Instead of taking the track out of service as required, the dispatcher would issue train orders permitting movements onto the section of the track where contractor employees and equipment were located.

Recommendation: CSX should monitor the actions of dispatchers during such operations to assure compliance with carrier rules.

Concern CSX-34: During the assessment, FRA discovered that some blocking devices for one of the traffic control machines at Saginaw, MI were ineffective, and there was an insufficient supply of blocking devices at Savannah, GA.

Recommendation: CSX should assure that all dispatching offices have a sufficient supply of blocking devices when required. These devices should be tested to assure they function as intended.

Concern CSX-35: It was noted on the Detroit Division that the maintenance of way department consistently failed to use temporary speed signs when placing speed restrictions, although required to do so by carrier rule 43.

Recommendation: Management of this division should take action to assure maintenance of way employees are in compliance with these carrier requirements.

Concern CSX-36: Failure of the carrier to install remotely controlled switches at the Deshler, OH, Interlocking, in conjunction with failure to equip trains with cabooses or operative end-of-train devices, created stress, train delays and other safety related problems for dispatchers. Because of this condition, dispatchers frequently found it necessary to authorize

the operation of trains against the established current of traffic for a distance in excess of 60 miles.

Recommendation: The railroad should either discontinue the practice of permitting train crews to leave main track crossover switches open at the Deshler Interlocking, or install remotely controlled electric switches.

Concern CSX-37: At Cincinnati, inspection of train order books and discussions with dispatchers disclosed violations of CSX Rule 214. This train order rule was not being applied to trains operating from the Louisville, KY area through the Latonia, KY, Interlocking toward Cincinnati.

Recommendation: Management of the Corbin Division, who are responsible for the Cincinnati Terminal, should investigate the procedures being used to deliver speed restrictions and other mandatory directives. Any deviations from Federal or carrier requirements should be corrected.

Concern CSX-38: At Dayton, OH, FRA noted deficiencies in the CSX DTC method of operation. Although there are pre-printed forms for use by train crews, and recommended verbiage in the radio rules, the use of neither is required. Radio communication of one such authority was monitored in which the engineer of the train involved failed to properly identify his train, a serious offense given the potential consequences. The dispatcher took no exception to this failure by the engineer.

Recommendation: The carrier should review the procedures used by the various dispatching offices for transmission and receipt of these important authorities. A standard procedure should be established which would provide an adequate degree of safety in these communications.

Concern CSX-39: Inspections at Dayton, OH disclosed there is no standard format in use by train dispatchers when issuing authorities for track car movements. A maintenance of way officer and trainmaster indicated that such standard verbiage forms are used by employees receiving such authorities, but it was apparent the dispatchers were issuing these authorities by rote. A potential for misunderstanding of these permits exists.

Recommendation: CSX should take the action necessary to assure the proper forms are being used for these on-track authorities.

Concern CSX-40: Inspections of records at Dayton, OH disclosed all Federally required information is not recorded on the dispatchers' records of train movements.

Recommendation: The carrier must assure all Federally required information is so recorded.

Concern CSX-41: At Dayton, OH. a train dispatcher was observed issuing authority for movement on a track car in DTC authority using CSX Rules 120-132 inclusive, which apply only to trains. This dispatcher also entered this track car authority on the train sheet in the blocks reserved for DTC train movements instead of the blocks reserved for track car movements.

Recommendation: CSX management should assure that train dispatchers are familiar with the DTC and OTE rules, and apply these rules as intended.

Concern CSX-42: It was disclosed that DTC block forms were not used to record DTC train movements for one subdivision controlled by the Dayton, OH dispatching office. There was no space on the train sheet provided for this purpose.

Recommendation: Detroit Division management, who are responsible for this office, should assure dispatchers are properly recording DTC block information.

Concern CSX-43: FRA noted serious concerns at certain locations where two train dispatching districts interconnected on the Huntington Division. At these locations, one dispatcher could apply a track block to a portion of the district under his/her control, and the adjoining dispatcher could remove these blocks without the knowledge of the dispatcher who applied the block. After removing the track block, the second dispatcher could then display signals for trains. The problem apparently results because all dispatching districts at this field office share the same computer processor, and this processor to fails to recognize that more than one dispatcher may have blocking established at these contiguous locations.

Since the field audit of this office was conducted, one of the dispatching positions involved has been transferred to the Jacksonville Control Center. This problem, which can be corrected by improved operating practices or software changes, now exists between the Jacksonville and Huntington offices.

Recommendation: CSX should arrange to have the software program revised to provide an adequate measure of protection at locations where this condition exists. In the interim, the carrier should implement the historical practice of requiring the dispatchers to converse with one another and to assure that each has established blocks for contiguous locations.

Concern CSX-44: At the Huntington, WV office, CSX was permitting dispatchers to transmit and receive train orders and work authorities without fully complying with the requirements. There were occasions when the dispatchers and receiving employees only partially repeated these authorities. Also at this office,

division management was permitting dispatchers to issue mandatory directives via radio to train crews as if they were mere informational messages.

Recommendation: Management of the Huntington Division should discontinue the practice of permitting dispatchers to violate carrier rules, and strictly enforce both carrier and FRA requirements.

Concern CSX-45: The testing program in **CSX Form 120 ROP** has not been updated to reflect changes in the operation resulting from the opening of the Jacksonville Control Center. Classifications of officers with program responsibility do not correspond with the classifications of officers employed at the center.

Recommendation: The carrier should promptly update the program. Officers responsible for program management and participation should be specified.

Concern CSX-46: Carrier officers stated that both surprise tests and casual observations were conducted at the control center. As described, the surprise tests did not appear to meet the definition of same contained in Form 120 ROP.

Recommendation: The carrier should include in the update addressed in Recommendation CSX-45 a clear differentiation between surprise tests and casual observations. If the carrier intends officers at the control center to conduct surprise tests, the manner in which they are to be conducted should be clearly stated.

Concern CSX-47: The carrier's program is comprehensive in that tests are provided for all operating rules. Program audit and analysis, however, indicates that a minimal testing effort has been directed towards certain safety-critical rules.

Recommendation: The carrier should prioritize the testing efforts of its supervisors. To prevent reoccurrence of human factors accidents, rules which have been implicated in accidents should be targeted for increased testing activity. To achieve the program's stated goal of eliminating human failure accidents, safety-critical rules should receive a share of testing activity proportional to their criticality.

Concern CSX-48: The officer in charge of the testing program at the centralized facility has not been furnished with reports of testing activity.

Recommendation: Officers responsible for program implementation should be furnished with appropriate reports so that they can manage the program effectively. These reports should indicate activity by supervisor, by employee tested, by type of test, by

time of day test was conducted and by any other category deemed pertinent. These reports can achieve two functions. First, they can identify patterns of rules violations which can be addressed in a timely and proactive manner. Second, they can identify areas of excessive or insufficient testing activity.

Concern CSX-49: Only the chief train dispatchers conduct tests on train dispatchers at the control center.

Recommendation: The carrier should expose it's train dispatchers to the maximum number of opportunities for meaningful tests. Superintendents, assistant superintendents, trainmasters, road foreman, and division level engineering officers frequently interact with train dispatchers. Testing activity by supervisors outside the control center could provide the carrier with an additional perspective of the extent to which it's train dispatchers comply with the operating rules.

Concern CSX-50: Entrance into the Birmingham, AL dispatcher's office was not restricted to authorized personnel conducting official business. Maintenance of way, signal department and other employees were observed entering the office on a frequent basis attempting to engage the dispatchers in idle chitchat. Employees often request that the dispatcher ascertain the whereabouts of other employees, and relay radio messages to employees.

Recommendation: Management on the Mobile Division should restrict access to this office for official business purposes only.

Concern CSX-51: Crew dispatchers frequently request that on-duty train dispatchers at Jacksonville (Tampa Division) notify train and engine service employees, via radio, of the status of their assignments.

Recommendation: Tampa Division management should establish alternate procedures for notifying employees of assignment information.

Concern CSX-52: FRA found concerns throughout CSX, regardless of the type of radio system which was in place. The former Chessie radio system functioned well at locations where there were no major terminals or the base stations were far removed from those controlled by other train dispatchers. Where this was not true, there were problems. There were frequent false calls intended for dispatchers in other cities, channels intended for road train use were used by yardmasters and terminal switching crews, and channels intended exclusively for use to communicate with dispatchers were used by road crews engaged in such duties as adding or removing cars from their trains, and calling of wayside signal indications.

Identical problems existed with the former Louisville and Nashville and Seaboard radio systems. In addition, these systems had a higher proportion of locations where communications were inadequate because of unsuitable spacing of wayside base stations.

Recommendation: CSX should complete the proposed upgrading of the radio system as quickly as possible. Segregated frequencies for operations which do not involve the train dispatcher and increased frequency capabilities for locomotive radios should be provided.

CHAPTER 8- DENVER AND RIO GRANDE WESTERN RAILROAD COMPANY

I. INTRODUCTION

The Denver and Rio Grande Western Railroad Company (DRGW), headquartered at Denver, CO, is comprised of 2392 track miles exclusively in Colorado and Utah. The DRGW extends from Denver in the East to Ogden, UT, in the west and Walsenburg, CO, in the South. Major classification yards are located in Salt Lake City, UT; Grand Junction, Denver and Pueblo, CO.

DRGW has joint operating rights over the Union Pacific Railroad Company (UP) trackage from Pueblo, CO, to Kansas City, MO. Operations over the joint trackage is controlled and operated by UP personnel. The DRGW has two operating divisions. One is headquartered in Denver and the other in Salt Lake City. In 1987 the carrier operated 5,774,055 freight train miles which included 626,140 yard miles.

II. STAFFING AND TRAINING

Organization

The organizational structure of the DRGW dispatching office does not coincide with the traditional industry structure. Dispatchers and assistant chief dispatchers report to a transportation management officer who reports to the superintendent of transportation. The superintendent of transportation reports to the vice president of operations. Division superintendents are responsible for all of the employees on their division with the exception of the dispatchers.

The system dispatching office is staffed by a transportation management officer and two assistant chief dispatchers on each shift, daily. Five trick dispatchers work on the first and second shifts Monday through Friday. There are three trick dispatchers on the third shift on weekdays and all shifts on weekends.

The following table represents the track miles and method of operation at each weekday first shift dispatcher position.

TABLE DRGW-I

Desk Identity	Computer Assisted Dispatching	Track Warrant Control	Multiple Main Track	Total Track Miles
Console I	22	259	143	424
Console II	207	0	0	207
Console III	330	33	0	363
Console IV	176	53	0	229
Console V	138	43	0	181
Totals	873	388	143	1404

Secondary and branch lines governed by Rule 93 are not included in the totals.

Hours of Service

In 1987 DRGW dispatchers ceased to be represented by the American Train Dispatchers Association and became officials of the company. The dispatching office has six qualified dispatchers who are assigned as extra list employees. They may be required to perform any type of service in the dispatching office, including the Transportation Management positions. However, they usually work as assistant chief dispatchers and dispatchers.

In 1986 the DRGW did not report any cases where dispatchers performed service in excess of that provided by law. There were 120 occasions when dispatchers were required to work their rest days.

Records of train movements and related data that the carrier is required by federal regulation to maintain are entered manually or automatically into the system computer. Exception was taken to dispatchers failing to sign a record verifying their hours on duty.

Candidate Selection

DRGW offers employees of any craft the opportunity to apply and be considered for train dispatcher positions. Candidates are subjected to a formal personal interview and physical examination before being accepted into the training program.

Initial Training

Computer Assisted Dispatching (CAD) and Track Warrant Control (TWC) are the methods used to direct and control movements over DRGW trackage. A formal classroom training program is in place to teach and qualify students on the rules, special instructions and application of the operating rules and procedures. Simulated CAD and TWC exercises are an integral part of the classroom training. Promotion to dispatcher is dependent upon the student passing an oral and written test of the operating rules and on simulated on-track operations. Classroom training is followed by two to four weeks of on-the-job training with various dispatchers on all shifts.

Periodic Training

DRGW dispatchers are required to attend an operating rule re-examination and instruction class each year. At these sessions operating rules are discussed and attenders must pass a written examination consisting of 125 questions. A minimum score of 88 percent is required to pass the examination.

Each dispatcher interviewed, with one exception, advised that they had taken one or two road characteristic familiarization trips each year. The excepted dispatcher's last trip was about three years ago.

III. OPERATING RULES AND PRACTICES

In addition to the system timetable, dispatchers are governed by several systems of rules. The **DRGW Operating Rules** have been in effect since January 1, 1986. Train and other on-track movement operations between Denver and Pueblo, and Pueblo and Walsenburg which are joint operations with the Atchison Topeka and Santa Fe Railway (ATSF) and the Burlington Northern Railroad Company (BN), are governed by the **General Code of Operating Rules.** These operating rules were placed in effect on the ATSF October 28, 1985 and on the BN April 27, 1986. The procedures used by dispatchers are also enumerated in the **ATSF Rules and Instructions for Train Dispatchers and Control Operators** and the **BN Train Dispatcher Manual.**

Under DRGW operating rules train and on-track equipment movements are governed by Computer Assisted Dispatching (CAD) and track Warrant Control (TWC). In addition movements over joint ATSF and BN tracks are governed by **Rules Governing Movements Of Trains With The Current Of Traffic On A Main Track By Block Signals** (Operating Rule 251).

Following is a synopsis of exceptions taken by FRA during the assessment:

- o FRA noted there was a conflict between Operating Rule 93 and Operating Rule 409. There is an internal ambiguity over whether or not more than one train movement may take place within yard limits in TWC territory.

- o An engineer, while at the controls of a moving locomotive, copied a mandatory directive from a dispatcher.

IV. OPERATIONAL TESTING

During the assessment FRA requested the carriers records of efficiency tests performed on dispatchers in 1986 and the first three months of 1987. The DRGW was unable to provide any such records. Except for occasional on the job criticisms none of the dispatchers interviewed were aware that they had ever been the subject of an efficiency test. FRA concluded an effective program for testing dispatchers did not exist on the DRGW.

When notified of FRA's concern regarding the significance of a quality and effective dispatcher efficiency testing program DRGW officials advised that such a program would be immediately implemented.

V. ENVIRONMENT AND WORKLOAD

DRGW dispatchers work at combined Computer Assisted Dispatching stations and Track Warrant Control desks. No exceptions were noted with respect to lighting, heating, cooling, and ventilation.

An electronic key card system controls access to the Transportation Management area. Another key card is needed to access the dispatchers control center. Visitors must be accompanied by a system official into the outer area but are not permitted in the dispatchers work place.

In general, FRA found that the office provided an adequate working environment. All dispatchers wear headsets and the office is configured so that their activities are not distracting to each other. Territorial assignments are reasonable and except for occasional peak periods--usually on the day shifts--workloads are not so great so as to compel dispatcher to work beyond the limits of their capability.

During the assessment inspectors observed some dispatchers taking rest breaks in an area adjoining the dispatchers control room. However, all dispatchers were required to eat their lunch

at their console while continuing to conduct on-track movement activities.

VI. COMMUNICATIONS

Because most DRGW trackage is situated in rugged mountainous terrain and often severely affected by drastic weather changes, the primary communication system is microwave. Receiving and relay towers are located so that very few transmission or reception problems are encountered.

Separate transmitting/receiving frequencies are assigned at each dispatcher console. This system almost entirely eliminates overrides and disruptions from the radio activities of other DRGW dispatchers. This is not necessarily true when DRGW dispatchers communicate on the ATSF and BN radio channels with employees of those railroads. Both the ATSF and BN dispatcher radio channels are occasionally interrupted by transmissions from yard, MW, and signal personnel.

Following are exceptions taken during the assessment to the radio procedures of DRGW employees;

- Dispatchers and other employees did not end radio transmissions with the words "over" or "out" as required.
- Radio procedures of the dispatchers are good but compliance with the proper procedures by other Colorado Division employees is poor.
- The dispatchers did not require other employees to identify themselves as Federally required before continuing with radio transmissions.

CONCERNS AND RECOMMENDATIONS

Concern DRGW-01: Dispatchers are not verifying, by a personal signature, their hours of duty.

Recommendation: Hours of duty records must be personally signed.

Concern DRGW 02: Dispatchers and employees of the Colorado Division are not fully complying with Federal regulations and carrier operating rules during radio transmissions.

Recommendation: DRGW must instruct all employees in the proper radio procedures. The carrier must improve compliance with Federal radio standards.

Concern DRGW-03: A dispatcher was observed transmitting, by radio, a mandatory directive to an employee at the controls of a moving locomotive.

Recommendation: The DRGW must ensure that mandatory directives transmitted by radio are not copied by an employee at the controls of a moving locomotive.

Concern DRGW 04: FRA noted a conflict between Operating Rule 93 (Yard Limits) and Operating Rule 409. There is an internal ambiguity over whether or not more than one train movement may take place within yard limits in TWC territory.

Recommendation: The DRGW should take the action necessary to resolve discrepancies regarding these rules.

Concern DRGW-07: The Rio Grande operational testing program does not include testing of dispatchers.

Recommendation: The DRGW must immediately include dispatchers in their operational testing program.

CHAPTER 9- FLORIDA EAST COAST RAILWAY COMPANY

I. INTRODUCTION

The Florida East Coast Railway Company (FEC), headquartered at St. Augustine, Florida, operates about 534 miles of trackage within the state of Florida. It extends from Jacksonville on the north to Florida City on the south. The carrier interchanges with CSX Transportation at Jacksonville, Lake Harbor, and Miami. Interchange is also made with Norfolk Southern at Jacksonville. In 1987 FEC operated 3,257,874 train miles, of which 810,552 were yard and switching miles.

The railway consists of a single division with one dispatching office at New Smyrna Beach, Florida. The office is staffed by a chief train dispatcher who normally works the first shift. On each of the three shifts, there is one train dispatcher, who is assisted by an operator. There are no assistant chief train dispatchers.

II. STAFFING AND TRAINING

STAFFING

The train dispatcher reports to the chief train dispatcher, who reports to the superintendent. The chief train dispatcher is responsible for the overall operation of the dispatching office, and the supervision of support personnel. Operators at outlying locations are also responsible to the chief train dispatcher for duties related to the dispatching function.

Hours of Service

In 1987, the FEC did not report any cases in which train dispatchers performed service in excess of that permitted by The Hours of Service Act. During the same period, no train dispatchers were required to perform service on their assigned rest days.

Candidate Selection

FEC selects qualified operators as candidates for the position of train dispatcher. Officers stated that over the years the carrier has had good results from this system of selection.

TRAINING

During the assessment, FRA reviewed initial and periodic dispatcher training in the area of operating rules and timetable special instructions, new technology applications, and physical characteristics. The following is a synopsis of that review.

Initial Training

Candidates selected for the position of train dispatcher have been examined on the operating rules while performing service as an operator. Knowledge of the operating rules and past performance as an operator are considered in the selection process. After selection, the train dispatcher trainee enters a training program working under the supervision of experienced train dispatchers on each shift. After certification by each of the qualified dispatchers he has worked under, the trainee's progress is evaluated by the chief train dispatcher and the superintendent.

In most instances the newly qualified train dispatcher returns to his former position as an operator. He continues working in that position while occasionally working as an extra train dispatcher. This procedure continues until full time work becomes available.

Periodic Training

The FEC requires train dispatchers to attend a yearly instruction class on operating rules and pass a written exam. The written examination consists of 25 questions, upon which a minimum grade of 75 percent must be achieved. Should the dispatcher fail this examination, he is immediately reexamined. Should he fail the second examination, he is removed from service until he can pass the examination.

III. OPERATING RULES AND PRACTICES

The Florida East Coast has its own code of operating rules. The carrier uses timetable and bulletins to provide employees with additional information. Train and on-track equipment movements are governed by Traffic Control (CTC), Manual Block System (MBS), and Rule 251. FRA inspectors did not take any exceptions to the operating procedures of train dispatchers during the assessment.

IV. OPERATIONAL TESTING PROGRAM

FEC instructions for conducting and reporting efficiency tests provide for only one test to be conducted on dispatchers. That test covers the granting of exclusive occupancy track and time limits to maintenance of way employees. The program specifies that at least one test will be conducted by each officer daily, and recorded on the proper form for a permanent record.

In 1987, the carrier did not conduct any tests or inspections of train dispatchers.

V. ENVIRONMENT AND WORKLOAD

FRA found the dispatching office provided an adequate working environment including heating, cooling and ventilation. FRA analysis of the dispatchers workload disclosed no exceptions.

VI. COMMUNICATIONS

FRA found the radio channel used by the train dispatcher for voice control of trains and on-track equipment was receiving interference from U S Coast Guard radios. This interference was sufficient to require train dispatchers to repeat instructions several times in order to be understood. The same was true of persons repeating the instructions.

FRA discussed this subject with FEC management. They stated that another frequency was being tested to determine if there was less interference. If so, that channel would be used for dispatching functions.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern FEC-01: The small number of questions on the annual operating rules examination does not adequately test the dispatchers' knowledge of the operating rules. Further, the low passing grade for the number of questions compounds the inadequacy of the test.

Recommendation: A new examination should be developed with a broad range of questions devoted to all of the safety-critical operating rules for which the dispatcher is responsible.

Concern FEC-02: FEC failed to conduct operational tests and inspections of train dispatchers who deal with vital safety rules in train operations. This failure is contrary to Federal regulations.

Recommendation: The FEC must take appropriate action to ensure train dispatchers understand and follow applicable rules by performing operational tests and inspections on a regular basis.

Concern FEC-03: FEC instructions for conducting and recording operational tests and inspections only provide for one test on train dispatchers. This testing program is not adequate.

Recommendation: The carrier must revise the operational test program to assure that it provides for testing and inspection under the various operating conditions of the railroad.

Concern FEC-04: The reliability of the radio channel in use for voice control in manual block territory is of concern. Interference from other transmissions poses a threat to the safety of train and on-track equipment operation.

Recommendation: The carrier should take immediate steps to ensure the radio frequency used by the train dispatcher for the issuance of mandatory directives is free from interference that would compromise safety in train operations.

CHAPTER 10- GUILFORD TRANSPORTATION INDUSTRIES

I. INTRODUCTION

At the time of the FRA Assessments, Guilford Transportation Industries (GTI) consisted of two principal railroads: Springfield Terminal Railway (ST) and Delaware and Hudson Railway (DH). Since the conclusion of the assessments DH has entered reorganization under the control of a bankruptcy trustee and a designated operator. For the purposes of clarity and consistency this report first addresses system findings. Findings for both component railroads are then addressed separately.

GTI was established in 1981. It acquired the Maine Central Railroad (MEC) in 1981, the Boston and Maine Corporation in 1983, and the Delaware and Hudson Railway in 1984. When it acquired B&M, GTI also acquired B&M's interest in several subsidiary companies, among them ST. At the time of the FRA Assessment, GTI had leased the operation of MEC and B&M to ST. Although DH was not leased, it was operated as a unified part of the GTI system.

GTI owned and operated 2814 miles of track and leased an additional 321 miles. It had 2285 miles of trackage rights over other carriers, primarily Conrail and Amtrak. It operated in 9 states and 2 Canadian provinces. It extended from Mattawamkeag, ME on the east to Buffalo, NY on the west and Alexandria, VA on the south.

The System Operations Control Center was located in North Billerica, MA as was the ST dispatchers office. The DH dispatchers office was located in Colonie, NY. Both offices were assessed by FRA in 1987 during the National Train Dispatchers Assessment and again in 1988 in conjunction with the Guilford Transportation Industries System Safety Assessment. This report contains findings from both assessments.

During the 1987 assessment the North Billerica office contained two additional dispatching positions. These positions dispatched commuter train territory in the greater Boston area. GTI operated this commuter service until January 1, 1987 at which time the operation was assumed by Amtrak. Dispatchers covering these positions at the time of the assessment were Amtrak employees. These positions have been moved since the completion of the assessment and are now located in the North Station complex in Boston. FRA assessment findings for these positions are found in the Amtrak section of this report.

On November 2, 1987 the United Transportation Union initiated a job action against GTI. The dispute was still in progress at the time of the second FRA Assessment.

Table GTI-I
TRAIN DISPATCHING OFFICES AND
DISPATCHER POSITIONS PER TRICK

LOCATION	FIRST	SECOND	THIRD	TOTAL
North Billerica, MA	6	5	4	11
Colonie, NY	2	2	2	2
TOTALS	8	7	6	17

The 1987 job action created a very fluid assignment situation at the North Billerica office. Assignments varied from day to day and on each shift depending on traffic flow and employee availability. The office is arranged so that four, five, or six dispatchers may work at one time.

II. STAFFING AND TRAINING

Organization

At the start of the second assessment, FRA requested copies of the GTI organization charts for the various departments. The carrier had no such charts. A chart was prepared showing the president and chief executive officer followed by 10 vice presidents. There are no formalized charts extending below the level of vice president. Some officers were unclear as to whom they reported. The chart provided to FRA shows the carrier with two vice presidents of transportation. Both report directly to the president.

Significant changes have impacted on ST train dispatcher staffing and workload since the start of the GTI acquisition and leasing program.

- The former MEC office in Portland, ME was relocated to North Billerica.
- The dispatching of most commuter train territory in the Boston area was transferred to Amtrak when that carrier assumed operations of commuter service. A disproportionate number of train dispatchers elected to accept employment with Amtrak.
- ST train dispatchers changed from agreement employees to non-agreement employees.
- Scheduling and locomotive utilization responsibilities on the DH were transferred from the DH dispatchers office to the ST office.

The ST office was staffed by the director of train operations or his assistant and a chief dispatcher on the day shift, an assistant chief dispatcher and four to six trick dispatchers on each shift daily. Six dispatcher districts comprise the ST operation. Train movements are controlled by TCS, ABS, and a Voice Control System.

The DH train dispatchers office was not as greatly impacted. Except for the scheduling responsibilities and an associated reduction in the number of supervisory employees, changes were minimal. The DH office was staffed by a chief dispatcher on the day shift, an assistant chief dispatcher on the afternoon and night shifts and two trick dispatchers on each shift daily.

Hours of Service

Normal attrition, resignations, transfer of experienced dispatchers to Amtrak, and the impending consolidation plan resulted in a severe shortage of dispatchers. The labor disputes in 1986 and 1987 exacerbated the situation to the point where there was an insufficient number of employees available to perform normal relief service.

Springfield Terminal

In 1986 the ST office reported 136 instances when train dispatchers performed service in excess of that permitted by the Act.

Delaware and Hudson

In 1986 the Delaware and Hudson reported 117 instances when dispatchers performed service in excess of that permitted by the Act.

Overtime

Springfield Terminal

In 1986 ST train dispatchers were required to work on their assigned rest day 378 times.

Delaware and Hudson

In 1986 DH train dispatchers were required to work on their assigned rest day 50 times.

Candidate Selection

Selection and training of dispatchers was not the responsibility of the ST and DH. It was a GTI System function. The Guilford component railroads historically selected dispatcher candidates from the operators craft. The closing of operators offices

diminished this labor pool on Guilford as on other railroads throughout the country. In addition the carrier did not hire replacement dispatchers due to the proposed consolidations. During the 1987 labor dispute some train dispatchers and their supervisors were used in train and engine service and as pilots. This created an immediate need for additional dispatchers.

Initial Training

During and between FRA assessments, the carrier's initial training program was impacted significantly by the labor disputes and was modified frequently. Employees from all crafts and new hires were eligible for consideration as train dispatcher trainees. A selection committee included the General Manager, Director-Train Operations, Assistant Director-Train Operations/Training, and Director of Operating Rules. Training was predominantly on the job. One week of the training period was devoted to classroom instruction and testing on rules and special instructions. There is no established training schedule. Promotion to dispatcher varied with each individual's progress and ability. On the job training was usually accomplished with experienced dispatchers.

Periodic Training

GTI train dispatchers were required to attend an annual instruction class on operating rules. The carrier had no other periodic training requirements or programs.

There was no policy for periodic road trips for dispatchers. FRA interviewed dispatchers who stated that they had not ridden over the territory under their jurisdiction for more than five years.

III. OPERATING RULES AND PRACTICES

In addition to timetables, Guilford has established its own code of operating rules. This code, **Rules Governing Transportation,** was made effective starting in 1985. Unlike some other railroads, Guilford has no additional rules for operators and dispatchers.

Train and on-track equipment movements are governed by traffic control, automatic block, and voice control systems. The GTI voice control system is similar to the track warrant control system in service on other carriers.

In the event of an emergency such as an accident, passenger train derailment or hazardous material spill, the Director-Train Operations or his assistant has overall command. Both these employees are located at North Billerica, MA. Separate emergency plans exist for both the ST office and the DH office.

At the ST office a adequate and detailed emergency plan is published and available at each dispatcher console. However the plan has not been updated recently. At the DH office an emergency plan is located in the chief dispatcher office. It contains limited guidelines for actions to be taken in the event of a hazardous materials spill or passenger train accident. The plan does not have detailed instructions and route maps. A copy of the plan is not available at the dispatchers consoles.

The Guilford operating rules provide for the use of a Form M in lieu of train orders. Form M's are used to authorize movements not otherwise provided for and to communicate speed restrictions and other safety-critical information not otherwise communicated. Form M authorities are recorded by the dispatcher in a bound book of 600 such forms.

Springfield Terminal

One book of completed Form M's was inspected to determine the number of deficiencies, if any, noted when compared to the requirements found in the operating rules. This inspection disclosed 394 deficiencies as follows:

- Rule 204. Unauthorized erasures or alterations.
  Deficiencies - 27

- Rule 205. Occupation of employee receiving Form M not entered.
  Deficiencies - 79

- Rule 207. Dispatcher did not underline each written word and figure when it was repeated by the receiving employee.
  Deficiencies - 1

- Rule 208. Dispatchers initials not entered on Form M.
  Deficiencies - 5

- Rule 209. Required entry not made to indicate when a Form M was fulfilled or cancelled.
  Deficiencies - 132.

- Rule 212. Time blocking devices were applied and/or removed was not entered on the Form M.
  Deficiencies - 131

- Rule 214. Unauthorized abbreviations.
  Deficiencies - 10

- Rule 902. Form M transfer not signed by dispatcher.
  Deficiencies - 9

FRA took particular note of the 131 deficiencies in the execution of Rule 212. Under this safety-critical rule, when the limits of authority on a Form M are defined by control points at one or both ends, the levers which control the signals providing access to the protected limits must be set at stop and blocking devices applied. The dispatcher must record on the Form M the time when the blocking devices are applied with the abbreviation " BDA " and the time they are removed with the abbreviation " BDR ". Blocking devices may not be removed until the movement being protected is complete unless other protective measures are taken. Before issuing a Form M the dispatcher must apply the blocking device(s) or if the control point protecting the movement is manned by an operator the dispatcher must receive information from the operator that the blocking device(s) have ben applied.

A second Form M book was examined. The purpose of this examination was to identify the type of movement associated with a failure to record BDA or BDR. Results of the second examination are as follows:

- o Operate with exclusive occupancy on a specific track between two locations.
  Deficiencies - 10

- 0 Operate against the current of traffic.
  Deficiencies - 46

- o Work between two specific locations on a specific track.
  Deficiencies - 18

Delaware and Hudson

FRA Inspectors examined records of 2,400 Form M authorities, 60 dispatchers record of train movements and observed dispatchers in the performance of their duties at each position and on each trick. The inspectors identified more than 700 deficiencies in the records and other operating procedures.

Among the deficiencies identified:

- o Rule 205. Occupation of employee receiving Form M not entered.
  Deficiencies - 606

- o Rule 207. Dispatcher did not underline each written word and figure when it was repeated by the receiving employee.
  Deficiencies - 4

- Rule 209. Required entry not made to indicate when a Form M was fulfilled or cancelled. Deficiencies - 8.

- Rule 212. Time blocking devices were applied and/or removed was not entered on the Form M. Deficiencies - 62

- Rule 902. Form M transfer not signed by dispatcher. Deficiencies - 23

- The carrier did not enforce compliance with Rule 110. This rule requires that the Form M be used when temporary speed restrictions are issued to trains.

- Entries on the dispatchers record of train movements for the movement of on-track equipment are not recorded in a uniform manner. Some entries show working limits without recording times. Some entries show a cancel time at the top of the sheet while others simply show a red line.

IV.OPERATIONAL TESTING PROGRAM

GTI is required under 49 CFR 217 to conduct a program of operational tests and inspections of train dispatchers. The assessment documented an almost total collapse of this program.

Springfield Terminal

1986 tests: 0

1987 tests: 26

- Springfield Terminal Tests for 1987 include the period August 1987 to March 1988 only. During this period there were three reported failures by employees who were disciplined by verbal reprimand. Several of the tests were for rules which do not apply to a train dispatcher such as the use of radio in switching operations and having an adequate supply of fusees and torpedoes. Three percent (2) of the tests were conducted between the hours of midnight and 6 a.m.; 45 percent (28) between 6 a.m. and noon; 15 percent (10) between noon and 6 p.m.; and 37 percent between 6 p.m. and midnight.

Delaware and Hudson

1986 tests: 14

1987 tests: 66

- Only seven test categories were included in the 1987 tests. Sixty-five percent of the tests were for compliance with the radio rules. There were no recorded tests on the completion or maintenance of the Form M book. The five failures were handled with verbal reprimands.

As a result of FRA findings the carrier was cited for failure to comply with 49 CFR 217 and civil prosecution has been recommended.

On December 22, 1987 GTI submitted to FRA copies of a revised program of operational tests and inspections, which for the first time provided for a uniform program on the entire railroad. In March of 1988 the program had not yet been implemented. Meetings were held with senior carrier officers, including the president of the railroad, to discuss this and other issues. In response to FRA concerns the program was implemented immediately.

V. ENVIRONMENT AND WORKLOAD

Springfield Terminal

- The environment at the North Billerica office was good with the exception that the office coffee pot, hot plate and refrigerator are located in the District 1/2 dispatcher's office. The result is that this office is an employee gathering place to obtain coffee, prepare meals and engage in non railroad related conversations.

- During the 1987 assessment the workload of several dispatchers was noted to be high. None were so extreme, however that the dispatcher appeared to be working without sufficient time to function safely. During the 1988 assessment traffic was at reduced levels due to the labor dispute. None of the positions assessed at that time exhibited a high workload.

Delaware and Hudson

- The Colonie dispatcher office is in a poor state of repair. Many acoustical ceiling tiles are missing and other tiles are dislodged and ready to fall. Ceiling light fixtures are without fluorescent bulbs.

- The two dispatchers desks and control panels are located in separate rooms adjacent to the chief dispatchers office. It is necessary to walk through

the District 8 office to reach the District 7 office. The coffee pot, microwave, and entrance to the mens room are also located in the District 8 office. Their use contributes to some noise and distraction.

- o During both assessments the workload of dispatchers did not appear to be unreasonable. However, as noted in the following section, the condition of the various communication systems adversely impacted both environment and workload.

VI. COMMUNICATIONS

In recent years GTI, like many other railroads, has constructed its operating practices to rely more heavily on radio as a means of communication. Under Voice Control System rules, train dispatchers issue authority for movement directly to train crews. A highly reliable radio system is necessary for this type of system to function as intended. The carrier has not upgraded the radio system to meet the needs of its revised operating practices.

Springfield Terminal

- o The transmission quality of the radio system at all dispatcher consoles in North Billerica ranged from marginal to non-functioning.

- o The system installed at the District 1/2 dispatcher's consoles is of old technology and produces poor reception and much static. This position includes 244 miles of VCS territory.

- 0 At the time of the second assessment, the base stations and Portland and Danville, ME, had not been functioning for four days. The South Paris, ME, base station provided extremely poor transmission capability. Dispatchers issuing Form M authorities and other safety-critical communications had to repeat transmissions several times. It was also necessary to request repetitions from employees repeating mandatory directives.

- o At the District 3/4 console radio interference was noted. This occurs because of the arrangement of single end to end radio frequencies.

- o The telephone and office intercom systems functioned adequately.

Delaware and Hudson

- The train-to-dispatcher radio system is a tone control type. Unlike tone control systems used by some other railroads, the DH system does not have an emergency feature. When a train crew member activates the tone control, the dispatcher's communications panel shows an illuminated indication. The dispatcher then must activate an unmute control to communicate with the train crew. The dispatcher is not provided with any means of determining whether the transmission is routine, urgent, or of an emergency nature.

- The telephone system at the District 8 position has 5 separate telephone instruments. Each has its own bell. Some are outside the reach of the dispatcher when seated at the console.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern GTI-01: During the assessment FRA noted that the carrier has no organization charts. Due to parallel position titles, some officers did not know to whom they reported.

Recommendation: The carrier should adopt, publish, and implement organization charts. The chain of command and reporting responsibility should be clearly understood by all officers.

Concern GTI-02: The staffing level of train dispatchers had been reduced to the extent that an insufficient workforce remained to allow for scheduled days off. Violations of the Hours of Service Act occurred. Prior to the labor disputes the carrier could have avoided these violations if it had exercised due diligence by employing a sufficient number of train dispatchers.

Recommendation: The carrier must maintain a sufficient staffing level to avoid violations of the Hours of Service Act and provide for regular relief days.

Concern GTI-03: There is no set schedule for initial training of train dispatchers.

Recommendation: In order to establish uniform and consistent training, the carrier should a develop and publish a minimum initial training schedule.

Concern GTI-04: Except for rules training, the carrier does not have a program of periodic training for dispatchers. Some dispatchers had not ridden over the railroad under their jurisdiction in more than five years.

Recommendation: The carrier should adopt, publish, and implement a policy for periodic retraining of dispatchers. A component of this retraining should be riding over territory under the dispatcher's jurisdiction.

Concern GTI-05: The emergency plan at the ST office has not been updated recently. The emergency plan at the DH office is not of sufficient detail and is not furnished at the dispatcher consoles.

Recommendation: The carrier should analyze its needs for emergency plans. Current, detailed plans should be provided to those who will execute them.

Concern GTI-06: Inspections detected a pattern of non-compliance with the operating rules regarding the issuance of Form M authorities.

Recommendation: The carrier should exercise sufficient vigilance--through supervision and operational testing--to ensure that the operating rules are complied with.

Concern GTI-07: Operational testing and inspection had virtually ceased to function.

Recommendation: The carrier must implement the revised testing program.

Concern GTI-08: The Colonie, NY office is in a poor state of repair. The floor plan and "kitchen" location provide for an opportunity for the train dispatcher to be subject to distractions.

Recommendation: The Colonie office should be maintained and arranged in a manner conducive to the safe functioning of the dispatchers working there.

Concern GTI-09: The communications systems used by train dispatchers to issue safety-critical information is so antiquated that it adversely affects the dispatchers environment and workload.

Recommendation: The carrier should conduct an engineering audit to analyze current communications needs. Each dispatcher position should be provided with the quality of communications systems needed to perform the required duties safely and efficiently.

Note: FRA specifically addresses those concerns and recommendations which apply to the Delaware and Hudson Railway to the current operator of that property.

CHAPTER 11- GRAND TRUNK WESTERN RAILROAD COMPANY

I. INTRODUCTION

The Grand Trunk Western Railroad Company (GTW) headquartered at Detroit, MI, operates freight trains over 1,227 track miles in four states. The GTW extends from Port Huron, MI, to the east to Chicago, IL, to the west and Toledo. OH, to the south. Major classification freight terminals are located at Battle Creek and Ferndale, MI, and Toledo, OH. At the time of the assessment, the railroad system was comprised of thirteen subdivisions. On October 5, 1986 all GTW dispatching offices were combined into one system office at Pontiac, MI.

In 1987 GTW operated 5,020,005 train miles which includes 1,932,498 yard miles.

II. STAFFING AND TRAINING

Organization

The GTW dispatchers report to the Chief Dispatcher who is responsible for the overall supervision of the dispatchers office. The dispatching office is staffed by a Chief Dispatcher on the day shift Monday through Friday; two assistant chief dispatchers and four trick dispatchers on each shift, daily.

Hours of Service

In 1987, the GTW reported to the FRA 61 instances in which dispatchers performed service exceeding that provided by law. Carrier officials explained that the excess service occurred as a result of the consolidation of the dispatching offices into the system office at Pontiac. The necessity to provide training to the dispatchers on new positions created a temporary staff shortage.

GTW dispatchers worked 1,014 rest days in 1987 because of the temporary staff shortage.

Presently the carrier employs an adequate number of qualified extra dispatchers to meet the staffing needs of the office.

Candidate Selection

The GTW permits employees of any craft the opportunity to apply and be considered for train dispatching positions.

Initial Training

Dispatcher candidates are trained for 60 days on the job under the supervision of the chief dispatcher or a designated trainer.

The trainee is required to pass a written 100 question operating rule examination with a minimum passing grade of 80 percent. The examination covers the operating rules, regulations and responsibilities of the train dispatcher position. The trainee must qualify on the physical characteristics of the railroad. A trainee is promoted to dispatcher after he has completed the training and been favorably evaluated by the Chief Dispatcher.

Periodic Training

Train dispatchers are instructed and examined on the operating rules and procedures at two year intervals. A dispatcher who fails to pass the reexamination is relieved of his dispatching duties. That individual will continue to work in another capacity until he can successfully pass the exam.

It is carrier policy to provide all train dispatchers an opportunity to make a familiarization trip over their assigned territory once a year. Of the dispatchers interviewed, only one indicated that he had not done so. He was working a new assignment and said he had not been over that territory in more than 15 years.

III. OPERATING RULES AND PRACTICES

Operating Rules

Dispatchers are governed by the **Grand Trunk Western Employee Operating Timetable**, effective May 1, 1988, and the **GTW Operating Rules**. These rules have been in effect since January 1, 1984. The GTW is currently developing a dispatcher's manual that should be completed in the near future.

Train and on-track equipment movements are governed by Centralized Traffic Control (CTC), Radio Control Block System (RCBS), Direct Traffic Control (DTC), and Rule 251. There are numerous main tracks that are governed by Operating Rule 93 (yard limits). On-track movements governed by Operating Rule 93 are not controlled by dispatchers.

Operating Procedures

The following is a synopsis of exceptions taken:

- Track permit records are entered in a log book with train orders, messages, dispatcher transfers, and other instructions. This method of record keeping does not provide dispatchers with an immediate visual record of track permits that are in effect.

- Train dispatchers are not recording weather conditions at six hour intervals as required by Federal regulations.

- Some dispatchers used radio procedures which did not comply with carrier operating rules and Federal regulations. Transmissions were not always ended with "over" or "out". In some instances the dispatcher did not correct those employees in the field who used improper radio procedures.

- Train and engine crews failed to use the railroad name or initials. Some dispatchers did not insist on proper identification before proceeding with the transmissions.

- On two occasions the conductor of a train crew received and copied "RCBS" authority from the dispatcher. The conductor immediately repeated it back to the dispatcher and was given an "OK" time. The conductor did not communicate the contents of the authority to the engineer prior to repeating it back to the dispatcher which is required by carrier operating rules.

IV. OPERATIONAL TESTING PROGRAM

The carrier's records showed that 75 efficiency tests were conducted on dispatchers in 1987. One failure was recorded, for a failure rate of about one per cent.. Since the GTW employees 37 dispatchers, there was an average of two tests per dispatcher for the entire year.

The FRA evaluation of the GTW testing program revealed that the tests performed were observation type tests conducted by the chief dispatcher. Although only one failure was recorded for the entire year, three dispatchers were disciplined during the same year for rules infractions.

V. ENVIRONMENT AND WORKLOAD

General

In general, FRA found the working conditions at Pontiac were adequate. Individual dispatching territories were assigned in a logical and reasonable manner. The workload appears to be evenly distributed to prevent the dispatchers from being overly burdened. The morale and work place environment were good.

GTW dispatchers work at computer assisted or centralized traffic control stations and voice train control desks.

The environmental considerations of lighting, heating, cooling, and ventilation were adequate. An emergency response plan was present that contained procedures and guidelines in the event it would be necessary to evacuate the dispatching office.

FRA found that the overall level of noise in the dispatching facility was not sufficiently loud to be distracting. Communications systems were clear with the exception of occasional radio channel overlap.

The workload at the TD-2 position has increased because the CTC control machine does not function properly. Occupied track indications sometimes disappear from the display panel at Holly, and the Holly block signal indicator light on the control panel sometimes fails to illuminate. According to the dispatchers this malfunction has been a problem for a long period of time.

VI. COMMUNICATIONS

General

GTW dispatcher's consoles are equipped with VHS radio channels, company telephones, and commercial telephones. Microwave relay stations provide reliable radio transmissions over long distances to many remote locations.

GTW radio channel number 1 is dedicated for dispatching purposes. Radio channel number 2 is assigned maintenance of way and signal department employees. The use of two channels eliminates much of the radio congestion.

FRA inspectors noted that the radio procedures of train dispatchers and other employees were generally poor. Notably lacking was the insistence by some dispatchers that employees initiating a transmission properly identify themselves (occupation and station) before continuing with a transmission and the use of the applicable words "over" or "out" when ending a transmission.

During RCBS radio transmissions the radio procedures of the employees involved in transmitting and receiving the directives, with one exception, were excellent.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern GTW-01: The method used to record track permit authorities and train orders does not provide dispatchers with an immediate visual record of permits that are in effect.

Recommendation: Track permits and train orders should be arranged so that dispatchers have an effective tool for visual recall.

Concern GTW-02: The operational efficiency test program is not adequate to determine if dispatchers understand how to apply the operating rules. Notably lacking were tests on safety-critical operating rules and dispatching functions. Only one official conducted tests on the dispatchers.

Recommendation: Officials from each department whose employees interface with the dispatcher should be required to conduct tests. The scope of those tests should include all of the safety-critical operating rules and functions for which the dispatcher is responsible.

Concern GTW-03: One train dispatcher had not qualified on the physical characteristics of his territory.

Recommendation: GTW should ensure this dispatcher is given the opportunity to review the physical characteristics in accordance with it's policy.

Concern GTW-04: Some dispatchers and the employees they interface with did not always use the proper radio procedures. In some instances the dispatcher did not require other employees to use proper radio procedures.

Recommendation: GTW should train all employees in the proper use of the radio. The carrier should intensify its operational testing of employees on radio procedures.

Concern GTW-05: The display panel at dispatcher TD-2 position occasionally malfunctions. The same failure has continued to occur for an extended length of time. The potential for making an error is intensified because dispatchers must remember train location indications which disappear from the panel.

Recommendation: The carrier must immediately correct this malfunction.

CHAPTER 12- ILLINOIS CENTRAL GULF RAILROAD COMPANY

I. INTRODUCTION

The Illinois Central Gulf Railroad Company (ICG), headquartered at Chicago, IL, operates over 3188 track miles in seven states. The ICG extends from Chicago southward to New Orleans and Mobile, AL. Major classification yards are situated in Chicago, Mattoon and East St.Louis, IL; Fulton, KY; Memphis, TN; Jackson, MS; and Baton Rouge and New Orleans, LA.

The ICG is separated into the Northern and Southern Operating Regions. The Northern region is headquartered at Chicago and the southern region at Jackson. In 1987 the carrier operated 8,846,289 train miles which included 2,173,932 yard miles. ICG also operated 78,893,918 passenger miles.

II. STAFFING AND TRAINING

Organization

In 1987, the ICG, as part of a reorganization, combined all dispatching office into one system office located at Chicago. The system dispatching office is staffed each day by a transportation officer and two supervising chief dispatchers on the day shift, daily. A supervising chief dispatcher and a chief dispatcher work on the second and third shifts, daily. Six trick dispatchers work on each shift, daily.

The chief dispatchers report to the transportation officer who in turn, reports to the assistant superintendent of transportation. Next in the line of management is the transportation superintendent who reports to the vice president of operations.

The transportation officer is responsible for the overall operation of the dispatching office and supervision of the dispatchers and the support staff in the office. The chief dispatcher and assistant chief dispatchers perform administrative functions.

Hours of Service

In 1987 the ICG reported to the FRA 23 cases in which train dispatchers performed service in excess of that permitted by Federal statute. A shortage of qualified dispatchers was stated as the reason for the excess service. Dispatchers were, on 136 occasions, required to work on their assigned rest days.

The dispatching office has six qualified dispatchers who are assigned as extra list employees. These employees are guaranteed compensation.

Candidate Selection

ICG offers employees of any craft the opportunity to apply and be considered for train dispatcher positions. Candidates are subjected to a formal personal interview and a written and physical examination before being accepted into the training program.

Initial Training

Historically the ICG has trained student dispatchers on the job. At the time of FRA's assessment no students were being trained but carrier officials stated that three employees were being considered for promotion to dispatcher. According to the officials a formal training program is being developed that will replace the present on-the-job training method. That program will include classroom instruction and limited on-the-job instruction with working dispatchers.

Periodic Training

The ICG requires that dispatchers attend an annual instruction class on the operating rules and instructions, with special emphasis on new operating rules or revisions in existing operating rules. A 100 question written examination must be passed with a minimum grade of 95 percent. Should the examination be failed, the dispatcher is permitted to continue working and successfully complete the written examination later. Those who cannot qualify are dismissed from dispatching duties.

Rule number 8 of the **ICG Rules for Train Dispatchers** requires that dispatchers "must be familiar with the physical characteristics of their dispatching territories". Of the eighteen dispatchers who were interviewed only one had taken a road trip in the last two years. Two had taken trips about three years ago. Eleven said that their last trip was more than three years ago. Four said they have never been over the territory they dispatch.

III. OPERATING RULES AND PRACTICES

In addition to the system timetable, dispatchers are governed by **The ICG Operating Rules** which have been in effect since January 19, 1987. The procedures used by dispatchers are enumerated in the **ICG Rules for Train Dispatchers** effective August 31, 1987.

Train and on-track equipment movements are governed by Centralized Traffic Control System (CTC); Track Permit Control System (TPCS); and Rules Governing Opposing and Following Movement of Trains by Block Signals (ABS).

Following is a synopsis of exceptions taken by FRA inspectors during the assessment:

- Dispatchers were not complying with rule 22 of the **ICG Rules for Train Dispatchers.** The rule specifies that the dispatchers transfer of records must be signed with the initials of both dispatchers and the time of the transfer must be shown.

  Inspection of the transfer records indicated that many dispatchers were not signing the record and entering the time when the transfer was completed. Inspectors also observed that some dispatchers had departed from the office before the relieving dispatcher had read and signed the transfer record.

- Operating rule 233 requires that both the conductor and engineer must have a copy of each track permit addressed to their train. Dispatchers were not requiring train crew members to confirm, after receiving a track permit, that this rule was being complied with.

- Some dispatchers failed to draw a red diagonal line or red "X" across a page of TPCS authority records when all items on a page and/or up to and including a page were no longer in effect.

- Many train movement records had not been recorded in a neat and legible manner as prescribed by rule 5 of the rules for train dispatchers.

- The weather was not being recorded at six-hour intervals as required by Federal Regulations.

IV. OPERATIONAL TESTING

FRA requested copies of records of efficiency tests performed on dispatchers in 1987, and, the results of those tests. The ICG was unable to provide the records. Carrier officials stated that, during that year, the transportation officer and the superintendent of rules had conducted operational tests on dispatchers but had not recorded them.

The absence of records prevents the carrier from establishing norms of performance of both the individual employee and groups of employees. Nor can the carrier determine those areas of employee non-compliance which might require additional training.

When notified of FRA's concern about the absence of an effective operational testing program for dispatchers ICG officials said such a program would be immediately implemented.

V. ENVIRONMENT AND WORKLOAD

ICG train dispatchers work at centralized traffic control stations and voice train control desks. Lighting, heating, cooling, and ventilation in the dispatching office were adequate.

In general, FRA found that the office provided a comfortable working environment. Individual dispatching districts were assigned in a manner that did not require dispatchers to work beyond their ability or potential.

VI. COMMUNICATIONS

The ICG has one radio channel assigned to the dispatchers which is used to transmit and receive mandatory directives, instructions and information regarding on-track movements.

During the assessment FRA inspectors monitored the dispatchers' use of the radio. The following was noted:

- There were interruptions and overrides on the radio channel emanating from other dispatching districts.
- There were interruptions caused by employees using the dispatcher's radio channel to conduct business unrelated to on-track movements.
- There were instances of non-compliance with federal regulations and carrier operating rules. Following are examples.
    1. Dispatchers and other employees did not identify the name or initials of the railroad when initiating a transmission.
    2. Failure of the dispatchers and other employees to end radio transmissions with the words "over" or "out".

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern ICG-01: The carrier--by rule--requires dispatchers to know the physical characteristics of the railroad. FRA found that 22 per cent of the dispatchers had not taken trips to learn these characteristics.

Recommendation: The ICG must implement a program of physical characteristics qualifications which is consistent with it's stated goals.

Concern ICG-02: During the assessment, FRA noted exceptions to the ICG rules and procedures. These exceptions applied not only to the dispatchers themselves, but also to the employees working with the dispatchers. In some instances the dispatchers took no action to correct those employees.

Recommendation: The ICG should monitor safety-critical dispatching functions. Instances of non-compliance should be handled for immediate correction.

Concern ICG-03: The operational efficiency testing program for dispatchers is inadequate.

Recommendation: ICG should require that all operating and engineering supervisory officials participate in the operational testing program.. The scope of the program should be sufficient to include all operating rules and instructions as well as the required work procedures. Special emphasis should be given to conducting tests on those safety-critical functions for which a dispatcher is responsible.

Concern ICG-06: Safety-critical dispatching functions which were being conducted on the radio were disrupted by interfering radio transmissions from employees who were using the radio for purposes not connected with the movement of trains and the protection of employees and equipment.

Recommendation: The ICG should immediately implement a program of instruction for all employees whose duties require them to use the carriers radio. Enforcement of the Federal regulations and carrier operating rules pertaining to radio procedures should be a made a strong part of the ICG operational testing program.

Concern ICG-07: Safety-critical dispatching functions which were being conducted on the radio were disrupted by overriding radio transmissions from adjoining dispatching territories.

Recommendation: The carrier should make every effort to limit interference.

CHAPTER 13- KANSAS CITY SOUTHERN RAILWAY COMPANY

I. INTRODUCTION

The Kansas City Southern Railway Company (KCS) headquartered at Kansas City, Missouri, operates over 1627 track miles in six states. The KCS extends southward from Kansas City to Port Arthur and Dallas, Texas and New Orleans, Louisiana. The dispatcher's office, located at Shreveport, Louisiana, is divided into two dispatching districts. Each district, comprised of numerous subdivisions, is supervised by a superintendent.

In 1987 KCS operated 10,594,383 train miles which included 1,075,711 yard miles.

II. STAFFING AND TRAINING

Organization

The KCS has an organizational structure in which train dispatchers report through the chief dispatcher to the director of dispatchers. The director of dispatchers reports to the division superintendent.

At the time of the assessment, the KCS had a total of eight train dispatchers, three chief dispatchers and a director of dispatchers. The dispatching office is staffed daily by a director of dispatchers and a chief dispatcher on the first shift. There is a chief dispatcher on the second and the third shift, daily, and two trick dispatchers on each shift, daily.

The dispatching office is divided into two districts. Console 1 controls on-track movements over 585 track miles by Centralized Traffic Control (CTC). Console 2 directs on-track movements over 461 track miles by CTC and 786 track miles by Direct Traffic Control (DTC). In the near future the carrier plans to install CTC over the entire system.

Hours of Service

In 1987, the KCS reported to the FRA nine cases in which train dispatchers performed service in excess of that permitted by Federal statute. Eight cases were reported to have been caused by a shortage of qualified dispatchers. In 1987, KCS dispatchers were required to work 92 rest days.

Candidate Selection

KCS currently offers employees with train order or operator background the opportunity to apply and be considered for train dispatching positions. The candidate must pass a written and physical examination prior to selection.

TRAINING

During the assessment, FRA reviewed initial and periodic dispatcher training in the areas of operating rules and timetable special instructions, new technology applications, and physical characteristics qualifications. Following is a synopsis of that review.

Initial Training

The dispatcher training program consists of formal instruction on the carriers operating rules and dispatching procedures in conjunction with on-the-job training. Trainees are also required to take a road characteristic familiarization trip over the territory they will dispatch.

Periodic Training

On January 1 and July 1 of each year dispatchers are required to read and sign the **Rules and Instructions for Train Dispatchers, Control Operators and Train Order Clerks.**

Dispatchers must attend an annual rules instructions class and complete a 100 question written examination with a minimum grade of 90 percent. Those who fail are reinstructed and reexamined. Upon failing the second examination, the dispatcher is withheld from service until the examination is passed.

Dispatchers are not required to periodically re-qualify on the physical characteristics of the railroad. Instead, road trips are taken by dispatchers at the discretion of the director of dispatchers.

III. RULES AND PROCEDURES

Operating Rules

In addition to a system timetable, dispatchers are governed by the **Kansas City Southern Lines Operating Rule Book**, which has been in effect since November 1, 1986. The procedures used by dispatchers are enumerated in the **Rules and Instructions for Train Dispatchers, Control Operators and Train Order Clerks.**

Train and on-track equipment movements are governed by Centralized Traffic Control (CTC) and Direct Traffic Control (DTC).

Operating Procedures

Following is an synopsis of exceptions taken by FRA during the assessment:

- Some dispatchers did not record extraordinary and unusual occurrences or the weather at six hour intervals as required by Federal regulations.
- Entries on the train movement record are not always made in a neat and legible manner as prescribed by the carrier operating rules.
- Dispatchers are using unauthorized abbreviations when recording mandatory directives.
- Multiple instances of the use of improper radio procedures were noted. Dispatchers were observed failing to properly use the railroad name or initials and the correct engine or track car number.
- General Orders were reissued with a number that had been cancelled during that year.
- Pages in the General Order book were missing or left blank.
- Dispatchers were observed extending track and time limits in CTC territory using unauthorized procedures.

IV. OPERATIONAL TESTING PROGRAM

The KCS operational testing program was last revised on July 4, 1982. It requires that each employee governed by the rules reread them January 1 and July 1 of each year. The director of dispatchers is responsible for assigning the monthly quotas of tests to be conducted by the district officials.

FRA requested a listing of the efficiency tests performed on KCS dispatchers during that year. The record indicated that seven of the eleven active dispatchers were subjected to 45 tests. One dispatcher was involved in 33 of the total tests, or 73 percent. There were no failures recorded.

The number of tests conducted is not only inadequate, but is also inconsistent with the carrier's stated policy that each district officer will conduct 25 efficiency tests per month, and, at least one test on each dispatcher every 90 days.

FRA must conclude the program does not adequately address Federal requirements.

V. ENVIRONMENT AND WORKLOAD

Individual dispatching districts are assigned in a logical and reasonable manner. Workloads are acceptable and do not require a dispatcher to work beyond his capabilities.

FRA found that work loads on the daylight shift were significantly higher than during other tours of duty. This was attributed to the demands placed upon first shift dispatchers by maintenance-of-way and signal forces.

The primary environmental considerations of lighting, heating, cooling, and ventilation were adequate.

Dispatchers work within one office. The overall level of noise was distracting to the extent that safety-critical radio communications often had to be repeated. The primary sources of the noise were open communication speakers. Although line static and hum were minimal, speakers were often adjusted to maximum volume so as to command the dispatchers attention over the surrounding din. Carrier officials had knowledge of the situation and concurred with FRA's opinion.

The mobile radio telephone system places an additional avoidable burden on the dispatcher. KCS supervisors regularly use it to talk to the dispatcher. Although the supervisors are equipped with mobile radio units, and the dispatchers' consoles are better equipped to receive those requests over the radio, the congestion on the radio channels frequently discourages the use of the radio. Many of those calls are not connected with dispatching functions and could well have been directed to someone other then the dispatcher. The workload is increased because the dispatcher must continuously monitor this additional communication device. In essence the dispatcher is, at times, used as a telephone operator to relay calls or information. That extraneous duty disrupts the dispatchers concentration and planning.

Unauthorized persons where observed in the facility. Conversations which did not relate to railroad operations disrupted dispatching functions and increased the overall noise level. Unnecessary foot traffic is also permitted in the work area.

VI. COMMUNICATIONS

General

Dispatcher consoles are equipped with VHF radio channels, company telephones, and commercial telephones. A mobile radio telephone system provides supervisors and other designated employees with mobile communication service. FRA inspectors noted that the radio procedures used by the dispatchers were well below average

while that of other employees conversing on the radio with the dispatchers were poor.

Also of concern was interference on the dispatcher's radio channel caused by transmissions from maintenance-of-way portable packsets and remote stationary field transmitters. Train and engine employees constantly initiated transmissions before listening to insure that the channel on which they intended to transmit was not already in use.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern KCS-01: KCS does not have a program requiring that dispatchers will periodically re-qualify on the physical characteristics of the railroad.

Recommendation: The KCS should consider a standard for periodic physical characteristics requalification of dispatchers.

Concern KCS-02: On numerous occasions dispatchers were in non-compliance with carrier operating rules and/or Federal regulations.

Recommendation: Supervisors must periodically monitor and test the rules compliance of dispatchers and the employees who interface with them.

Concern KCS-03: The operational testing program is inadequate.

Recommendation: The program should include tests on safety-critical operating rules and dispatching procedures. Realistic quotas of tests should be established to be conducted by officials of the engineering and the transportation departments. The carrier should determine a valid statistical norm for failure rates. The results of those tests should be compiled, evaluated and distributed to guide officials in recognizing repetitive failures by individuals or trends in failures by groups of employees.

Concern KCS-04: The high level of noise from open speakers is disruptive.

Recommendations: The KCS should consider the use of individual headphones or acoustically isolated cubicles for train dispatchers.

Concern KCS-05: Dispatching duties are disrupted when dispatchers are required to respond to calls on the mobil radio telephone system from supervisors. Often those calls are not connected with on-track movements.

Recommendation: The KCS should develop and enforce rules for supervisory use of the mobile radio telephone system. Non-essential calls should be directed to support personnel instead of the dispatcher.

Concern KCS-06: Unauthorized persons are allowed to enter the office and create noise that is distracting to the train dispatcher.

Recommendation: The carrier should restrict unauthorized persons from the dispatchers office.

Concern KCS-07: Dispatcher compliance with Federal and carrier radio rules and instructions is unsatisfactory. The dispatcher's radio channel is also congested with transmissions by employees conducting business that is not related to on-track movements.

Recommendation: The KCS should implement a program to enforce proper radio procedures by employees.

Concern KCS-08: The KCS **Rules and Instructions for Train Dispatchers, Control Operators and Train Order Clerks**, effective July 4, 1982 has not been revised or updated to keep the dispatchers informed of changes which have been made in the operating rules. FRA inspectors noted that this manual does not contain written procedures addressing Direct Traffic Control (DTC) and the computer aided General Railway Signal (GRS) system.

Recommendation: The KCS should update this publication.

CHAPTER 14- LONG ISLAND RAIL ROAD

I. INTRODUCTION

The Long Island Rail Road Company (LI), headquartered at Jamaica, NY, is the largest passenger train operator in the United States. In addition to a limited freight train operation, the railroad has 721 scheduled passenger trains per weekday carrying more than 281,000 passengers. In 1987 the carrier operated 3,367,580 total train miles, of which 33,890 were yard and switching miles. It also operated 816,954,888 passenger miles.

The Long Island Rail Road operates solely within the state of New York. It extends westward from Montauk Point and Greenport to Pennsylvania Station in Manhattan. There are also stations in the New York City Boroughs of Brooklyn and Queens. The railroad extends southward from Port Jefferson, NY, on the north shore of Long Island to Patchoque, NY, on the south shore. The train dispatchers office is located in the carrier's general office building at Jamaica, NY.

II. STAFFING AND TRAINING

The general superintendent of transportation has overall responsibility for the transportation department. The superintendent of train movements reports to the general superintendent of transportation. He is responsible for the management of the train dispatchers office and of block and interlocking stations.

Four supervisors of train movements report to the superintendent of train movements. The supervisors of train movements are management positions, exempt from the collective bargaining agreement. On weekdays, one supervisor of train movements is assigned to the dispatchers office on first shift, another is assigned to the second shift. The remaining two supervisors of train movements are assigned to supervise the duties of interlocking station operators.

The remainder of the dispatching office staff are union employees. They are assigned as follows:

First shift:	1 chief dispatcher
	1 assistant chief dispatcher
	4 train dispatchers
	1 PA system dispatcher
Second shift:	1 chief dispatcher
	1 assistant chief dispatcher
	4 train dispatchers
	1 PA system dispatcher

Third shift:	1 chief dispatcher
	2 train dispatchers
	1 clerk

The chief train dispatcher is responsible for the daily operation of the dispatchers office. He oversees the dispatchers and support staff. The assistant chief train dispatcher performs the industry standard ancillary functions. In addition the assistant chief is responsible for coordinating train movement over Amtrak trackage between Harold interlocking and Pennsylvania Station, New York. This includes coordinating with the Amtrak train dispatcher and interlocking stations.

The public address system (PA) dispatcher is a non-hours of service position. This dispatcher informs the public about train delays through the use of a public address system with speakers at each station. He also deals with the news media regarding service disruptions. This position is filled from the train dispatchers seniority roster. It is also used as a training position for new train dispatchers.

Hours of Service

In 1987 the LI reported no cases in which train dispatchers performed service in excess of that permitted by the Hours of Service Act.

Overtime

During 1987 LI train dispatchers worked on their normal relief days on 116 occasions.

Candidate Selection

The Long Island Rail Road offers interlocking station operators the opportunity to apply and be considered for train dispatching positions. Selection of candidates is at the discretion of the carrier.

Initial Training

When an interlocking station operator is selected to become a train dispatcher he is assigned to the train dispatchers office. He works as either an assistant chief dispatcher or a PA dispatcher. Both positions are under the supervision of the chief train dispatcher on duty. These positions expose the employee to the functions and responsibilities of the dispatchers office. The candidate works these two positions until a train dispatcher training class is scheduled.

The train dispatcher training class is a 14 week program conducted by the carrier training department. The program

combines formal classroom instruction, field instruction and on the job training. Candidates are given periodic quizzes on the rules and physical characteristics. The final segment of the program is administered by the manager-transportation rules and procedures. A two day final examination is administered. One day of the examination covers rules and procedures, the other day covers physical characteristics. The minimum passing score is 90 per cent.

Periodic Training

The LI requires train dispatchers to attend an annual instruction class on the operating rules and pass an examination. The examination consists of 25 questions. The minimum passing score is 85 per cent. The instruction and examination take about five hours.

Physical characteristics familiarization trips are provided at the discretion of the supervisor of train movements. FRA Inspectors questioned nine dispatchers regarding familiarization trips. Eight dispatchers stated that they had taken one such trip within the past year. One dispatcher stated he had not taken a trip within the last two years.

III. OPERATING RULES AND PRACTICES

Operating Rules

In addition to a system timetable, dispatchers are governed by the carrier's own code of operating rules. The following exceptions were noted by FRA during the assessment:

- Several train dispatchers were observed reading newspapers and books while on duty. There were books and magazines stockpiled at a dispatcher's desk. This constitutes a violation of the carrier's operating rule E.

- Train dispatchers on several occasions failed to sign the transfer from the train dispatcher they were relieving. This is in violation of the carriers operating rule 811. Signing the transfer certifies that the train dispatcher has read and understood all orders in effect and other instructions.

Operations on portions of the Long Island Rail Road are governed by traffic control system rules, automatic block signal system rules, and manual block signal system rules. Movements against the current of traffic in automatic block signal system territory are governed by manual block signal system rules. Technology currently exists to provide computer assistance in dispatching manual block signal system territory. This assistance can

perform conflict checks and take action to prevent the dispatcher from granting overlapping authority. The carrier has not availed itself of this technology.

Federal Regulations

- Dispatchers record of train movements on several occasions did not contain weather conditions at 6-hour intervals. This constitutes a violation of 49 CFR 228.17 (a)(4).

- Dispatcher's record of train movements did not contain the identification of engineers and conductors of scheduled passenger trains and their times on duty. This constitutes a violation of 49 CFR 228.17 (a)(5).

- Dispatchers record of train movements used on Section A did not contain the information about distances between stations. This does not comply with the requirements of 49 CFR 228.17 (a)(8).

Emergency Plan

Emergency plans for handling derailments, evacuations and fires are published in the timetable. This method allows employees a continuous opportunity to review the plans. A standard operating procedure book is located in the train dispatchers office. This book provides more detailed information. However, when reviewed by FRA the procedures book was found to be outdated.

IV. OPERATIONAL TESTING PROGRAM

Pursuant to 49 CFR 217, LI has in effect a program of operational testing and inspection for it's employees. However, train dispatchers are not being tested under this program. An officer assigned to the dispatchers office stated that it is the carrier's position that train dispatchers hold management-type positions and operational testing is unnecessary.

FRA does not agree. Under 49 CFR 217.9 railroads are required to conduct operational tests and inspections of employees to determine the extent of compliance with its code of rules and other instructions. Train dispatchers duties must be conducted with precision and in full compliance with the operating rules. An operational testing and inspection program is necessary to ensure rules compliance. A meaningful test and inspection program can also improve supervisors' awareness of the importance of operating rules compliance.

FRA noted violations of the operating rules which could have been detected by a testing and inspection program or supervisory vigilance. For example, dispatchers were noted reading

newspapers and books while on duty. This was brought to the attention of an officer. He stated that he did not take exception to the practice if a dispatcher's work was "caught up". This practice is in violation of the carrier's operating rule E.

V. ENVIRONMENT AND WORKLOAD

Environment

Train dispatchers are located in a large room which is divided by cubicals that are opened on the side, top, and bottom. Train dispatchers work stations are not sufficiently isolated to eliminate the noise generated by adjacent dispatchers, chief and assistant chief train dispatchers, clerical personnel and supervision. The communication system utilizes speakers which broadcast within office. Output from these speakers contributes considerably to the noise and distraction in which the dispatcher must function. FRA took no exceptions to the heating, lighting, and ventilation systems in the office.

Workload

None of the dispatchers on LI operate any type of traffic control or interlocking machines. This function is performed by operators at interlocking stations along the line of road. Dispatchers communicate with operators to issue directives for train and track car movements as required. FRA observed train dispatchers during all shifts and detected no excessive workloads.

VI. COMMUNICATIONS

Radio Procedures

FRA took several exceptions to the employee compliance with federal and carrier radio standards, procedures and rules. Dispatchers were noted:

- Ending a transmission to which a response is expected without using the word "over".
- Not using proper identification.
- Ending a transmission to which a response is not expected without the word "out".

During the commutation period when vital train information is being transmitted via the radio, FRA noted unnecessary and frivolous transmissions.

Train Information Monitoring and Control System

LI employs a computer aided traffic tracking arrangement known as the train information monitoring and control system or TIMACS. The system is designed to provide the train dispatcher with current information about the location of trains.

Computer monitors and terminals are located at each interlocking station and dispatcher desk. When a train passes an interlocking station, the operator strikes a single key on a computer terminal which generates a passing time for the train.

During the assessment FRA noted the following problems with the TIMACS:

- When a train passed a reporting location the operator inputed the passing time into the system but the passing time would not be sent to all system monitors.

- The system has not yet achieved a high degree of reliability. Train dispatchers stated it routinely fails. An FRA Inspector was present when the operator of a interlocking station on the Long Beach Branch reported that the TIMACS machine at that location failed.

- An FRA Inspector was present at the dispatchers office when the TIMACS indicated a passing time for a train when the train had not yet passed by the location. A carrier officer stated that the system had been incorrectly programmed and that the passing time which appeared on the TIMACS was the time for that train on a previous day.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern LI-01: Train dispatchers were required to work on their rest days on 116 occasions during 1987.

Recommendation: The carrier should review its personnel and staffing policies and procedures.

Concern LI-02: The annual rules examination for dispatchers consists of only 25 questions. An examination of this length may not be sufficient to accurately evaluate a dispatcher's knowledge of the rules.

Recommendation: The carrier should analyze the adequacy of the annual rules examination and modify it if necessary.

Concern LI-03: At least one dispatcher has not received a familiarization trip for more than two years.

Recommendation: The carrier should ensure that dispatchers are provided with familiarization trips at appropriate intervals.

Concern LI-04: Dispatchers were observed reading newspapers and magazines while on duty in violation of a carrier operating rule. A carrier officer did not take exception to the practice.

Recommendation: The carrier should ensure that its officers understand and enforce the operating rules.

Concern LI-05: Dispatchers were observed failing to comply with the operating rules requiring a signed transfer. The precise transfer of information at the change of shifts is vital to the safety of operations.

Recommendation: The carrier should ensure that the rules and procedures regarding transfer at the change of shift are complied with.

Concern LI-06: The carrier has not adopted the latest technology available for train dispatching in non-automatic block signal system territory.

Recommendation: The carrier should analyze the costs and benefits of available technology.

Concern LI-07: The dispatcher's record of train movements did not comply with the requirements of 49 CFR 228.17.

Recommendation: The carrier should comply with the requirements of the regulation.

Concern LI-08: The standard operating procedure book in the dispatcher office was not current.

Recommendation: The carrier should review the standard operating procedure book and its other emergency plans and procedures to ensure that they are current and sufficient.

Concern LI-09: The carrier is not performing operational tests and inspections on train dispatchers.

Recommendation: The carrier must promptly expand its operational testing and inspection program to include train dispatchers.

Concern LI-10: The noise level in the dispatchers office is of a volume sufficient to be a source of distraction. The design of communications speakers and layout of the office contribute to the noise level.

Recommendation: The carrier should institute a program to minimize unnecessary noise in the dispatchers office.

Concern LI-11: Multiple instances of non compliance with the radio rules, standards and procedures were noted. In addition, unnecessary communications were noted by FRA.

Recommendation: The carrier must ensure that all employees using the radio system understand the rules governing its use. Enforcement of these rules is both a federal regulation and requirement for the safety of operations.

Concern LI-12: Dispatchers stated concerns about the reliability of the TIMACS. FRA noted failures of the system. The possibility of granting overlapping authority exists if the system does not accurately record the locations of trains. The dispatcher must know the locations of trains before granting mandatory directives such as track car permits.

Recommendation: The carrier should not rely on the TIMACS for safety critical applications until the system is operating reliably.

CHAPTER 15- METRO-NORTH COMMUTER RAILROAD COMPANY

I. INTRODUCTION

The Metro North Commuter Railroad (MNCR) dispatching office is located at 347 Madison Avenue, New York City, New York. Tracks of the MNCR are owned by the States of New York and Connecticut. Operations and maintenance are conducted by MNCR over 267 route miles (650 track miles).

In 1987 the MNCR operated 7,257,588 train miles and 117,612 yard miles which are included the total train miles. The carrier also operated 855,614,412 passenger train miles.

National Rail Passenger Corporation (ATK) passenger trains, Consolidated Rail Corporation (Conrail) and Guilford Transportation Industries freight trains operate over portions of MNCR trackage.

II. STAFFING AND TRAINING

Organization

The dispatcher's office is managed by a superintendent of train movements. A chief dispatcher, an assistant chief dispatcher and an assistant chief dispatcher/freight work on the first shift. A chief dispatcher and an assistant chief dispatcher provide supervision on the second shift. The third shift is protected by an assistant chief dispatcher.

Six dispatching desks are manned on the first and second shifts and three on the third shift.

Relief for vacations, sickness and personal reasons is provided by extra board employees whose members who receive a guaranteed salary.

Hours of Service

There was no excess service, as defined by the Hours of Service Act, performed during the calendar year 1986.

Overtime

Dispatchers who are assigned to the 15 desks have a contractual right to accept or refuse overtime work. During the calendar year 1986 they elected work on 269 of their rest days.

Candidate Selection

Candidates for promotion to dispatcher are chosen from the operator ranks based upon an evaluation of their work history and a qualifying interview.

Initial Training

Operating rules are taught in a 3 day classroom course. An indefinite period of on-the-job training with a qualified dispatcher follows.

Two examinations are given to determine if the student is qualified. The first consists of a 165 question written examination on the operating rules and other dispatching responsibilities which must be passed with a grade of 85 percent or higher. The second is a written exercise in which the student must properly issue train orders in six different simulated train dispatching operations. The rules examiner determines if the student is qualified.

Periodic Training

Retraining is given annually in a 16 hour classroom program which concentrates on operating rules and dispatching procedures. The course is preceded by a written pretest and followed by a written examination. The pretests and the examinations are not graded but they are reviewed by the rules examiner who also conducts a critique of the course.

Dispatchers are required to go on a road trip once annually to familiarize themselves with the physical characteristics of the railroad.

III. OPERATING RULES AND PROCEDURES

Operating Rules

Dispatchers are governed by the **MNCR Rules of the Operating Department** which have been in effect since April 28, 1985, and the operating timetables. Train and on-track equipment movements are governed by timetable, train orders, manual block system rules, automatic block system rules, and traffic control system rules supplemented by a cab signal system.

Operating Procedures

The following exception was taken by the FRA during the assessment:

- Dispatchers must insert blocking devices into the "D" desk traffic-control-system machine control panel to

prevent switches at some control points from operating to a normal from a reverse position when an unrelated route is programmed.

IV. OPERATIONAL TEST PROGRAM

MNCR conducts operational tests and inspections to determine the extent of compliance by employees with its code of operating rules, timetables and timetable special instructions in accordance with its Operational and Safety Test System "MOST". The program specifies approximately 250 different observations, inspections or monitoring procedures which are carried out by officials. Those efforts are individually recorded and entered into a data bank for sorting and dissemination to carrier officials.

The carrier recorded 57 operational efficiency test on dispatchers during 1986. There were no failures reported. The number of tests conducted calculates to an average of less than 2 tests annually on each dispatcher. Those tests related to track car protection, radio procedures and the issuance of train orders.

V. ENVIRONMENT AND WORKLOAD

The desks are located in one room. Individual head sets are not used. Radio and block telephone communications are received on loud speakers. Persons who had no apparent reason to be there had access to the office. The crowded room, casual conversations between dispatchers and others and the high level of noise emanating from the communications systems created a very disruptive atmosphere.

The office in which the assistant chief dispatchers are housed is very crowded. The ventilation is poor.

VI. COMMUNICATIONS

The following deficiencies relating to radio communications and procedures were noted:

- Dispatchers occasionally experience delays in originating outgoing telephone calls because an insufficient number of telephone lines are provided.

- The radio communication network is often congested with transmissions unrelated to the movement of trains and other on-track equipment and by transmissions associated with the operations of other railroads.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern MNCR-01: The operational efficiency test program, although apparently adequate as a plan of testing, has not been applied in a meaningful manner. The number of tests conducted, with an absence of failures, suggests that both on-line officials and managers in the dispatching office have given little attention to complying with the requirements of this Federal regulation.

Recommendation: The carrier should implement a strong operational efficiency test program. Tests should be conducted by officials in the field and in the dispatching office. Dispatchers should be informed when they have been tested and the results of those tests. A summary of the tests should be published as an aid to officials in evaluating the performance of individuals and to recognize trends of non-compliance.

Concern MNCR-02: The spontaneous operation of switches at control points which can be defeated only by the application of blocking devices increases the dispatchers workload and is an obvious indication of control device deficiencies.

Recommendation: Control machine deficiencies should be immediately corrected. Pending those corrections written instructions should be issued to guide the affected dispatchers.

Concern MNCR-03: The presence of unauthorized persons in the office is a distraction which could contribute to a serious dispatching error.

Recommendation: Only those persons who have a legitimate reason to be there should be permitted in the office.

Concern MNCR-04: The noise generated by the communication system and the unnecessary conversations between dispatchers which are not associated with directing the movement of trains are yet another distraction which could contribute to dispatching errors.

Recommendation: The desks should be separated by sound absorbing barriers. Loud speaker systems should be replaced by head sets and an intra-office communication system.

Concern MNCR-05: Even though regularly assigned dispatchers have the option of accepting or rejecting overtime work, the high number of rest days worked by those dispatchers suggests that the low seniority extra board dispatchers who do not have the option of refusing to work could have placed upon them an unreasonable burden of working many consecutive days. FRA is of the opinion that all dispatchers should receive regular rest days.

Recommendation: MNCR should structure their training program and staffing to provide adequate relief for vacation, sickness and other necessary absences of dispatchers.

CHAPTER 16- NEW JERSEY TRANSIT RAIL OPERATIONS INC.

1. INTRODUCTION

The New Jersey Transit (NJT) passenger rail system, headquartered at Hoboken, New Jersey, is among the nation's largest transportation agencies. It provides commuter rail service to 33.7 million passengers annually between points in the states of New Jersey and New York. Approximately 550 revenue trains are operated daily over 380.4 route miles. The railroad is divided into two divisions--the Hoboken and the Newark.

II. STAFFING AND TRAINING

Organization

The office is managed by a chief dispatcher on the daytime shift Monday through Friday. There is an assistant chief dispatcher on each of three shifts daily. There are seven dispatchers on the first and second shifts daily and three dispatchers on the third shift daily.

The chief dispatcher is responsible for the overall operation of the dispatching office and supervision on the dispatchers and the support staff located in the office. The assistant chief dispatchers perform typical administrative and ancillary functions.

Hours of Service

NJT reported to the FRA that dispatchers performed service in excess of that permitted by the Hours of Service Act on one occasion in 1986 and on three occasions in 1987.

Dispatchers worked on their assigned rest days 15 times in 1986.

Candidate Selection

In the past candidates for promotion to dispatcher have been chosen from the operator ranks. Operators were very familiar with the territories and operations because of their exposure to the physical characteristics of the railroad and could usually successfully qualify on the job. The elimination of most of the operator positions on NJT has virtually eliminated this source of dispatcher trainees.

Initial Training

Candidates for dispatching positions receive two and one-half days of classroom rules instruction followed by a written examination consisting of 260 questions. The 260 questions are divided into 13 sections which correlate with individual parts of

the operating rules. The student must correctly complete 85 percent of the questions on each section. Each student then must successfully pass a 6 to 8 hour oral examination conducted by the superintendent of rules and safety.

The student next learns the physical characteristics of the railroad by riding trains over the various routes. An oral examination on physical characteristics is conducted by three supervisors.

Periodic Training

Dispatchers are required to attend an annual rules instruction class. The 100 question written examination must be passed with a grade of at least 85 percent. Those who fail return in 30 days for a second examination. If the dispatcher fails to achieve a passing grade he/she is withheld from service until a subsequent examination is passed.

III. RULES AND PROCEDURES

Operating Rules

Dispatchers are governed by timetables and the NJT operating rules. Trains and on-track equipment movements are directed by a traffic control system (TCS), a manual block signal System (MBS) and rule 251. NJT is a participating member of the Northeastern Operating Rules Advisory Committee (NORAC) which is developing a common operating rules system for some railroads in the Northeast corridor. Those rules were implemented in late 1988.

Dispatchers are authorized by the NJT operating rules to direct the movement of trains against the current of traffic by verbal authority to an operator, who in turn, verbally instructs the engineer, or by face to face conversation between the train dispatcher and a crew member on the train. FRA inspectors, while in a locomotive, observed an engineer receive an authority from an operator who was standing on the ground alongside the locomotive. In a second instance, while the FRA inspectors were standing on the ground alongside the operator, they observed the operator yelling those instructions to the engineer. The engineer leaned out of the locomotive window to hear the operator over the noise created by the running locomotive. In both instances the instructions were correctly repeated by the receiving individual. Neither the operator nor the engineer is required to make a written record of the authority.

Operating Procedures

The following is a synopsis of deficiencies observed:

- Numerous violations of operating rules in the recording of train orders and TRO-2 authorities.
- Failure to sign the transfer between dispatchers when coming on or going off duty.
- Unauthorized abbreviations were used and train order and clearance records were altered.
- Red ink was not used as required by Rule No. 813 for recording the time blocking devices were applied and removed.
- The names of engineers and conductors and their times on duty were not recorded as required by Federal regulations.
- Weather conditions were not recorded at six hours intervals as required by Federal regulations.
- A dispatcher applied the blocking devices after granting exclusive use of a main track to an employee. The applicable operating rules required the blocking device to be applied first.

IV. OPERATIONAL TESTING PROGRAM

The NJT efficiency testing program is entitled Program for Operational and Safety Test (POST). Of the 2280 tests conducted, 897 (39 percent) were train orders and TRO-2's, 828 (36 percent) were the application and removal of blocking devices, 431 (19 percent) were radio procedures and the remaining tests were on the maintenance of train sheets and other miscellaneous items. There was a failure rate of 1.9 percent.

Carrier officials reported that POST tests No. 9105 and 9504 were conducted on dispatchers. POST does not identify a test number 9105 and test number 9504 is not recognized as one that is performed on the NJT.

Two times officials reported having conducted tests to determine if dispatchers complied with the duty of observing passing trains for defects. However, the dispatcher's office is located in an area where it would be impossible to observe a passing train.

Some officials repeatedly performed the same two or three tests on dispatchers in each month of 1987. Tests of other categories,

relating to dispatchers, were not reported by those same officials.

The majority of test sessions were conducted between the hours of 8 a.m. and 4 p.m. even though the morning "rush hour" commuter traffic begins at approximately 6 a.m. and the evening "rush hour" traffic extends to 7 p.m. or later.

V. ENVIRONMENT AND WORKLOAD

Office Environment

NJT is constructing a new dispatching facility in the station at Hoboken. The North Jersey Coast Line and the Raritan District dispatchers are housed in a partially completed section of the new facility. The remaining three positions remain in the older offices.

Many unidentified persons frequently enter and leave the older facility. FRA inspectors observed train crew personnel, after having obtained copies of their train orders, staying to visit with the dispatchers. Unidentified persons carried on conversations among themselves and cleaning ladies stopped to chat with the dispatchers. Such distractions are undesirable in a dispatching office.

An NJT memorandum dated April 20, 1988, states that the new dispatching facility was off limits to all unauthorized persons. The older office was not included in the prohibition. There were no unauthorized persons observed in the new facility.

Workload

FRA inspectors observed the dispatchers on each shift and at all dispatching consoles. They were very busy during the peak hours of commuter traffic but at no time did the workload on any position appear to be unreasonable.

VI. COMMUNICATIONS

General

FRA observed that the use of a common radio frequency on both divisions for dispatching purposes, for operation of the Hoboken terminal and for engineering and other personnel on line of road resulted in much congestion. Critical dispatching communications were continually interrupted. Some of those interruptions originated with employees who were not connected with on track movements.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern NJT-01: Unauthorized personnel frequent the older dispatcher office creating unnecessary distractions to the dispatchers.

Recommendation: The older dispatcher office should be declared off limits to unauthorized persons. Those who are conducting legitimate business in the office should be required to do so without distracting the dispatchers.

Concern NJT-02: System operating officials are not performing quality efficiency tests on dispatchers. Quality tests would include testing in each area of the dispatchers responsibility.

Recommendation: The carrier should immediately implement a program that will require all system operating officials to frequently perform efficiency tests on dispatchers. The program should include all areas of the dispatchers functions and responsibilities.

Concern NJT-03: A program of exclusive on-the-job training is very time consuming and not as effective as a combination of classroom instruction followed by on-the-job training.

Recommendation: The carrier should design a classroom training program for student dispatchers. The agenda of the program should include instruction and testing in the carriers operating rules, timetable and special instructions, and if possible, simulated training for the operation of electronic controls. Classroom training should insure that the student has a complete and accurate knowledge of the dispatchers responsibilities and functions. On-the-job training should be devoted to familiarizing the student with the physical characteristics of the railroad and control machine functions.

Concern NJT-04: The practice of directing the movement of trains against the current of traffic by verbal authority reduces the performance of the employee to his/her ability to remember those instructions. There is a great risk of misunderstanding, forgetting or confusing one authority with another.

Recommendation: Operating rules should be adopted which will provide for the movement of trains against the current of traffic by written authority.

Concern NJT-05: The dispatchers radio channel is congested with transmissions which disrupt critical dispatching functions.

Recommendation: The carrier should explore the possibility of dedicated radio channels for dispatchers. Separate channels

should be considered for those dispatching districts in which radio transmissions interfere with other districts.

Regular audits should be conducted to identify employees who are using the channel for purposes other than those related to on-track movements or who fail to comply with the rules pertaining to the initiation of a radio transmission. Those employees should be instructed on proper radio procedures and then required to comply with the rules in all future transmissions.

Concern NJT-06: The 1.9 percent failure rate of operational efficiency tests conducted by NJT officials does not reflect the performance of dispatchers and the operating records kept by those dispatchers.

Recommendation: The operational efficiency tests program should be expanded and intensified in application to those safety-critical rules which the dispatcher must understand and apply.

CHAPTER 17- NORFOLK SOUTHERN RAILWAY

I. INTRODUCTION

The Norfolk Southern Railway, headquartered at Norfolk, Virginia, operates about 17,500 miles of trackage in 20 states, the District of Columbia, and the Provence of Ontario. The NS system extends from Buffalo, NY, on the northeast to New Orleans, LA, on the southwest; from Des Moines, IA, and Kansas City, KS, on the northwest to Palatka, FL, on the southeast. There are port facilities on both the east and gulf coasts. Large classification terminals are located in Birmingham, AL; Sheffield, AL; Atlanta and Macon, GA; Calumet, Chicago and Decatur, IL; Ft. Wayne, IN; New Orleans, LA; Kansas City and St. Louis, MO; Asheville and Linwood, NC; Bellevue and Portsmouth, OH; Columbia and Spartanburg, SC; Chattanooga and Knoxville, TN; and, Norfolk and Roanoke, VA. In 1987 NS operated 47,622,761 total train miles, of which 12,257,028 were yard and switching miles. It also operated 19,565,845 passenger miles.

In 1982, Norfolk and Western Railway and Southern Railway merged to form Norfolk Southern. In total track miles, it is the fourth largest railroad in the United States. Both railroads used the division dispatching concept which was continued after the merger.

At the time of the assessment the railway was divided into four regions, with 15 operating divisions. It has since been restructured with 3 regions; two headquartered at Atlanta, GA, and the other at Roanoke, VA. The number of operating divisions was reduced to 13.

The following table illustrates the location of train dispatching offices monitored during the assessment and the number of dispatchers assigned on each shift:

TABLE NS-I
TRAIN DISPATCHERS OFFICES AND
DISPATCHERS POSITIONS PER TRICK

LOCATION	FIRST	SECOND	THIRD	TOTAL
Birmingham, AL	3	3	2	8
Atlanta, GA	2	1	1	4
Macon, GA	3	2	2	7
Louisville, KY	2	1	1	4
Somerset, KY	3	3	2	8
Moberly, MO	2	1	1	4
Hattiesburg, MS	2	1	1	4
Brewster, OH	2	2	1	5
Portsmouth, OH	3	2	2	7
Greenville, SC	4	3	3	10
Knoxville, TN	3	3	2	8
Crewe, VA	2	2	2	6
Roanoke, VA Radford Division	2	2	1	5
Roanoke, VA Shenanodah Division	2	1	1	4
Bluefield, WV	3	3	3	9
TOTALS	30	24	20	93

II. STAFFING AND TRAINING

Staffing

The dispatching organization functions of NS closely followed the traditional industry standard. Train dispatchers report to the superintendent through the chief train dispatcher.

The chief train dispatcher is responsible for the overall operation of the dispatchers office, and the supervision of support personnel. Operators at outlying locations are responsible to the chief train dispatcher for any functions they

may perform relating to train movements controlled by the train dispatcher.

At most locations the chief dispatcher works the first shift, and assistant chiefs work the second and third shifts. Not all of the assistant chief train dispatchers have a dispatching background, and some have never worked as a regular train dispatcher. The duties of the assistant chiefs closely parallel those of the chief train dispatcher.

At the time of the assessment, there were 13 assistant chief dispatchers assigned to the second shift and 13 assigned to the third shift.

Hours of Service

In 1987, NS reported to FRA 183 cases in which train dispatchers performed service in excess of that permitted by the Hours of Service Act. All were attributed to a shortage of qualified dispatchers. There were no instances of excess service reported by 13 of the 15 offices. The Roanoke offices reported 2 instances. The Bluefield office reported 181 instances of excess service or 98.9 percent of the system total.

Overtime

During the same period, 11 of 15 offices required dispatchers to work a total of 459 rest days. Although NS dispatching offices have qualified extra dispatchers for relief of regular train dispatchers, it is clear that not all are sufficiently staffed. The following chart illustrates the offices where dispatchers worked on their rest days and the number of such occurrences in 1987.

Table NS-II
Overtime by Location

Location	Rest days worked	Percent of Total
Bluefield	222	48.3
Greenville	153	33.3
Atlanta	25	5.4
12 other offices	59	12.8

Candidate Selection

NS generally selects qualified operators for the position of train dispatcher. In some instances the carrier has recruited candidates with experience in dispatching from other carriers who have reduced their work force and have surplus personnel.

Initial Training

Candidates selected for the position of dispatcher trainee have been qualified on the operating rules and timetable special instructions while performing service as an operator. Knowledge of the rules and performance as an operator assists in the selection. The candidate then enters an on-the-job training program. The trainee works under the direct supervision of experienced dispatchers. After having worked each dispatching district, and having been certified by each of the instructing train dispatchers, the candidate is evaluated. The chief train dispatcher, assistant chiefs he has worked under, and the division superintendent complete the review process. Providing the unanimity of opinion is favorable, the qualified candidate is then permitted to work as a train dispatcher. In most instances the newly qualified train dispatcher returns to a regular or extra position as an operator, and continues working as an operator and extra train dispatcher until needed full time as a dispatcher.

Periodic Training

NS requires train dispatchers to attend a yearly class on operating rules and pass an examination. The number of questions in the review varies from a low of 38 to a high of 150. The passing grade is from 75 to 90 percent depending upon the standard established by the division and region.

Physical characteristics familiarization trips are not required for train dispatchers on any division.

III. OPERATING RULES AND PRACTICES

Operating Rules

Operations on Norfolk Southern are conducted pursuant to a carrier publication entitled **Operating Rules.** This document was last revised on December 1, 1987. Division timetables and bulletins govern dispatchers with additional procedures .

Operating Practices

FRA noted that the location of yard limits is only described by station name in the carrier's timetables. Precise mileposts or other geographically unique identifiers are not used. At Portsmouth, OH, and Bluefield, WV, it was noted that blocking devices applied by a train dispatcher could be removed by an adjacent train dispatcher.

The following is an office by office synopsis of exceptions noted by FRA during the assessment:

Louisville, KY

- Train dispatchers providing protection in CTC territory between Dumesnil and 4th Street can not apply blocking devices at the interlocking with CSX.
- Bulletin No. 47 was not included in the bulletin book at the east end dispatching desk.
- A train dispatcher annulled a train order then used the same number for the following order on the same date.
- Dispatcher's record of train movements did not show the names of engineers and conductors for trains originating at Lawrenceburg, KY.
- A train dispatcher transmitted a radio train order without having proper identification from the employee copying the order.
- Train dispatcher underscored train order in book before order was repeated by operator.
- Train dispatcher failed to determine that all persons addressed in radio train order had a copy.
- Train order repeated to train dispatcher contained an error, and train dispatcher failed to note this error during the repetition process.
- Multiple instances of radio rules violations were noted, including radio transmissions of train orders.

Brewster, OH

- Train dispatchers failed to properly address orders to those who will execute them.
- Unauthorized abbreviations noted in train orders such as "exa" for extra.

Portsmouth, OH

- Train dispatcher did not apply blocking device to the control machine before advising person obtaining track and time authority that protection was provided.
- Train dispatcher extended track and time authority to an employee by 30 minutes, but did not record this extension on prescribed form.
- Clocks in dispatching office were not marked as standard clocks, and not designated in the timetable as required by operating rule.
- Train dispatchers issued temporary speed restrictions to trains via radio without knowing if temporary speed restriction signs are in place in accordance with Rule 101(c).
- Track and time authority was issued by the train dispatcher without a specific time given as required by Rule 809.

Crewe, VA

- Blocking devices used by train dispatchers on control machines were not adequate because they can easily become dislodged.
- Train orders were being transmitted in a manner not in compliance with carrier rules, and in some instances not in compliance with federal regulations.
- Notwithstanding the requirement of carrier rules and timetable special instructions, it was noted that trains were permitted to leave stations without required clearance form.

Roanoke, VA
Radford Division

- Blocking devices used by train dispatchers on control machines are not adequate because they can easily become dislodged.
- Train orders were being transmitted in a manner not in compliance with carrier rules, and in some instances not in compliance with federal regulations.

IV. OPERATIONAL TESTING PROGRAM

At the time of the assessment the operational testing programs of Norfolk and Western and Southern had not been revised. Neither program has instructions for the specific testing of train dispatchers.

FRA determined the average number of tests per dispatcher for each office by dividing the number of tests conducted by the number of desks per office. This formula does not allow for regular relief positions, or extra board dispatchers. If these employees were included, the number of tests would have been further reduced. The following table illustrates the number of dispatchers desks per office, the number of operational tests and inspections conducted in the year prior to the assessment, the number of failures, the total failure rate, and the average annual number of such tests and inspections per dispatcher desk.

TABLE NS-II
OPERATIONAL TESTING DATA

LOCATIONS	#DISPATCHERS	#TESTS	#FAILURES	%FAILURES	#ANNUAL TESTS PER DESK
Birmingham	8	0	0	0	0
Atlanta	4	0	0	0	0
Macon	7	0	0	0	0
Louisville	4	0	0	0	0
Hattiesburg	4	0	0	0	0
Brewster	5	0	0	0	0
Portsmouth	7	0	0	0	0
Greenville	10	0	0	0	0
Knoxville	8	0	0	0	0
Bluefield	9	0	0	0	0
(Subtotal)	(66)	(0)	(0)	(0)	(0)
Roanoke[1]	4	588	0	0	147
Somerset	8	240	15	6	30
Crewe	6	200	0	0	33
Moberly	4	668	1	0.14	167
Roanoke[2]	5	5766	2	0.03	1153
(Subtotal)	(27)	(7482)	(18)	(0.02)	(277)
TOTALS	93	7482	18	0.02	80

[1] Shenandoah Division

[2] Radford Division

Using the formula previously described, the number of tests per dispatcher at the offices where tests were conducted is 277. Failure to conduct operational tests and inspections at 10 of 15 dispatching offices is inconsistent with 49 CFR Part 217.

V. ENVIRONMENT AND WORKLOAD

General

FRA found that the majority of train dispatchers offices on NS provide an adequate working environment. Individual dispatching districts were assigned in a logical and reasonable manner. Except as noted below workloads are not so great as to require dispatchers to perform at the outward limits of their ability or skills to avoid delay to trains.

The primary environmental considerations of lighting, heating, cooling, and ventilation were adequate for each office. Except for those locations where train dispatchers worked in an individual enclosed office, FRA found that the overall noise level was often sufficient to be distracting or to require repetition of communications. The primary source of this noise was open communication speakers. While line hum and static were minimal, speakers were often adjusted to a high level so as to command the attention of the dispatcher over ambient noise.

With respect to workload not immediately connected with the safe and efficient movement of on-track equipment and productive use of tracks, FRA found that dispatchers were often used as a source of information not related to train management. Maintenance of Way personnel routinely request the train dispatcher to relay messages or information that is clerical in nature to other personnel or locations. According to the dispatchers FRA contacted, this practice is distracting and time consuming. Further, many of these requests are made over the train dispatchers radio. These conversations disrupt the dispatchers planning and concentration.

Individual Dispatching Offices

During the assessment, FRA found certain concerns which were confined to individual offices as follows:

Knoxville, Tennessee

- Unauthorized persons not connected with train dispatching were observed in the dispatching office. Conversations which did not relate to the dispatching functions offered the opportunity for distraction and increased the overall noise levels.

Somerset, Kentucky

- FRA noted that the workload at West End desk posed a somewhat greater potential for train dispatchers to work at or near the limits of their abilities. The position utilizes timetable and train order authority and controls 736 miles of track. On first shift the desk handles lineups for M of W personnel, and issues a large number of train orders to operators by telephone, and to train and engine crews by radio. The carrier was aware of FRA's concerns, yet to FRA's knowledge, no formal studies have been conducted, and no substantial adjustments made in the workload.

Brewster, Ohio

- On the third shift at this office, a significant consolidation of assignments occurs. As a result of this consolidation, train dispatchers are working at or near the limits of their abilities.

Roanoke, VA
Shenandoah Division

- Dispatchers are required to monitor hotbox detectors. The arrangement of the office requires dispatchers to vacate their consoles while read out tapes are being monitored.

VI. COMMUNICATIONS

NS channel number 1 is the normal channel used by train crew members and other persons wishing to communicate with the train dispatcher. This channel is used for delivery of train orders, track warrants, and other mandatory directives. Channel 1 is also used by employees to transact company business not directly related to the dispatching of trains.

FRA believes that where radio congestion is significant, a radio channel should be dedicated for the exclusive use of the train dispatcher and employees whose duties require that they communicate with him.

During the assessment FRA noted that the radio procedures used by dispatchers and other employees were marginal. Particularly notable was the failure of the dispatcher to require other employees to use required identification at the start of the transmission, and to use the necessary language in ending transmissions.

- At Birmingham, AL, the channel used by the train dispatcher is cluttered with transmissions not related to the dispatching of trains or the movement of on-track equipment. These transmissions make it necessary for train dispatchers to repeat instructions to trains and on-track equipment. The source of many of these transmissions were M of W and signal department employees.

- At Somerset, KY, the radio channel used by the dispatcher is congested and cluttered by transmissions from numerous base stations, including the yardmaster at Louisville, KY. Also, the radios of the south end train dispatcher and the north end train dispatcher interfere with the west end dispatcher. Because the territory of the west end dispatcher is operated by train orders conveyed by radio, the need for a reliable radio system is vital.

- At Moberly, MO, it was noted that employees were criticized for train delays attributed to the proper use of radio procedures.

- At Portsmouth, OH, the radio channel used by the train dispatchers is extremely congested. On the first and second shifts there is significant radio congestion. Track and time limits authorized by the train dispatcher had to be repeated numerous times by both the train dispatcher and the employee in the field before complete could be given. Further, there is considerable overlap from one dispatcher to the other and with transmissions of other divisions which are clearly audible to these dispatchers.

- At Greenville, SC, the radio for the north end dispatcher had considerable static. There were problems in adjusting the volume to a reasonable level.

- At Knoxville, TN, the radio was found to be cluttered with non dispatching transmissions from the mechanical department, signal department, and M of W department. Because of the amount of transmissions, the train dispatchers frequently had to repeat train orders and track and time authority.

- On both dispatching desks at Crewe, VA, there is interference from the train dispatchers radio in Christiansburg. Also, the radio channel used by the train dispatchers at Crewe is congested.

- At Roanoke, VA, the dispatchers radio is congested by numerous base stations, including that of the train dispatchers in Crewe, VA.

- At Bluefield, WV, the train dispatchers radio is congested with transmissions from Weller Yard, Portsmouth, OH, and Roanoke, VA. There is also a problem with reception. Some transmissions to the Bluefield train dispatcher are barely audible.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern NS-01: FRA found that NS train dispatchers were at least occasionally required to work on their assigned rest days. At the Bluefield office in 1987, 181 cases of service in excess of that permitted by the Hours of Service Act were reported and train dispatchers were required to work on 222 rest days.

Recommendation: NS should evaluate the staffing for dispatching offices, and maintain a sufficient number of extra train dispatchers to meet the work-force requirements. Special emphasis must be placed on the Bluefield, WV, office.

Concern NS-02: Annual operating rules examinations vary widely from one division to the other. FRA found the number of questions on these tests ranged from 38 to 150. Further, the passing score for these tests had a 15 point spread between the high and low requirements.

Recommendation: NS should establish a system standard for operating rules tests to assure consistency.

Concern NS-03: Physical characteristics familiarization trips are not required at any dispatching offices. FRA believes that train dispatchers should have current and accurate knowledge of the physical characteristics of the territory over which they dispatch.

Recommendation: NS should establish a system standard regarding familiarization trips over the territory for which the dispatcher is responsible.

Concern NS-04: In 1987, NS failed to make any operational tests at 10 of 15 train dispatching offices where 66 of the 93 dispatching positions were employed.

Recommendation: In order to comply with 49 CFR 217, NS must conduct operational test and inspections. In order to achieve maximum benefit from the program the carrier should conduct meaningful tests which will enhance the safety of operations.

Concern NS-05: At the offices where tests were conducted, the failure rate ranged from a low of 0 percent to a high of 0.5 per cent. This low failure rate may indicate that tests of questionable quality are conducted.

Recommendation: The carrier should determine a valid statistical norm for failure rates. Offices which report failure rates significantly above or below the norm should be audited to verify data and correct irregularities.

Concern NS-06: A wide range of NS officers either converse with the train dispatcher or have the ability to monitor his performance concerning compliance with operating rules. However, at the locations where tests were performed, most of the tests were made by chief train dispatchers.

Recommendation: The carrier should instruct supervisors other than the chief dispatcher to conduct operational tests on dispatchers. Supervisors in both the transportation and engineering departments should be utilized.

Concern NS-07: FRA noted that timetables did not indicate where Rule 93 was in effect except by station location. Yard limits should be shown by milepost locations in addition to yard limit signs.

Recommendation: NS should designate locations where Rule 93 is in effect by specific location rather than station name only.

Concern NS-08: At Louisville, KY, dispatchers cannot block the CSX crossing at grade when providing protection between Dumesnil and 4th Street.

Recommendation: NS should review the procedures used at this and similar locations to ensure that a sufficient level of protection is provided.

Concern NS-09: FRA noted a number of exceptions to NS rules and procedures. These exceptions applied not only to the train dispatchers themselves, but also to those employees interfacing with the train dispatchers for operating authority.

Recommendation: NS should assign supervision to monitor and test for rules compliance by train dispatchers as well as those conversing with dispatchers.

Concern NS-10: The use of open speakers which broadcast within "studio" type dispatching offices contributes to the noise level, and causes distraction. Most NS officers agree that unnecessary noise hinders concentration and may impede important communications. FRA finds little evidence that the carrier has a

meaningful program designed to eliminate or reduce these disruptions.

Recommendation: The NS should review it's in house capabilities to determine if appropriate audio/acoustic expertise exists. Each dispatching office on the system should be examined to determine the needs of the office and develop standards and priorities. At a minimum, consideration should be given to the use of individual headsets, or acoustically isolated rooms for train dispatchers.

Concern NS-11: FRA observed that the west end dispatchers position at Somerset, KY, and the third shift at Brewster, OH, were sufficiently busy to cause train dispatchers to work at or near the limits of their skills and abilities.

Recommendation: The NS should thoroughly review the volume of train operations and the workload of these dispatching positions, and provide additional personnel if necessary.

Concern NS-12: Unauthorized persons allowed to enter the dispatching office at Knoxville, TN, caused unnecessary noise. MW personnel regularly enter the chief train dispatchers office to use the radio for discussions with field forces. Dispatchers offices are equipped with doors, but they are seldom closed to reduce noise from the clerical forces and chief dispatchers office.

Recommendation: Unauthorized persons should be restricted from the dispatching office, and dispatchers office doors should remain closed.

Concern NS-13: Train dispatchers compliance with Federal and carrier radio rules is marginal. The dispatchers are not insisting that all employees use the proper procedures during radio transmissions and do not always use required procedures in the course of their transmission.

Recommendation: The NS should immediately implement a program to ensure that dispatchers will comply with all applicable Federal and carrier radio rules. Additional enforcement should be extended to those communicating by radio with the train dispatcher.

Concern NS-14: On a system wide basis there appears to be considerable overlap of radio transmissions from one dispatching district to another, and from one division to another.

Recommendation: The carrier should conduct an audit to determine the radio communication needs of each dispatching district. Consideration should be given to limiting transmissions to the train dispatcher on a dedicated frequency. Further consideration

should be given to alternating radio frequencies by dispatching districts in order to reduce the possibility that train and on-track equipment operators will misunderstand train dispatchers directives.

Concern NS-15: At Portsmouth, OH, and Bluefield, WV, FRA found that blocking devices applied by the train dispatcher for protection of the first tracks within his territory could be removed by the adjacent train dispatcher. FRA is concerned that this signal circuitry might permit signals to be cleared into a segment of track that is under blocking device protection.

Recommendation: NS should undertake an analysis of the signal system at these locations to assure safeguards are in place which prohibit one train dispatcher from clearing the signal into territory under the control of another.

CHAPTER 18- SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY (SEPTA)

I. INTRODUCTION

The Southeastern Pennsylvania Transportation Authority, also known as SEPTA (SEPA), is headquartered in Philadelphia, PA. SEPTA operates the mass transit system in the metropolitan Philadelphia area. This is an integrated system of subway and elevated rapid transit lines, trolley lines, bus lines, and the railroad commuter lines which are known as the Regional High Speed Line (RHSL).

Although the administrative, financial and technical direction of SEPTA's affairs are consolidated at the higher levels of supervision, the day-to-day management of railroad operations is an RHSL responsibility. Dispatching functions for all other modes of transportation are coordinated at the authority's main headquarters. Traffic control for rail, however, is coordinated at a single consolidated train dispatchers office located in one of the carriers main mid-city terminals, Market East Station. This facility is designated by the carrier as the Regional Rail Operations Center (RROC).

The carrier operates 497 scheduled passenger trains weekdays over 224 miles of main track. In 1987 SEPTA operated 9,778,228 train miles and 257,541,447 passenger miles.

The following table represents the staffing levels in the train dispatcher office.

TABLE SEPTA-I
CONTROL CENTER PERSONNEL BY SHIFT

TITLE	DAY SHIFT	AFTERNOON SHIFT	NIGHT SHIFT
Superintendent of Operations	X	X	X
Chief Train Dispatchers	X	X	
Delay Clerk	X	X	X
Secretary	X		
Section A Dispatcher	X	X	X
Section B Dispatcher	X	X	X
Section C Dispatcher	X	X	X

II. STAFFING AND TRAINING

Organization.

SEPTA's dispatching operations are structured as follows.

- Three dispatchers work on each shift daily. They report to the chief dispatcher or the assistant superintendent of operations when the chief dispatcher is not available.

- Chief dispatchers are assigned on the first and second only. These employees report to the superintendent of operations and perform administrative duties in a support capacity as assigned.

- There are three superintendents of operations, one on each shift. They report to the assistant general superintendent operations.

- The assistant general superintendent operations is responsible for the entire rail operations section and reports to the general superintendent operations.

Train dispatchers on this carrier are considered to be management (non-agreement) positions.

Hours of Service

In 1987 SEPTA reported to FRA 18 cases in which dispatchers performed service in excess of that permitted by the Hours of Service Act. Of the 18 cases, 16 were attributed to labor shortages. Inspection of train dispatchers hours of service records disclosed that another 7 cases of excess service occurred. SEPTA failed to report these cases to FRA.

During the assessment FRA Inspectors observed a train dispatcher entering false information on the hours of service record (train sheet). This occurred when a dispatcher improperly entered his assigned time off duty rather than his actual time off duty.

49 CFR 228 requires railroads to maintain certain specific information on the dispatchers record of train movements. Records of Train movements inspected at SEPTA failed to contain required information about the distances between stations.

Overtime

During the same period there were 181 occasions in which dispatchers were required to work their assigned rest days. Twelve employees are needed to protect the assigned dispatching

positions in the office. SEPTA officials stated that there were 17 qualified dispatchers available on the system.

Candidate Selection

Candidates for promotion to dispatcher are normally selected from qualified "towerpersons" (SEPTA's occupational description for the craft generally known in the industry as block operator). However, any employee may apply for a vacant train dispatcher position by submitting a resume to the personnel department. SEPTA has also accepted applications from applicants without previous railroad experience, including air traffic controllers. Applicants must be approved by the superintendent of train operations, the assistant general superintendent of rules and instructions and a senior representative of the personnel assignment office.

Training

Classroom training is provided at a central training facility. On-the-job training occurs in the towers on line-of-road, and in the train dispatching center. Train dispatcher trainees are required to qualify at all block and interlocking stations and train order offices. Candidates must also qualify on the physical characteristics of the entire SEPTA system.

Initial Training

Training for employees without a railroad background consists of a 267 work-day program. Trainees with prior railroad experience may not be required to complete the entire program. Training includes both formal classroom instruction and on-the-job experience under the supervision of a qualified employee.

The Program is outlined as follows:

LENGTH	SEGMENT
13 days	Operating Rules Classroom Instruction
10 days	Field Instruction
2 days	Amtrak/Conrail, Special Instructions, Hazardous Materials
41 days	Physical Characteristics
3 days	Amtrak Lines Familiarization
137 days	Interlocking Machine Qualifications
60 days	"Posting" Train Dispatchers Positions
1 day	Final Examination

The training periods identified do not consider failure of a student to meet established standards for a program segment and retest times.

Train dispatcher candidates must pass a written test with a grade score of 85 percent. The final examination consists of ten sections, which were identified by SEPTA officials as follows:

Section 1	General Rules, 30 questions
Section 2	Definitions & Terms, 50 questions
Section 3	Operating Rules 1-79, 40 questions
Section 4	Movement of Trains, 40 questions
Section 5	Signal System Rules, 50 questions
Section 6	Interlocking Rules, 25 questions
Section 7	Radio Rules, 25 questions
Section 8	Track Car Rules & MOFW Rules, 50 questions
Section 9	Special Rules and Timetable Special Instructions 30 questions
Section 10	Train Order (Form D) Formats 50 questions

The candidate must achieve a passing grade on each section. However, a student who does not pass the original examination is permitted a second opportunity. If the candidate fails a section of the test twice he is terminated from the training program.

The final decision as to whether or not a trainee is qualified to become a train dispatcher is made by a senior management committee.

Periodic Training

Dispatchers are required to attend a three day rules instruction program each year. They are re-examined on the SEPTA operating rules at the conclusion of the class. They must pass a 50 question written examination with a grade of at least 85 percent to remain qualified. A dispatcher who fails the examination is re-instructed prior to taking a second examination within thirty days. If the dispatcher fails to achieve the necessary score on the second examination, he is held off his position as a dispatcher.

Dispatchers are also required to take a familiarization road trip over the entire system once every six months.

III. OPERATING RULES AND PRACTICES

Within the regional rail operations center there are no traffic control machines or computer assisted work stations. Rather, dispatchers work through block operators. Under this system, the dispatcher plans, organizes and "manages" train operations within his territory. He directs block operators at control stations on line-of-road to execute his instructions. The operators manipulate switches, signals and other interlocking appliances as may be necessary to implement these instructions.

The operators also report train/track related information to the dispatcher and receive other operational instructions from the dispatcher as appropriate. Within the center city terminals, operators coordinate most track assignments independently.

SEPTA dispatchers coordinate seven block stations and train order offices. In addition, these dispatchers coordinate movements with three Conrail (CR) and two Amtrak (ATK) block and interlocking stations. They also coordinate with two ATK train dispatchers and the ATK chief dispatcher.

Three dispatchers are assigned to each shift. Their positions are identified as the "A", "B", and "C" desks.

The following exceptions were noted by FRA during the assessment period.

- Examination of train dispatchers transfer records disclosed that transfers were not made in accordance with the operating rule 903. This rule requires that the written transfer record list all outstanding and unfulfilled Form D's, Plate Orders[1], authorities, messages and other information relative to existing conditions.

  Dispatchers were observed listing a blanket message on their transfer that states "various messages and C&S 39's on hand." This practice eliminates the safeguard in the event that a message or other important document were misplaced or lost.

- On one occasion, FRA observed the Section "C" train dispatcher issue a Form "D" authority to the operator at Media Block and Interlocking Station. The train dispatcher did not require the employee controlling the last interlocking signal governing movement to place that signal in the stop position as required by operating rule 168.

  The Form "D" authority was made effective at 1:15 p.m. At about 1:25 p.m., the operator at Media called the train dispatcher and informed him that a blocking device was needed before a Form "D" authority was issued. The train dispatcher then instructed the operator to record the time the blocking device was applied as 1:14 p.m. Inspection of Form "D" books and

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[1] A plate order is a mandatory directive which suspends operation of electric trains and locomotives on a specified track between specified limits.

train sheets disclosed that Rule 168 had been violated several times.

- FRA observed train dispatchers misrepresenting their times on and off duty on their transfer record and on the train sheet. On one occasion, the "C" Section train dispatcher working the 6 a.m. - 2 p.m. shift transferred responsibility to the afternoon dispatcher (2 p.m. - 10 p.m.) at 1:35 p.m. The relieving train dispatcher signed the transfer and indicated his time on duty as 2 p.m. The relieved dispatcher listed his time off duty as 2 p.m.

  Several minutes later, the afternoon train dispatcher issued a Form "D" authority which was effective at 1:43 p.m. Both train dispatchers falsely reported the time and signed the train sheet.

- Further observation of train dispatchers transfer procedures disclosed noncompliance with operating rule 904. Dispatchers did not verify Form "D"s, plate orders, and other written instructions in effect with the operators under their jurisdiction upon assuming duty.

- Examination of the bulletin board in the Control Center disclosed that instructions were not current at the time of inspection. SEPTA Bulletin Order 5-6 became effective on the date of inspection. There were no copies available for employees at the center.

- On two occasions train dispatchers were observed reading newspapers while on duty. This is in violation of the carriers operating rule E.

  FRA also observed a commercial broadcast (AM/FM) radio located in the train dispatchers work area. This is in violation of the operating rule E.

- ATK train dispatchers directly communicate orders, instructions and messages to SEPTA dispatchers via telephone. Often this includes mandatory directives pertaining to speed restrictions for trains at specific locations on ATK property. Based upon this information, SEPTA train dispatchers issue written instructions for SEPTA trains which are to be routed over the effected ATK area. FRA found that there are no written instructions issued to train dispatchers to establish procedures for this type of situation. FRA found that dispatchers were using three different methods to issue Form "D" authorities to trains.

- SEPTA train dispatchers control train movements over the Conrail (CR) Trenton Line. Several SEPTA passenger crews go on duty at West Trenton yard, which is located in West Trenton, N.J. There is no bulletin board or employee register at West Trenton yard. Carrier operating rule 60 requires that crews reporting for duty at locations where no employee register is available must contact the train dispatcher. The dispatcher is required to inform the crew of pertinent conditions affecting the movement of their train. During the assessment FRA did not observe any communication of this nature between crews going on duty at West Trenton and the train dispatcher. Discussions with the train dispatcher assigned to the "A" Section desk indicated that dispatchers are not contacted by crew members as required.

IV. OPERATIONAL TESTING PROGRAM

SEPTA's operational testing program is entitled "Compliance Test Program" (CTP-1). It provides instructions for compliance testing on the operating rules, timetable special instructions, safety rules and air brake instructions. Effective September 1, 1988, SEPTA implemented the NORAC (Northeast Operating Rules Advisory Committee), Operating Rules. However, the carrier did not revise it's operational testing program to align with the NORAC Rules. As a result, the railroad arbitrarily discontinued participation in an FRA required program. No testing was performed during September and October.

FRA examined the test records from the former program for the month of August, 1988. During this month, SEPTA officials performed 448 compliance tests on train dispatchers. There were 51 types of tests performed. There were in no failures. The inspection disclosed that one official performed the same test on the same dispatcher at one day intervals. Concerns are as follows:

- On August 4, 1988, a train dispatcher was checked for Compliance with Test GA 1. The purpose of the test is to ensure that an employee is in possession of a current operating rule book. The same official conducted the same test on the same dispatcher on August 5, 1988.

- On August 6, 1988, another train dispatcher was observed for compliance with test 2104. The purpose of this test is to ensure that the dispatcher marks the train order book with the initials of the towerperson who recopied and repeated a train order. The same test was conducted on the same dispatcher by the same official on the following day.

According to the assistant general superintendent of rules and instructions, there were 930 operational tests and inspections conducted on SEPTA dispatchers in 1987. He stated that there were three failures.

V. ENVIRONMENT AND WORKLOAD

The Regional Rail Operations Center is a new facility which basically consists of one large room, with a small separate office for the superintendent of operations. The facility is equipped with adequate space and is effectively illuminated. Temperature control and ventilation are ample, and kitchen facilities are provided for the employees.

The chief dispatcher can review the activities of all three dispatchers from his work station which is near the center of the room. The Superintendent of Operations is normally located in a separate glass enclosed office. Entrance to the RROC is tightly controlled so as to minimize distraction for the dispatchers. The Dispatchers are situated in a row located against one wall. The room is shared with the chief train dispatcher, delay clerk, secretary and maintenance of equipment trouble desk. The train dispatchers desks are partially separated by portable dividers.

The dispatchers use open loudspeakers for both train wires and radio transceivers. This generates a significant level of background noise. The sound carries throughout the large room. The dispatchers are not issued headsets and the partitions between desks do not substantially reduce noise from adjoining desks.

The section "B" dispatchers block line (train wire) is not equipped with a microphone. The wire is connected to a telephone handset. When the dispatcher needs to talk on the block line he must devote one hand to holding the telephone. Dispatchers were observed issuing Form "D's" over the block line, with one hand on the telephone and the other used to write the Form "D." Basic technology (telephone headsets) is readily available to remedy this situation. The dispatcher should have the ability to talk on a telephone or block line with both hands free for writing or moving documents.

Each dispatchers desk is equipped with a radio transceiver. However, all of the radio units are placed behind the dispatchers facing their backs. This prevents the dispatchers from reviewing or referring to their train sheets while communicating over the radio since the train sheets are of traditional size and difficult to manage when unsupported. The inconvenient placement of the radio hampers it's use and limits it's effectiveness. Radios should be positioned within easy reach of the dispatcher

where they can be used from the employees normal working position.

The desks used by the train dispatchers are draftsmen's desks. These desks consist of an unbroken surface tilted on angle. There are no provisions for securely mounting telephones or radios, and there is no provision for organizing and storing auxiliary documents such as Form D authority books, messages or plate orders. The "C" desk Dispatcher used a used cardboard box placed along side the desk to hold the telephone.

Workload

The workload at all three desks appeared to be about even during the first and second shifts. During third shift, freight train activity increased on the "A" desk, and MOW activity increased on the "B" desk. Activity on "C" desk during third trick was comparatively low.

During FRA's observations, rush hour activity went smoothly. The dispatchers managed their territories without difficulty. Both the chief dispatcher and Superintendent of Operations were always present during the morning and evening rush hours to assist the dispatchers if needed. The clerical staff was adequate for the carriers needs and nonadministrative workload was at a minimum. There were no exceptions concerning workload uncovered during the period of observation.

VI. COMMUNICATIONS

The radios and telephone communication systems appeared to function properly. Except for the telephone hand set on the "B" desk, the dispatchers did not indicate any problems with the system nor did our inspectors note any significant deviations.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern SEPTA-01: Train dispatchers were observed misrepresenting their times on and off duty on both the carrier required transfer document and on the Federally required hours of duty record.

Recommendation: The carrier must take immediate action to ensure proper reporting of times on and off duty as required by Federal regulations and the Hours of Service Act. The carrier should specifically prohibit employees from entering incorrect information on the dispatchers transfer record.

Concern SEPTA-02: FRA observed dispatchers who failed to comply with operating rule 904. The dispatchers did not verify that towerpersons were in possession of all Forms "D," plate orders, and other written instructions as required.

Recommendation: Train dispatchers operating rules classes should expand coverage of operating rule 904. The carrier should resume it's operational test program immediately and consider increased testing for compliance with this rule.

Concern SEPTA-03: The bulletin board located in the operations center was not up to date.

Recommendation: SEPTA should review procedures and practices associated with the distribution and posting of bulletin boards, particularly where employees are required to communicate bulletin board information to crews reporting for duty at non-bulletin board locations.

Concern SEPTA-04: SEPTA dispatchers were observed making transfers in a manner which was inconsistent with operating rule 903. This occurred because the dispatchers use a "blanket" statement on the transfer, rather than listing all orders, authorities and messages in effect as required. This procedure eliminates a protective level of redundancy in the event that a message or order were to be misplaced or lost.

Recommendation: The carrier must require train dispatchers to comply with the provisions of rule 903 and individually list all orders, authorities and messages in effect. Monitoring for compliance with this rule should be a priority when operational testing is restored.

Concern SEPTA-05: FRA found that SEPTA train dispatchers did not ensure that required protection was established at interlocking stations prior to issuing Form "D" authorities to trains.

This occurred when a dispatcher neglected to ensure that the last interlocking signal governing movement to the location where a Form "D" was to be delivered to a train was in stop position.

Recommendation: SEPTA should review the requirements of operating rule 168 with train dispatchers and operators. SEPTA supervision should focus increased operational testing on this rule when the testing program recommences.

Concern SEPTA-06: FRA observed a train dispatcher instruct an operator to misrepresent the time that a blocking device was applied in order to create the appearance of compliance with the requirements of the operating rules.

Recommendation: The carrier should ensure that all train dispatchers and operators have a comprehensive understanding of the new NORAC operating rules, particularly where protection of employees and equipment is provided through blocking devices. SEPTA should specifically forbid the manipulation of reporting

times to create the illusion of compliance with carrier or FRA requirements.

Concern SEPTA-07: On two occasions, FRA noted that on-duty train dispatchers were reading newspapers. This is prohibited by operating rule E. An AM/FM radio was also observed in the dispatchers office. The use or possession of radios while on duty is prohibited by the same rule.

Recommendation: SEPTA should review this rule to determine if it is consistent with the railroad's needs and policy. Employees should not be permitted to flagrantly disregard rules and regulations.

Concern SEPTA-08: The procedure employed to exchange orders and information between SEPTA and ATK has not been formally reduced to a written document. Consequently, FRA noted that three dispatchers each used different procedures to accomplish this task.

Recommendation: SEPTA should adopt, implement and enforce a uniform written procedure. FRA believes that the NORAC group should consider this issue and develop a single standard procedure.

Concern SEPTA-09: SEPTA failed to report seven cases of excess service by train dispatchers to FRA during 1987.

Recommendation: SEPTA should evaluate the procedures being used to report dispatchers excess service. The authority must ensure that all excess service is identified and reported to FRA.

Concern SEPTA-10: The dispatchers record of train movements does not contain Federally required information about the distances between stations.

Recommendation: SEPTA must revise the dispatchers record of train movements to include FRA required information about the distances between stations.

Concern SEPTA-11: SEPTA, in conjunction with the other members of the NORAC committee, has developed a new operating rule book. The carrier did not, however, develop a new program of operational tests and inspections before the book became effective. The tests in the carriers previous program did not align with the new rules. SEPTA's response was to suspend testing. FRA regulations require a program of operational tests and inspections. FRA believes that this program is particularly critical when major operating rules have been changed, and the likelihood of employee misunderstanding may be greatest.

Recommendation: SEPTA must immediately develop, adopt and implement a program of operational tests and inspections that conforms to Federal regulations and the NORAC operating rules.

Concern SEPTA-12: The near perfect level of train dispatcher compliance indicated by SEPTA operational testing contrasted notably with FRA's limited operational observations.

Recommendation: SEPTA should review the procedures and practices employed by supervision to ensure effective and high quality tests.

Concern SEPTA-13: Each train dispatcher has a radio console. The radios are located behind the dispatchers seat. This prevents the dispatcher from reviewing his train sheet when using the radio.

Recommendation: The placement of the radios in relation to the dispatchers working location is inconvenient. The carrier should reposition the radio to a location that is accessible from the dispatchers normal working position.

Concern SEPTA-14: Open loudspeakers which broadcast within the "studio" environment of the operations center contribute considerable noise and distraction to the work place.

Recommendation: The Carrier should use individual headphones or acoustically isolated cubicles for individual dispatchers.

Concern SEPTA-15: Section "B" dispatcher must pick up telephone headset in order to talk on block line, thereby eliminating the potential use of one hand.

Recommendation: Septa should upgrade the telephone equipment provided for this position. This will permit the dispatcher more freedom to perform his duties.

Concern SEPTA-16: Septa dispatchers use draftsman style desks. The desks do not provide a secure mounting space for telephones and radios and are inconvenient for organizing the additional documents and forms.

Recommendation: Septa should audit the individual dispatchers work stations to determine if the existing equipment should be modified or replaced.

CHAPTER 19- SOO LINE RAILROAD COMPANY

I. INTRODUCTION

The SOO Line Railroad Company (SOO), headquartered in Minneapolis, MN, operates in 12 states. At the time of the assessment, the railroad was divided into three districts. Each district is comprised of numerous subdivisions.

The railroad's primary hub is in Minneapolis, with lines extending to Chicago, IL, Duluth, MN, Kansas City, MO, and through Minot, ND to Canada. There are also lines extending from Chicago to Kansas City and Louisville, KY.

In 1987 the SOO operated 11,155,139 train miles and 2,587,245 yard miles which are included in the total train miles.

The following table illustrates the locations of the train dispatching offices and the number of dispatchers on each shift:

TABLE SOO-I
TRAIN DISPATCHING OFFICES AND
DISPATCHER POSITIONS PER TRICK

LOCATION	FIRST	SECOND	THIRD	TOTAL
Chicago, IL	1	1	1	3
Milwaukee, WI	5	5	5	15
St. Paul, MN	2	1	1	4
TOTAL	8	7	7	22

II. STAFFING AND TRAINING

Organization

Each of the three districts are under the supervision of an Assistant General Manager who reports to the General Manager.

The SOO Line dispatching organizational structure does not conform with the traditional industry standard where train dispatchers report through the chief dispatcher to the division superintendent. A Director of Train Dispatching, located in Milwaukee, is responsible for operations in the three dispatching centers. Dispatchers report to the Chief Dispatcher, or in his absence the Assistant Chief Dispatcher. The Chief and Assistant Chief Dispatchers report to the Director of Train Dispatching. At the time of the assessment the SOO had a total of four Chief and four Assistant Chief Dispatchers in the three dispatching centers.

Hours of Service

In 1988 the SOO reported 14 cases in which train dispatchers performed service in excess of that permitted by Federal statute. Of the 14 cases, 13 were related to a shortage of qualified dispatchers.

At the time of the assessment, the SOO had recently qualified six dispatchers who were assigned as extra list employees to protect the scheduled and unscheduled vacancies in the three centers. Extra lists include employees who are guaranteed compensation in order to be available to protect the dispatcher and assistant chief dispatcher positions at the three centers. Three of those extra list dispatchers have subsequently resigned.

During the assessment, FRA found that SOO dispatchers were at least occasionally required to work on their assigned rest days. While the number varied from office to office, dispatchers at Milwaukee were required to work 364 rest days during 1987.

The SOO should evaluate their dispatching extra list to ensure the staff is sufficient to meet the work force requirements. It was apparent the SOO needs to train and qualify new dispatchers to fulfill the needs of the dispatching centers.

Candidate Selection

SOO offers employees of any craft the opportunity to apply and be considered for train dispatching positions. Candidates must pass initial interviews conducted by a representative of the Office of Personnel and by the Assistant Director of Train Dispatching. Candidates are selected for promotion to train dispatcher on the basis of those interviews.

TRAINING

Initial Training

Currently SOO's dispatcher training program consists of limited formal instruction on the operating rules and dispatcher procedures in conjunction with extensive on the job training. A student must take a road familiarization trip before being permitted to work on any territory.

Periodic Training

The SOO requires that all dispatchers attend a re-examination class on the operating rules every two years. An operating rule test consisting of 300 questions is taken at the class. Minimum passing grade is 90 per cent. If the dispatcher fails the examination he is permitted to continue working and retake the

examination at a later date. Eventually, and within a specified time, all dispatchers must pass the examination.

Periodic physical characteristics familiarization trips are at the discretion of the chief dispatcher. SOO has no schedule or plan for road trips.

FRA believes train dispatchers should have current and accurate knowledge of the physical characteristics of the territory over which they dispatch.

III. RULES AND PROCEDURES

Operating Rules

In addition to a system timetable, dispatchers are governed by several systems of rules. The SOO subscribes to **General Code of Operating Rules** which have been in effect since April 23, 1986. The procedures used by dispatchers are also enumerated in the **Rules and Instructions for Train Dispatchers and Control Operators**, and the **Instructions for Agents, Control Operators, Train Order Operators, and Bridgetenders.**

Train and on-track equipment movements are governed by Centralized Traffic Control (CTC), Track Warrant Control (TWC), and Operating Rule 251.

Operating Procedures

Following is an office by office synopsis of exceptions taken by FRA during the assessment:

St. Paul, Minnesota

- By not consistently recording the weather at six hour intervals and failing to not unusual occurrences, train dispatchers were not complying with the provisions of CFR 49 Part 228.
- Inspectors observed that many entries on the dispatchers' record of train movements were not recorded in a neat and legible manner as required by the carrier operating rules.
- Multiple instances of violations of the radio rules were noted. Notably lacking was the dispatchers failure to end radio transmissions with the words "over" or "out".

Chicago, Illinois

- Dispatchers are not required to take periodic physical characteristics familiarization trips.

- Multiple instances of violations of the radio rules were noted.

Milwaukee, Wisconsin

- Dispatchers are not required to take periodic physical characteristics familiarization trips.

- Multiple instances of violations of the radio rules were noted.

- Train crews operate trains on a round trip entailing more than one tour of duty. The train crews are not contacting the dispatcher when reporting on duty the day of the return trip to verify that their track authority is accurate.

IV.OPERATIONAL TESTING PROGRAM

The SOO program has not been revised for a period of time. It requires that each employee governed by the rules be tested at least every other year. The Director of Train Dispatching is responsible for assigning the number of tests each officer must perform each month.

FRA requested the listing of all efficiency tests performed on SOO dispatchers in 1987. There record furnished indicated that two tests were performed. It is apparent the number of operational tests and inspections conducted on dispatchers is not sufficient for the carrier to assure these employees are familiar with the railroad's operating rules and timetable instructions.

A wide range of carrier officers have contact with dispatchers and have the means and opportunity to conduct operational tests. Efficiency testing can be conducted on dispatchers more easily than other employees subject to the operating rules because the dispatchers work at a fixed location.

V. ENVIRONMENT AND WORKLOAD

In general, FRA found that the majority of train dispatchers' offices on the SOO provide an adequate working environment. Districts were assigned in a logical manner. However, at one location dispatchers were observed working, at times, at the limits of their ability. When the district General Manager was

informed of those conditions, he advised that the matter would be reviewed.

SOO train dispatchers work centralized traffic control stations and voice control desks. FRA found that work loads on the daylight shift were significantly higher than during other tours of duty. This was due to the demands placed upon the dispatcher by MW and signal department employees.

With the exception of the St. Paul center, the primary environmental considerations of lighting, heating, cooling, and ventilation were adequate.

The St Paul dispatchers' center is housed in a building located near the terminal switching lead. There is substantial noise and distraction generated by the activities outside the building. Dispatchers at Chicago and Milwaukee worked within enclosed individual offices.

FRA observed that in all the centers overall noise level was often sufficient to be considered distracting. The distractions required repetition of radio or telephone conversations. The primary sources of this noise were open communication speakers. Speakers were often adjusted to maximum volume so as to command the dispatchers attention over the surrounding din. Again, carrier officials were knowledgeable and concurred with FRA's opinion.

Individual Dispatching Offices

During the assessment, FRA noted certain concerns which were confined to individual offices as follows:

St. Paul, Minnesota

- Dispatchers expressed concern about the possibility of errors being committed because of the work load at their position. Their concerns were reported to the district General Manager. On July 11, 1988, the SOO established a new dispatcher position that reported on duty at 5:00 a.m. to lessen the work load on the first trick. The carrier plans to add another position of this type when the center is moved to Milwaukee in December 1988.

- Unauthorized persons were observed in the dispatching center by FRA. Conversations which did not relate to railroad operations offered the opportunity for distraction and increased the overall noise levels.

Chicago, Illinois

- Unnecessary pedestrian traffic is permitted in the work area. This traffic created unnecessary distractions.

Milwaukee, Wisconsin

- Train dispatchers' work areas are not effectively isolated to eliminate the noise generated by the adjacent clerical personnel and supervision.

- Unnecessary pedestrian traffic is permitted in the work area. This traffic created unnecessary distractions to the dispatchers.

VI. COMMUNICATIONS

General

Dispatcher consoles are equipped with VHF radio channels, company telephones, and commercial telephones. Also available is a Mobile Radio System which provides supervisors and other designated employees with mobile telephone communication capabilities.

During the assessment FRA inspectors noted that the radio procedures of the dispatchers were above average while those of employees conversing on the radio with the dispatcher were poor. A notable exception to this was when employees were obtaining Track Warrant Authority which depends heavily upon reliable communication.

Also of concern was interference on the dispatcher's radio channel caused by transmissions from MofW portable packsets and remote stationary field transmitters.

The use of the mobile radio telephone system by SOO supervisors sometimes places an additional burden on dispatchers. Supervisors use the mobile telephone to acquire data from the dispatchers rather than from the Chief or Assistant Chief Dispatchers. These supervisors were frequently using the mobile telephone system to circumvent and reorganize the dispatchers priorities.

The communication system is subject to "dead spots" at various locations. Most notable was along the route adjacent to the Mississippi River. Some "dead spot" areas are located where the method of train movements is Track Warrant Control, which is safety dependent on adequate radio communications.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern SOO-01: At the Milwaukee office, dispatchers were required to work their rest days a total of 364 times during 1987, despite the fact the SOO does not schedule physical familiarization trips.

Recommendation: The SOO should evaluate current staffing levels to assure the dispatching staff is sufficient to meet the work force requirements at this office.

Concern SOO-02: Dispatchers are not required to take periodic road characteristic familiarization trips.

Recommendation: The SOO should establish system standards for physical characteristics familiarization trips.

Concern SOO-03: During the assessment, FRA noted a number of exceptions to the **General Code of Operating Rules** and dispatching procedures. These exceptions applied to dispatchers, operating department and other carrier employees.

Recommendation: SOO should assign supervisors to monitor operating rule compliance by employees in the dispatching work place.

Concern SOO-04: Operational testing of dispatchers is not an effective part of the SOO operational testing program.

Recommendation: The SOO should revise the testing program. Effective operational testing of dispatchers should be an integral part of the carriers overall monthly testing program.

Concern SOO-05: The use of open speakers within dispatching centers contributes considerably to distracting dispatchers.

Recommendation: The SOO should review it's communication system and examine the needs of each dispatching center to develop standards and priorities. At a minimum, consideration should be given to the use of individual headphones or acoustically isolated cubicles for train dispatchers.

Concern SOO-06: The St Paul dispatch center is noisy both because of it's location and because it has inadequate insulation. Unauthorized persons are allowed to enter the office and create noise that is distracting to the train dispatcher.

Recommendation: The carrier should take immediate action to restrict unauthorized persons from the dispatchers office. Insulating noise barriers should be installed to restrict noise.

Concern SOO-07: Supervisors are using the mobile telephone system to circumvent and reorganize the dispatchers priorities.

Recommendation: The SOO should develop and enforce rules for supervisory use of these mobile telephones and eliminate the interruptions of essential dispatcher safety functions. Supervisors should be required to contact the Director of Train Dispatchers, Chief Dispatcher, or the Assistant Chief Dispatcher for communications of an administrative nature.

Concern SOO-08: Dispatcher compliance with federal and carrier radio rules and instructions is not adequate. The dispatchers do not promote proper radio procedures and are not always using the required procedures in the course of their own transmissions.

Recommendation 1: The SOO should immediately implement a program to teach proper radio procedures to all employees in order to comply with the applicable carrier operating rules and Federal regulations.

Recommendation 2: The carrier must regularly audit radio transmissions to insure that employees are complying with the applicable Federal regulations and carrier operating rules.

Concern SOO-09: At various locations radio "dead spots" eliminate the assurance that trains and other on track equipment can be contacted by radio at all times.

Recommendation: The carrier should determine the location of "dead spots", and relocate or reposition radio apparatus to eliminate that condition.

CHAPTER 20- SOUTHERN PACIFIC TRANSPORTATION COMPANY

I. INTRODUCTION

The Southern Pacific Transportation Company (SP) and it's subsidiary, the St. Louis Southwestern Railway Company (SSW), are headquartered at San Francisco, CA. The SP and the SSW are operate in 13 states with a combined total of 12,800 track miles. For purposes of this report the two carriers are called SP.

The Western Region is comprised of five divisions, the Oregon, Sacramento, Western, Los Angeles and Tucson. It extends from Oregon southward to Los Angeles, California; from San Francisco to Ogden, Utah; from Los Angeles through the states of Arizona and New Mexico to El Paso, Texas and northeastward to Tucumcari, New Mexico.

Two SSW divisions, Pine Bluff and Kansas City, and, two SP divisions, Houston-Lafayette and San Antonio, make up the Eastern Region. The region extends from El Paso, Texas, to New Orleans, Louisiana, and from Tucumcari to St. Louis, Missouri. Other major cities served are Kansas City, Kansas, Fort Worth, Galveston, Houston, Brownsville and Denison, Texas, and, Shreveport, Louisiana. The following table shows the locations of the train dispatching offices and the number of dispatchers on each shift:

TABLE SP-I
TRAIN DISPATCHER OFFICES AND NUMBER OF DESKS ON EACH SHIFT

LOCATION	FIRST	SECOND	THIRD	TOTAL
Eugene, Oregon	4	4	4	12
Houston, Texas	3	3	3	9
Kansas City, Kansas	2	2	2	6
Lafayette, Louisiana	2	2	2	6
Los Angeles, California	5	5	5	15
Pine Bluff, Arkansas	3	2	2	7
San Antonio, Texas	4	4	4	12
Roseville, California	6	6	6	18
Tucson, Arizona	4	4	4	12
TOTAL	33	32	32	97

Relocation of Offices

Dispatching offices formerly located at Lafayette, LA, and Kansas City, MO were recently combined with the Houston office at Houston. The FRA conducted a safety assessment of those two offices prior to that consolidation. The results of the audits are included in this report. The Pine Bluff and the San Antonio offices are scheduled to be consolidated into the Houston office in November 1988.

II. STAFFING AND TRAINING

Organization

Some division dispatching offices have been consolidated to create a regional dispatching center at Houston. The resulting organizational structure departs from the traditional industry standard in which the dispatcher reported through the chief dispatcher to the division superintendent. Now, dispatching functions are reported through the chief dispatcher to both regional and divisional level officers.

The consolidations also brought about changes in the titles and management structure which occurred during and after the FRA assessment field work. The FRA did not have an opportunity to fully evaluate those new relationships.

The chief train dispatcher is responsible for the overall operation of the dispatching office and supervision of the dispatchers and the support staff located at the office. The assistant chief dispatchers perform typical administrative and ancillary functions.

At the time of this assessment, the carrier had a total of 51 assistant chief dispatchers, 17 each on the first, second and third shifts.

Hours of Service

In 1987 the SP reported to the FRA two instances in which train dispatchers performed service in excess of that permitted by Federal statute. Both occurred because of a shortage of qualified dispatchers in the Tucson office.

Each dispatching office is staffed with an extra board of dispatchers who are guaranteed compensation. They are available to protect vacancies which occur in the assistant chief dispatcher and dispatcher positions.

Overtime

Dispatchers were required to work on their assigned rest days 1,070 times during a 12 month period beginning in 1986 and ending in 1987. The number of rest days worked at each office is: Los Angeles 321, Roseville 200, San Antonio 184, Lafayette 125, Houston 76, Tucson 75, Eugene 56, Pine Bluff 33, and Kansas City, none.

Candidate Selection

Candidates for promotion to dispatcher are selected from the ranks of employees with train order or operator background. In each of the nine offices they are given a pre-selection interview. In seven offices candidates complete a pre-selection written interview paper. Candidates in six of the offices are required to undergo a physical examination. Only four of the nine offices required all of these selection procedures.

Initial Training

The carrier does not have a system-wide standard for the initial training of dispatchers.

At the time of the assessment, a course was being developed to train student dispatchers at Cerretos, California. Classroom instruction will be supplemented by an electronic dispatching simulator.

The San Antonio office has a working program to train student dispatchers. The course will be expanded to include a program of requalification for the experienced dispatching staff.

San Antonio students receive the following course of study:

Four weeks of formal classroom instruction in carrier rules including but not limited to blue signal protection, radio standards and procedures, rear end marker requirements, the Hours of Service Law and all operating rules and procedures relating to directing the movement of trains and other on-track equipment.

The student must complete a written examination. A minimum score of 80 per cent is required which permits the student to continue in the training program. The student is next placed in on-the-job training with a working dispatcher, moving from desk to desk until he/she qualifies on the territories designated by the carrier. The final decision regarding qualification is made by the chief dispatcher.

Student dispatchers in other offices receive a combination of classroom instruction and on the job training.

Periodic Training

Written directives state that dispatchers will attend an operating rules instruction class once each year. In fact, however, dispatchers have not been required to do so. There is no system policy that requires a written examination.

During the four years preceding this assessment two offices required an examination of dispatchers on the operating rules annually; three offices, each second year; one office, each third year and three offices, each fourth year.

The Los Angeles office does not require dispatchers to periodically re-qualify with a written examination on the operating rules.

The Roseville office has no standard for periodic requalification by a written examination on the operating rules. Dispatchers at Roseville were last instructed on the operating rules when the carrier subscribed to the **General Code of Operating Rules** which became effective April 18, 1985.

The Tucson dispatchers were last examined on the carrier operating rules in 1982. They received a two hour instruction class along with other crafts when the General Code of Operating Rules was implemented on the SP system in October 1985, but they were not examined on those rules.

In those offices where dispatchers are required to re-qualify, the examinations ranged in the number of questions from 30 to 150. Also the qualifying grade ranged from 80 to 100 percent among the offices.

Dispatchers go on familiarization trips to learn the physical characteristics of the railroad at the discretion of the chief dispatcher in each of the nine offices. Only one office has a requirement that dispatchers must take familiarization trips over the territory which they dispatch. Eight offices had no schedule or plan established for the purpose. However, in some locations train dispatchers are permitted to ride trains or a high rail vehicle over the territory which they dispatch to learn the physical characteristics.

III. RULES AND PROCEDURES

Operating Rules

In addition to the regional timetables, dispatchers are governed by several systems of rules. The carrier subscribes to the **General Code of Operating Rules** (GCOR) which became effective October 28, 1985. The procedures used by dispatchers are enumerated in **Rules and Instructions for Train Dispatchers and Control Operators** effective November 1, 1985. Also, dispatchers are governed by general orders, system bulletins and division bulletins.

Trains and other on-track equipment movements are governed by centralized traffic control [CTC] rules, direct traffic control rules, the yard limit rule and rule 251.

Operating Procedures

The following is a synopsis of deficiencies observed by FRA inspectors:

Tucson

- Standard clocks are not identified by signs as required by operating rule No. 1 of the GCOR.
- Some maintenance of way employees did not release track and time authorities before going off duty as required by rules No. 351 and 351(B) of the GCOR.
- DTC block authority was not released by a conductor before going off duty as required by the GCOR. The dispatcher called the conductor at home to secure the release.
- A dispatcher did not require a conductor to release an authority in the manner required by the GCOR.
- There were several instances when dispatchers did not record weather conditions at 6-hour intervals as required by Federal regulations.
- Some dispatchers, when transmitting on the radio, failed to use the terms "Over" and "Out", as required by carrier operating rules and Federal regulations.
- There were non-work related radio transmissions by train crew members.

Pine Bluff

- Standard clock signs were not posted under the six clocks utilized by dispatchers as required by GCOR operating rule No. 1.

- Dispatchers did not re-establish communications on the dispatcher telephone by identifying themselves with the term "dispatcher" after having been away from the desk as required by the Rules and Instructions for Train Dispatches and Control Operators.

- Track and Time and Direct Traffic Control (DTC) authorities were not always repeated to the dispatcher after they were transmitted on the radio to train crews.
- Some dispatchers did not underscore Track and Time and/or DTC authorities when they were repeated by the receiving employee.

- A dispatcher issued a Track and Time authority, closed the Track and Time authority book, listened to the repetition without referring to the book and then approved the authority.

- Dispatchers granted Track and Time authorities before the blocking devices were applied on signals and/or switches as required by the GCOR.

- The carrier has no established rule for extending Track and Time authorities, nor is there a column provided on Track and Time records for that purpose.

Eugene

- Some dispatchers did not sign the train dispatchers' record of movement of trains nor did they show their time on duty as required by Federal regulations. Dispatchers did not record the arrival and departure times for local trains that departed from yard limits, entered the main track and then returned to yard limits.

- Dispatchers did not record the weather at 6 hour intervals as required by Federal regulations.

- A dispatcher did not underscore the record of a track and time authority when it was repeated by the receiving employee.

- A dispatcher issued a track and time authority before he applied the blocking device to the control panel.

- o A dispatcher issued a track and time authority in a territory in which a similar authority had already been issued. The dispatcher, in violation of the GCOR, did not notify the employee holding the first authority that a second authority had been issued.

- o Dispatchers transmitting on the radio did not identify the railroad when beginning a transmission or use the words "over" and "out" when ending a transmission.

Lafayette

- o Dispatchers did not extend work and time authorities in DTC territory as required by the Rules and Instructions for Train Dispatchers and Control Operators.

- o After carrier officers instructed a dispatcher to do so, the dispatcher instructed a train crew to use a switch which had been removed from service by a General Order.

- o Some dispatchers did not place their initials under the last word in train orders as required by the GCOR.

- o Some dispatchers did not always comply with radio rules and procedures. Employees in the field did not comply with radio rules and procedures in communicating with the train dispatchers.

Los Angeles

- o DTC rules were not complied with in two instances:

  1. A dispatcher tried to influence a train crew to release a DTC block authority before the crew could determine that the rear of their cabooseless train was clear of the block. The train was equipped with an end-of-train telemetry device. The data transmission from that device had been lost because the device failed.

- o Even though GCOR rule No. 482, under certain conditions, prohibits the movement of more than one train at a time in unsignalled DTC territory, dispatchers occasionally issued work and time authority to accomplish that same purpose.

- o Dispatchers and train crews when transmitting by radio regularly used first names as identification, failed to identify the railroad, did not end a transmission with

the words "over" or "out" and conducted many non-business related conversations.

- Improper radio procedures were used to issue mandatory directives:

  1. The dispatcher did not correct an employee who omitted to repeat the "30" on a 30 mph slow order.

  2. A 10 mph slow order was not issued in the format provided for in the GCOR.

  3. A verbal authority transmitted on the radio by a yardmaster to permit a train to move against the current of traffic on a main track lacked proper identification, terminology and repetition.

San Antonio

- A dispatcher permitted a train to operate on the San Antonio Subdivision with more restricted movement cars than was permitted in General Order No. 41, Section E, Item 13.

Houston

- Dispatchers extended track and time authorities and did not record the extensions in the track and time book.

- A dispatcher issued a track and time authority to a maintenance of way employee and did not apply blocking devices to the control panel to protect that authority.

- A train dispatcher under the pressure of peak period workload issued a track order with an incorrect location (station number). After the receiving train crew questioned the accuracy of the order the dispatcher restated the proper location to that crew. The same order, with the same error, was delivered to other trains. Several hours later, before those trains reached the restricted track, the order was reissued with the correct location.

- Because a first trick dispatcher was three to four hours behind with his work due to an overwhelming workload the dispatcher coming on duty completed the written transfer of authorities between the two dispatchers even though the Rules and Instructions for Train Dispatchers and Operators required the inverse of that.

- A cabooseless freight train which was operating ahead of a National Rail Passenger Corporation (Amtrak) passenger train cleared the main track and responding to instructions from the dispatcher did not realign the switch for the following main track movement of the Amtrak passenger train. Instead, the dispatcher relied on the radio communications system to instruct the Amtrak train to stop and align that switch.

  This operating practice was immediately discontinued when it was brought to the attention of the general manager.

- Dispatchers, train crew members, and maintenance of way personnel when transmitting on the radio often did not use the words "over" and "out" when ending transmissions.

IV. OPERATIONAL TESTING PROGRAM

The SP program of operational efficiency testing was revised on May 16, 1986. The program requires that an audit of rules compliance will be conducted once each quarter. The superintendent of each division is responsible for assigning the number of tests each officer must conduct.

There were 18 train dispatchers disciplined for rules violations during a 1 year period beginning in 1986 and ending in 1987. The majority of the violations involved "Track and Time" or "Work and Time" authorities; other rules violations were the improper release of DTC authorities and four violations of the carrier's rule G which relates to the control of drug and alcohol use.

Table SP-II shows the number of dispatchers, the number of operational tests and inspections conducted, the number of failures, the total failure rate, and the average annual number of such tests and inspections for each dispatcher.

FRA determined the average annual number of efficiency tests conducted on each dispatcher, for each office, by dividing the number of tests conducted by the number of desks per office. Those averages do not include assigned relief dispatcher positions, extra board dispatchers or assistant chief dispatchers. If those positions had been included the average number of tests for each dispatcher would have been even lower.

TABLE SP-II
OPERATIONAL TESTING DATA

LOCATION	Dispatchers	Tests	Failures	Failure Rate	Average
Pine Bluff	7	378	0	0.0	54.0
Tucson	12	0	0	0.0	0.0
Roseville	18	0	0	0.0	0.0
Los Angeles	15	8	1	12.5	0.5
Lafayette	6	0	0	0.0	0.0
Kansas City *	6	39	1	2.6	6.5
Eugene	12	320	3	0.9	26.6
Houston	9	167	1	0.5	18.5
San Antonio	12	1	1	100.0	8.3
TOTALS	97	913	7	0.7	9.4

The FRA evaluation of the data revealed the following:

- Pine Bluff - 378 tests were conducted with no failures. FRA inspectors observed numerous violations of operating rules and instructions in this office.
- Tucson - Although the chief dispatcher stated that efficiency tests were performed on dispatchers, those individual tests were not recorded. Nor was there any record maintained of the total number of tests conducted or the number of failures.
- Roseville - The carrier does not conduct efficiency tests on dispatchers.
- Lafayette - The carrier did not maintain records of the number of tests conducted or the number of failures.
- Kansas City - The carrier conducted 39 efficiency tests with one recorded failure. Each test was conducted on the same rule which related to the repetition of block limit authority.

- Eugene - 320 tests were conducted with three failures. 70 percent of those tests were on the issuance of DTC authority and 28 percent on radio procedures. 75 percent of all of the tests were conducted during day light hours.

- Houston - 167 tests were conducted with one failure. The dispatchers were unaware they had been tested. The FRA requested copies of those test records but they were not furnished.

- San Antonio - The assistant manager of dispatching operations said that he had conducted tests on dispatchers in that office. There was one record of testing, a failure. No records were maintained on the other tests.

The carrier's efficiency testing program lists only two specific operating rules upon which dispatchers are to be tested. There are no tests designed to determine if dispatchers are complying with the instructions contained in the **Rules and Instructions for Train Dispatchers and Control Operators**, or the regional timetable special instructions.

FRA requested a copy of the computer generated reports of operational efficiency tests which had been conducted on dispatchers and which could be used by carrier officials to manage and evaluate the operational testing program. The carrier did not provide that report. There was a complete absence of testing in the Tucson, Roseville, Lafayette and San Antonio offices and only a small number of tests conducted at the other offices. Those tests that were conducted were limited in scope. This leads FRA to conclude the program is not adequately managed or audited by the carrier.

V. ENVIRONMENT AND WORKLOAD

General

FRA found that most of the offices provided an adequate working environment of lighting, heating, cooling, and ventilation.

The desks are equipped with computer assisted dispatching systems, centralized traffic control systems, voice control manual block systems or with a combination of any of those systems.

The workload on some of the first and second shifts was significantly higher than the third shift because of the concentration of maintenance programs during daylight hours.

Some dispatchers working first and second tricks had a workload so heavy that they were compelled to work at the limit of their ability and endurance to direct train movements without delaying them. Often, dispatchers did not have time to use the rest room facilities or to eat during their eight hour shift.

The traffic load on four desks, which are combined CTC and DTC operations, created a workload which sometimes went beyond the limit of the dispatchers abilities.

The consolidation of some dispatching districts on the second and third tricks on weekends and holidays has created very heavy workloads.

Carrier officials at Houston, when told of the excessive workload on one first shift dispatcher, divided the territory into two districts. A dispatcher was assigned to each district.

The mobile radio telephone system places an additional avoidable burden on the dispatcher. Supervisors and other employees who are provided with this equipment often use the dispatcher as a telephone operator to locate, or call, and deliver messages from one department or person to another. Supervisors regularly use the mobile telephone to contact the dispatcher to determine the status of train movements and to suggest movement priorities. Those conversations and requests interrupt the dispatchers concentration and planning.

The workload and environmental concerns of the individual office are as follows:

Houston

- After a first trick desk was assigned two dispatchers, a lack of adequate work station engineering became apparent. There was no capability of dividing the territory between two desks. Instead, two persons now work on the one desk, in a very small room. One operates the control panel, and the other issues authorities, operates the telephone and radio, and operates the computer.

- One desk at Houston was not planned to coordinate in a logical manner with the Lafayette territories which were moved to Houston. A new control panel, designed with the stations and flow of traffic from right to left, was joined with an older panel on which the stations and flow of traffic was from left to right. The increase in workload becomes apparent if one tries to imagine reading two adjoining maps with the directions on one of the maps reversed.

- The workload on the second and third trick dispatcher positions which are consolidated on weekends and holidays is very heavy.

- The work area which was previously dedicated to the Houston division dispatchers is presently being enlarged and modified to accommodate those dispatching offices which will comprise the Houston regional dispatching center.

- Construction equipment and construction personnel have added to the general confusion of relocation. The additional noise, dust, clutter and activity of the workmen disrupt the dispatchers ability to concentrate.

- Dispatchers have no control over lighting or room temperature.

- There are no rest room facilities within the assigned dispatching area.

- The chief dispatcher, in the absence of the dispatcher, received from a train crew the release of a DTC block authority and recorded that information. In a second instance the chief dispatcher issued a DTC block authority in three blocks and properly recorded those authorities. At the same time several train crews and other personnel on the line of road were calling the dispatcher on the radio. Some trains were standing still waiting for authority to move. The dispatcher, had taken his first break in several hours to use the rest room. The chief dispatcher received no transfer as required by the Rules and Instructions for Train Dispatchers and Operators.

- A first trick dispatcher, at the end of his shift, was three to four hours behind with his work because of an extremely heavy workload. The relieving dispatcher entered trains into the computer and cleared those trains for movement even though those trains had not been entered on the dispatchers record of movement of trains.

- Traffic through the dispatching area has increased because of the construction in adjacent offices.

- The HD-3 desk has the radio channel selector switch located so that the dispatcher has to reach the full length of the desk (in excess of 15 feet) to change channels.

Tucson

- FRA took no exceptions to the office environment
- During the first shift and part of the second shift the Northline and West train dispatchers are required to work to the limit of their ability and endurance. The two desks are CTC territory for the most part and much of the time is spent providing track and time authorities for maintenance-of-way employees.
- The Eastline and Middle DTC desks presently have very light workloads.

Los Angeles

- The office environment is acceptable.
- The Los Angeles Division is heavily congested with a high density of train movements. On the Valley-Mountain and West end desks, this congestion, along with tenant operations and the difficulty of determining the time elements involved in directing train movements in mountainous terrain combine to create an very high level of workload for even the most experienced dispatcher.
- The workload of the Valley-Mountain and West End desks is greatly increased by the extremely heavy congestion of radio transmissions which disrupt the issuance of authorities.
- The long commute, the heavy workload of some of the positions and the high level of interfering radio transmissions causes a high turnover in personnel. The result is that this office has a high percentage of low seniority dispatchers.

Roseville

- The working environment is acceptable.
- The workload on the Coast, the Cal-P and the Lathrop desks sometimes press the ability and endurance of the most experienced dispatcher.
- The workload on the East End and the Valley desks cause the dispatchers to work to the limit of their skill.

- The workload on many of the desks is increased by overlapping and interfering radio transmissions between dispatching territories, from engineering forces on line-of-road, from trains, from yard offices and from some mobile units.

Kansas City

- The office environment is acceptable.

Lafayette

- The desks are located in separate rooms. They are well lighted, well ventilated and unauthorized persons may not enter the office.

- The workload on the first trick desk was heavy because of the need to provide protection for maintenance-of-way employees.

Eugene

- The first and second shift desks were busy but the workload appeared to be reasonable.

- Each dispatchers work area is separated by floor to ceiling partitions and doors that may be closed. Unauthorized personnel were not observed in any of the offices.

Pine Bluff

- In one room are the West desk and the Texas desk which are manned on first trick. The high level of noise emanating from the two first trick desks causes each dispatcher to disrupt the work of the other.

- The same two desks are combined into one dispatching territory on the second and third shift, creating a workload which at times appears excessive.

- The North Pine Bluff/Brinkley desk is surrounded by CTC control panels. Trains are also dispatched by DTC from this desk. The resulting workload tests the ability and endurance of the dispatcher.

- Dispatching functions were disrupted when employees from other crafts entered the office, carried on conversations among themselves and used the dispatcher's communicating equipment.

- The workload on the combined second and third tricks on weekends and holidays is at time excessive to the point that the most qualified dispatcher must work to the limit of his ability and endurance.

San Antonio

- The dispatchers offices are well arranged in cubicals and separated from each other. The lighting and ventilation are adequate. The offices are secured to prevent entry by unauthorized personnel.

- The dispatchers on the first shifts are extremely busy because of the number of maintenance-of-way projects which require protection by the dispatcher. The workload on those positions is at times excessive to the point of requiring the most qualified dispatcher to work to the limit of his ability and endurance.

VI. COMMUNICATIONS

General

SP radio channel number 1 is used by dispatchers and other employees to transmit and receive mandatory directives, instructions and information regarding on-track movements. A microwave communicating system comprised of remotely controlled base stations is designed to permit the dispatcher to maintain direct radio contact with train crew members.

The SP utilizes a computerized information transmission network named Computer Generated Clearance (CGC) which enables the dispatcher to issue clearances and train directives which are transmitted to locations to be received by train crews. The clearances and directives are received and printed by mechanical printers. At some locations clerical personnel deliver the clearances and train directives to the train crews and at other locations a train crew member removes them from the printer. An electronic facsimile transmitting network provides a back up if the CGC fails. The dispatching desks are equipped with VHS radio equipment, company telephones, and commercial telephones.

Radio procedures of dispatchers were generally acceptable while those of employees conversing on the radio with the dispatcher were generally poor. Notably lacking were an insistence by some dispatchers that employees initiating a transmission properly identify themselves (occupation and station) and the use of the required words "over" or "out" when ending a transmission.

Critical dispatching functions were continuously interrupted by radio transmissions which are automatically activated each time a train approaches and passes wayside hot box, dragging equipment,

loose wheel, and high/wide load detectors. Those talking devices cannot be controlled by the dispatcher as to the time when they transmit or to the number of transmissions. They interrupt and override the dispatcher when he is issuing DTC authorities, track and time authorities and other conversations. They also interrupt employees receiving and repeating those directives. Often those critical communications were transmitted several times by the dispatcher and repeated several times by the receiving employee before the communication was safely completed.

Single end-to-end radio frequencies used by dispatchers on adjoining dispatching territories often interfere one with the other. Similar over-riding radio transmissions occur between dispatching offices because the same frequency is used.

Additional interference on the dispatchers radio channel is caused by maintenance-of-way personnel, yard operations and trains on line of road.

Houston

- Dispatchers observed were familiar with and practiced prescribed radio procedures. Instances of radio use not consistent with rules and procedures were exhibited by employees in other crafts. Improper identification before initiating transmissions, the failure to use the terms "over" and "out" and failure to ensure that the channel intended for use was not already being used were deficiencies most often noted.

- Radio communications were unreliable because of static, dead spots and radio channel congestion. Interference from radio equipped track side detectors, from radio equipped mobile vehicles and trains, remotely controlled microwave base stations, yard locomotives, yard offices, engineering personnel on line of road and other dispatchers constantly interfered with critical dispatching functions.

- Train movements on some desks are dispatched by DTC operating rules which provide for the dispatcher to issue mandatory authorities over the radio to train crews and employees who are conducting other on-track movements. The level of interfering transmissions increased the workload to the point that the dispatcher often did not have time to answer other communication devices.

Roseville

- Interference on the radio channels was severe enough that it disrupted dispatcher communications.

Kansas City

- The communication system is fully recorded and very dependable. As with other systems of voice control, a loss of relay stations may affect the efficiency of the operation but does not imperil safety. Each desk has its own channel and unless two adjoining relays are activated there is little interference.

Lafayette

- The radio system is very poor because of overriding transmissions from radios in the Houston dispatching office, interfering transmissions between desks in the Lafayette office and automatic transmissions from radio equipped wayside detector devices.

- A dispatcher issued track and time authority on the radio to a maintenance-of-way employee. The repetition of the authority by the employee could not be understood by the dispatcher. The dispatcher stopped a train at this location and used the radio on the locomotive to complete the authority to the maintenance-of-way employee.

- Often, because of other interfering radio transmissions, a train order, DTC authority, track and time authority or other priority radio transmission had to be transmitted and/or repeated several times before the dispatcher could be certain it had been received correctly.

Eugene

- Congestion on radio channels was prevalent for all desks throughout the period of the FRA audit. Bleed over transmissions from the other desks and trains on other territories disrupted critical dispatching functions.

- There is no method other than radio for a train crew or other employee in the field to contact the dispatcher.

Pine Bluff

- Proper radio procedures are almost none existent by the dispatchers and employees who interface with the dispatcher. First names were used as identification, mandatory directives were not repeated properly and transmissions were not ended with "over" or "out".

- Radios used by dispatchers are congested with overlapping transmissions from SP radios at Houston, San Antonio, Dallas and Ennis, Texas and from the Kentucky Street operators office at Memphis, Tennessee.

San Antonio

- The radio system on each desk is severely impacted by overlapping transmissions. On two separate occasions a dispatcher required an employee to repeat a DTC authority five times before the repetition could be understood. On four of the five times the repetition was interrupted by other unrelated radio transmissions. Also, track and time authorities were repeated by on-line personnel numerous times because of static and other interfering radio transmissions.

Los Angeles

- Radio transmission interference is heavy and adversely affects operations, especially in the DTC territories and on the main line.

Tucson

- The radio channels are extremely crowded during the daylight hours when maintenance-of-way employees, signal forces and train crews are attempting to contact the dispatcher.

- The wayside detection devices which automatically transmit announcements with each passing train are a severe source of disruption to dispatching functions. Their occasional malfunction results in a continuous announcement which stops all other radio transmissions until repairs are made.

CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern SP-01: The workload on many desks required some dispatchers to work near or at the limit of their ability and endurance. Under those workloads some dispatchers not only violated operating rules but they failed to correct other employees who also violated operating rules. At times dispatchers did not have time to use the rest room facilities or to eat.

Recommendation: The carrier should periodically conduct an audit of the workload on each dispatching position. Dispatching territories should be adjusted to have a workload which will give the dispatcher time to reflect and exercise good judgement.

Concern SP-02: The radio system is impacted with a severe level of overlapping and interfering transmissions. They greatly increase the dispatchers' workloads and could compromise safety.

Recommendation: A dedicated radio channel, free from interference should be provided for directing the movement of trains.

Concern SP-03: The method of selecting and training dispatchers in the nine offices is inconsistent.

Recommendation: The carrier should develop and implement a standardized method of selecting dispatcher candidates. SP should consider augmenting on the job training with classroom training. Use of simulators or on-hands instruction in the use of electronic or computer assisted dispatching and/or communicating systems should be reviewed.

Concern SP-04: There is no system-wide policy for the requalification of dispatchers. Some offices conduct periodic rules instruction. Others do not. Some require a written examination. Others merely provide an opportunity to the dispatcher to ask questions.

Recommendation: Dispatchers must receive periodic rules instruction. A written examination would confirm acquired knowledge.

Concern SP-05: The operating rules examination for dispatchers ranged in the number of questions from 30 to 100 throughout the nine offices. Although 100 questions could comprise an adequate examination FRA seriously doubts that 30 questions is sufficient.

Recommendation: The SP should establish a system standard for an operating rules examination which would cover all of the responsibilities of the train dispatcher.

Concern SP-06: Policy is inconsistent throughout the nine offices regarding dispatchers qualifying on the physical characteristics of the railroad.

Recommendation: The SP should establish a system standard for qualifying new dispatchers and for the periodic re-qualifying of all dispatchers on the physical characteristics of the railroad.

CONCERN SP-07: Dispatchers in the Los Angeles, Roseville and San Antonio offices worked a very high number of rest days. Staff size at these locations appears to be inadequate.

RECOMMENDATION : The carrier should evaluate and adjust staffing levels at these locations.

Concern SP-08: The operational efficiency testing program is not sufficient in scope. Only the chief dispatcher conducted tests. In five offices no tests were conducted and a relatively low number of tests were conducted in the other four offices.

Recommendation: The carrier should develop a program of operational testing which will cover the full scope of dispatching responsibilities. Carrier officials in both the transportation and the engineering departments should be required to conduct operational tests on dispatchers.

Concern SP-09: The office environment at some offices was disrupted by the presence of unauthorized persons.

Recommendation: The carrier should restrict entry to the dispatching offices to those who have a legitimate need to be there.

Concern SP-10: Dispatchers often did not comply with Federal and carrier radio rules and procedures. Neither did they insist that the employees they interface with use proper radio procedures. Dispatcher communications were disrupted by other employees.

Recommendation: The carrier should monitor compliance with radio rules and require employees to use proper radio procedure.

Concern SP-11: Weather conditions, the dispatchers' signature and hours on duty were not recorded on some dispatchers records of movement of trains as required by Federal regulations.

Recommendation: The carrier should instruct dispatchers on the requirements of 49 CFR 228 and monitor them for compliance.

CHAPTER 21- UNION PACIFIC RAILROAD

I. INTRODUCTION

The Union Pacific Railroad Company is headquartered in Omaha, Nebraska, and operates over 21,500 miles of track in 21 Midwest, Southern, Southwest and Western states. The railroad extends from Chicago, Illinois to Los Angles, California and from New Orleans, Louisiana, to Seattle, Washington. It operates through the plains states of the midwest and the Rocky Mountain, Sierra Nevada and Cascade Mountain Ranges of the far west. Union Pacific serves the Pacific ports of Seattle, Portland, San Francisco and Los Angeles; the gulf ports of Houston and New Orleans; the river ports of Kansas City, St. Louis and Memphis; and the Great Lakes port of Chicago. In 1987 UP operated 66,448,073 train miles including 8,695,660 yard and switching miles.

The carrier recently changed its organizational structure from 12 divisions which reported to 3 regional managers, to 30 transportation service districts reporting to a single assistant vice president-service operations. The carrier has also consolidated and reorganized some train dispatching offices. At present Union Pacific has nine dispatching offices with 134 dispatching positions as follows:

TABLE UP-I
UP TRAIN DISPATCHING OFFICES AND
DISPATCHER POSITIONS PER TRICK

LOCATION	FIRST	SECOND	THIRD	TOTAL
N. Little Rock, AR	6	6	6	18
Sacramento, CA	4	3	3	10
Kansas City, KS	3	3	3	9
Kansas City, MO	5	5	5	15
North Platte, NB	6	6	5	17
Portland, OR	6	5	5	16
Spring, TX	8	8	8	24
Salt Lake City, UT	4	4	4	12
Cheyenne, WY	5	4	4	13
TOTALS	47	44	43	134

II. STAFFING AND TRAINING

Staffing

FRA's evaluation of staffing on Union Pacific included examining the organizational structure as it effects the dispatching operation, and review of the duties of personnel managing dispatching offices. An evaluation was made of the adequacy of staffing levels to provide for unexpected vacancies and to comply with the provisions of the Hours of Service Act.

Organization

The relationship of the dispatching office to the operating division in which it is located has changed in recent years. Dispatching centers on Union Pacific, which may have covered a single operating division, now cover as many as five operating divisions or transportation service units. The chief dispatcher manages the dispatching office. He no longer reports to the division superintendent but reports through the general director of train management to the assistant vice president of service resources in Omaha, Nebraska. The chief dispatcher must still work closely with local operating supervisors and division operating officers.

Each dispatching office is staffed by a chief dispatcher, assistant chief dispatchers, and train dispatchers. Clerical, signal and administrative personnel perform other duties at the office. The chief dispatchers, assistant chief dispatchers, and train dispatchers are not represented by a labor organization.

Duties

The chief train dispatcher is responsible for the general planning, managing and supervision of the dispatching office and staff. He is responsible for office efficiency, budget, staffing, planning, training, and all matters pertaining to the effective movement of passenger and freight trains. He must review car scheduling and locomotive pools, handle crew claims, investigate failures, and coordinate all operations at the dispatching center.

Depending on the policies of the particular dispatching office, the assistant chief dispatcher may or may not have supervisory responsibilities. In certain cases the assistant chief may act as a coordinator or administrative assistant for two or more train dispatchers. The assistant chiefs often operate as liaison between the train dispatcher and the crew management center, the power management center, or terminal operations. When a derailment or other service disruption occurs, the assistant chief relieves the train dispatcher of much of the emergency

communication so the train dispatcher can concentrate on restoring operations.

Train dispatchers are required to direct the movement of trains and other on-track equipment through an assigned territory in an safe and expeditious manner. While handling these movements, the dispatcher coordinates with the maintenance-of-way and signal department for the routine inspection and maintenance of the track and signal systems.

Clerical positions may perform such duties as customer service or car control, crew management, crew claims, and filing and recordkeeping assignments. The duties of the position are usually at the discretion of the chief dispatcher.

Hours of Service

In 1987 Union Pacific reported only one case in which a train dispatcher performed service in excess of the maximum hours permitted by the Hours of Service Act.

Each Union Pacific dispatching center has a supplemental staff of extra dispatchers to provide for vacancies which may occur on the regular assignments. Besides providing relief for dispatcher vacancies for sick leave and vacations, the extra board allows the regular dispatchers an opportunity to be released from their position in order to cross-train on other positions or to take familiarization trips over their assigned territory. The employees on the extra boards are guaranteed compensation for being available.

It was noted during the assessment that dispatchers occasionally had to work their assigned rest days due to the inadequate size of the extra boards. In 1986 Union Pacific had 992 cases in which the dispatcher was required to work a rest day. Four of the nine offices assessed had policies which did not allow a dispatcher to refuse overtime work. In five of the nine offices, the chief dispatcher admitted that the office did not have a sufficient number of qualified extra board dispatchers to adequately cover the needs of the office. The following table illustrates by dispatching office the number rest days worked by dispatchers and the number of days per position.

TABLE UP-II
REST DAYS WORKED
IN 1986

Office	Positions	Days Worked	Average Days Worked Per Position
North Little Rock, AR	18	228	12.7
Sacramento, CA	10	192	19.2
Kansas City, KS	9	13	1.4
Kansas City, MO	15	330	22.0
North Platte, NB	17	154	9.1
Portland, OR	16	212	13.2
Spring, TX	24	99	4.1
Salt Lake City, UT	12	0	0.0
Cheyenne, WY	13	67	5.2
Total	134	1295	9.7

In addition to working on rest days, in at least one location, Portland, Oregon, the dispatchers were asked to sell back their vacations. Although the decision to forfeit vacation for pay was up to each dispatcher, it was explained to all dispatchers that if enough people did not surrender their vacation, the office would probably have to go to a six-day work week to cover vacations. Vacation sell backs were not included in the count of total rest days worked which is listed above.

Candidate Selection

Union Pacific considers employees from any craft when selecting candidates for train dispatching positions. Potential candidates are considered on the recommendation of department heads at the division or transportation service district level. The candidates' records are examined and supervisors contacted for a background check. The candidates are interviewed by the chief dispatcher prior to final selection. A physical examination is also part of the selection process. The carrier requires a physical examination for all entry level employment and dispatchers must be reexamined at least biannually. A candidate must be current on his physical examination. Final selections are made by the chief dispatcher. Individuals selected are entered in the carrier's dispatcher training program.

Training

The FRA reviewed the Union Pacific programs for initial and periodic training of dispatchers. The review included the training on operating rules, timetable special instructions, new equipment and technologies, and the physical characteristics of the railroad. The following is a summary of that review.

Initial Training

The initial training of dispatcher candidates is generally the responsibility of the chief dispatcher at the location where the individual is being considered for employment. Instruction of the candidate is initially accomplished through on-the-job training. The chief dispatcher places the candidate at a position with selected experienced train dispatchers until the individual is thought to be able to handle the duties of the position. The candidate is then be moved to another position. The training continues until the candidate is able to perform the duties of each position in the office.

At some point during the initial training period, the candidate is sent to the Union Pacific training center in Salt Lake City, UT for intensive training. Subjects covered by this training include the rules, regulations and standards essential to a train dispatcher. The training program is arranged and taught by the system rules department. Training includes study of the carrier operating rules, rules governing the use of train orders, track warrants and track bulletins, and signals. The students are also introduced to the functions of signals, air brake rules, locomotive standards and the hazardous materials regulations. Before completion of the school, the candidate must pass written examinations in each of four areas: operating rules; train order/track warrant/track bulletins; signal rules; and hazardous materials. The passing grade for each examination is 85 percent.

Candidates are required to become familiar with the physical characteristics of the territories over which they will dispatch. They usually spend sufficient time during the training period riding trains over the assigned territory.

The length of the initial training varies according to the background and experience of the candidate. Usually the training lasts about 10 weeks. The final decision as to the qualification of the individual to perform the job of a train dispatcher rests with the chief dispatcher at the location where the candidate will be assigned. The chief dispatcher generally bases his decision on his own observation of the candidate's performance as well as the reports received from the other train dispatchers in the office and the rules examiner.

Periodic Training

The federal regulations require that railroads periodically instruct their employees on the meaning and application of the carrier's operating rules. The method of training must be specified in a program filed with FRA. Union Pacific is not consistently using attendance at rules instruction classes to meet the training requirement. Attendance at rules instruction classes is not mandatory at all dispatchers' offices. Officers at Sacramento; North Little Rock; Kansas City, Kansas; Kansas City, Missouri; Spring; and Salt Lake City stated that attendance was required. Officers at North Platte, Portland and Cheyenne stated that attendance was not mandatory. At these latter offices the individual dispatcher decides if he needs additional training.

Union Pacific requires all train dispatchers to pass a biannual examination on the carriers' operating rules. These examinations are written. They range from 50 to 400 questions depending on the policy of the office in which the dispatcher works. Each office also has a minimum passing grade. Failure to achieve a passing grade could result in the employee being withheld from service until a reexamination is scheduled and a passing grade attained.

The assessment determined that dispatchers were not always attending rules classes or receiving examinations in the two-year period specified by the program. At Sacramento, California, it was noted that the dispatchers had neither attended a class nor been examined on the operating rules for 34 months.

Dispatchers are required to take road trips over their assigned territory at least once every two years in order to be familiar with the physical characteristics of the route. The scheduling of the trips is at the discretion of the chief dispatcher. The workload of the office or the availability of extra board dispatchers can effect whether the two year schedule is met or exceeded. Of the 128 dispatcher position/shifts examined during the assessment, FRA found that fewer than 57 percent had actually taken a familiarization trip in the last two years. In over 33 percent of the cases the dispatcher had not ridden over his assigned territory in more than three years. In Portland, Oregon, only 5 of the 20 dispatchers interviewed had completed road trips within the previous three years.

III. OPERATING RULES AND PRACTICES

Operating Rules

Union Pacific dispatchers are required to be familiar with and obey all carrier rules and instructions which effect the movement of trains, engines or other on-track equipment. These rules may

be found in several different formats. Union Pacific has adopted **The General Code of Operating Rules.** These rules have been in effect on the railroad since April 28, 1985. The operating rules are supplemented by the **Rules and Instructions for Train Dispatchers and Control Operators.** In addition the dispatchers must be familiar with timetables, timetable special instructions, and any general orders, notices and bulletins which may amend or supersede rules or regulations.

The methods of operation used on Union Pacific for the movement of trains and on-track equipment are as follows: centralized traffic control (CTC), automatic cab signal (ACS), track warrant control (TWC), automatic block signals with train orders, automatic block signals with track warrant, and automatic block signals with Rule 251.

Operating Practices

The following is an office by office synopsis of exceptions taken by FRA during the assessment:

N. Little Rock, AR

- Track and time records were not being properly maintained. The office had no uniform format. At one desk records of maintenance-of-way authorities were kept separate from records of train movement authorities. The track or tracks affected were not always being identified on the record. At least one desk was not showing the ending time limit for track and time on sidings. Some dispatchers did not underscore the record during the repeat before giving the "okay". Rule 351 (E).

- Track and time authorities were issued before the dispatcher had applied the blocking device to the control machine to prevent movement into the limits. Rule 755.

- Track warrants were not being marked "VOID" when a crew member reported the train or engine clear of the limits, the time limit specified had expired, or the track warrant had been changed. Rule 411.

- Dispatcher's records of train movements did not always contain the information required by 49 CFR 228.17. At Texarkana, Texas, train crews report and operate into two different dispatching territories. Neither dispatcher was given the crew or train assignments before the trains entered his territory.

- Track warrants were not being numbered consecutively from the beginning of each calendar date. At the beginning of a new date, the numbers continued from the numbers used on the previous date. Rule 400.

- Use of the abbreviation "T/E" in address for track warrants, track bulletins and clearances was not authorized by carrier rule. Rule 719.

- When dispatchers had been absent from their desks, they failed to identify themselves by saying "dispatcher" over the dispatcher circuit when they returned. Rule 710.

- Dispatcher did not ensure that a train crew which had been relieved before completion of a trip due to its hours of service, had delivered or made arrangements to deliver its train orders, clearances, instructions and hazardous materials documentation to the relieving crew. Rule 215.

Sacramento, CA

- Dispatchers were required to monitor read-outs for wayside failed equipment detectors. The graph machines were found to be improperly maintained or serviced. Graphs sometimes ran out of ink and failed to print the journal heat indications.

- Standard clock at the dispatching office was found to vary as much as one minute from the correct time. The clock was not being maintained to the level of accuracy required of a standard clock. Rule 1.

- Employees did not always repeat the okay time for track and time authority. General Order No. F-7.

- Dispatcher's records of train movement were not being properly maintained as required by 49 CFR 228. The weather was not recorded at six hour intervals. Some records were found with no entry identifying the dispatcher or indicating times on duty.

Kansas City, KS

- The computer system does not maintain a record of train orders after an order has been annulled. Without train order books or computer records, a dispatcher on a following shift or another dispatching district could not retrieve the order for other crews carrying or effected by the order.

- Records of unusual events required by 49 CFR 228.17 (a) (11) were not maintained.

Kansas City, MO

- The weather was not being recorded at six hour intervals as required by 49 CFR 228.17 (a) (4).

North Platte, NB

- A train dispatcher issued a slow order to a train without doing so in the proper train order format. Rule 201.

Portland, OR

- A train dispatcher authorized a train to operate at a speed greater than that which was authorized by a train order speed restriction, without annulling the train order. Rule 213.

- Numerous errors in the procedures for issuing track warrants were noted during the assessment. In one case an error was discovered with an engine number on line 17 of a warrant and the dispatcher took no action to correct the warrant (Rule 407). In another case a track warrant was issued to a train for territory for which another train already held track warrant authority (Rule 717 (d)). In two cases a dispatcher failed to identify the person that was copying the warrant (Rule 717 (j)). In five instances a dispatcher was observed giving an "okay" to a track warrant despite the fact that it had not been repeated back correctly or radio interference prevented the dispatcher from knowing that the warrant had been correctly repeated (Rule 717 (h)). A dispatcher issued authority and addressed it to an eastward train when the movement was westward; the train crew discovered the error and called for a correction (Rule 717 (e)).

- Bulletins for the period prior to the assessment were not properly posted and maintained. Rule 4 (c).

Spring, TX

- Track and time limits were not established as required. A CTC board was completely cleared of all protection and then the dispatcher reestablished all the track and time from the track and time form.

- Track warrant procedures were not being properly followed. The dispatcher's file copy was not being voided as prescribed (Rule 411). Letters and numbers were not being pronounced and spelled in the prescribed manner (Rule 207). Track warrants used the abbreviation "T and E" which was not authorized (Rule Q). A warrant was issued via radio, changed on the computer, then reissued with the same number (Rule 407). Dispatchers were using the initials instead of the name of individuals when releasing a track warrant (Rule 410). Warrants were not being numbered consecutively from the beginning of each calendar day. (Rule 400).

- Track and time authorities were used for protection of Maintenance of Way employees instead of track bulletins. This caused an overload of track and time authorities to be issued.

- The rule for extension of track and time authority was vague and did not prescribe the method which should be use by the dispatcher when extending track and time authority. Rule 351 paragraph 6.

- Slow orders were issued in other than the prescribed format. The dispatcher did not use a train order or track warrant but gave a verbal instruction without a form or record.

- Train dispatchers did not void track bulletins or parts of track bulletins in the correct manner. Rule 463.

- Special instructions in General Order books were not posted or cancelled as required by special instruction.

- Dispatchers issued Form A track bulletins over half the time without flags displayed. Rule 10.

- Track bulletin requests Form A were written on scratch paper without date, time received or name of person requesting. Rule 771.

- A dispatcher failed to sign the record after completing a transfer of train order, track warrants, track bulletins, line-ups, messages and other instructions to a relieving train dispatcher.

Cheyenne, WY

- Blocking devices on two of the CTC consoles were found to be ineffective. They would allow the switch and signal levers to be changed while the devices were in place.

IV. OPERATIONAL TESTING PROGRAM

The FRA examined the efficiency test records at each dispatching location on Union Pacific to determine the number of tests, the test failure rate and the total number of tests conducted per dispatcher position at each location. The results do not take into account the number of extra board dispatchers or assistant chief dispatchers. They use only the number of regularly assigned positions. If the total number of employees at each location were used instead of the number of regular dispatcher positions, the total number of tests per dispatcher would be even lower. The results are illustrated in Table UP-III.

TABLE UP-III
OPERATIONAL TESTS

LOCATION	Dispatcher POSITIONS	TESTS	FAILURES	Percent FAILURE	ANNUAL TESTS Per DSPR
N. Little Rock	18	0	0	0.0	0.0
Sacramento	10	0	0	0.0	0.0
Kansas City, KS	9	91	13	14.3	0.1
Kansas City, MO	15	0	0	0.0	0.0
North Platte,	17	30	0	0.0	1.7
Portland	16	0	0	0.0	0.0
Spring	24	113	12	10.6	4.7
Salt Lake City	12	0	0	0.0	0.0
Cheyenne	13	0	0	0.0	0.0
TOTALS	134	234	25	10.7	1.7

At six of the offices assessed, there were no records that efficiency tests were being performed.

V. ENVIRONMENT AND WORKLOAD

Environmental Concerns

Most train dispatching offices on Union Pacific provided employees with an environment adequate to perform their duties in a safe manner. The offices provided the chief dispatcher with a means of observing and communicating with individual dispatchers. They were designed to restrict access to unauthorized persons and minimize noise or outside distractions. Proper lighting, ventilation, heating and cooling were provided as were means to communicate with support staff.

Individual Dispatching Offices

During the assessment, the FRA noted certain concerns particular to individual offices:

Kansas City, Kansas

The design of this office placed the chief dispatcher in a separate work area from the trick dispatchers. With this arrangement, the chief dispatcher was unable to observe the individual dispatchers in the performance of their duties.

With the office area separated into four rooms, communication between the individual dispatchers and the chief dispatcher was difficult. No communication system was present to handle the normal communication between the chief and the individuals he was supervising. The same communication problem existed between the trick dispatchers. The dispatchers were frequently observed shouting or talking loudly to each other in order to discuss duty assignments or convey information.

Kansas City, Missouri

The trick dispatchers were located in individual work areas within a large room. Each work area was glass enclosed with its own entry door. The glass walls extended to the ceiling and were found to create an acoustical echo which made for a noisy environment.

Egress from the trick dispatchers' offices was restricted. To exit the work area designated as Desk No. 5, the dispatcher must pass through three doors and the work areas of Desk No. 4 and Desk No. 3. The work areas are small and passage through each area is restricted. In a fire or emergency situation, the restricted egress from Desk No. 5 and Desk No. 4 could be dangerous.

Desk No. 2 was located in the main hallway leading from the work area to the locker room. Also located in the hallway were a

microwave oven, electric water cooler, hot plate and refrigerator. The amount of traffic and the noise created by this traffic was disruptive to the work environment.

Electrical wiring was exposed. A large collection of wires was suspended through a hole in the ceiling tile. None of these wires were secured in any way. Some of the wires had outlet boxes and junction boxes suspended in midair to provide electricity for the various appliances in the area. Other unsecured outlets were located in the hallway with wires traversing the hallway and extending down to the locker room.

North Platte, Nebraska

The office is designed in an open concept with the dispatchers' desks placed next to one another. Dispatchers use headsets to monitor communication systems which helps to reduce outside noise interference. Communication between dispatchers was designed to be handled by intercom but the system was not being used. Dispatchers were routinely observed shouting to each other to communicate work information or discuss duty assignments. The noise was disruptive to all within shouting distance. Noise between dispatchers' desks was excessive.

Cheyenne, Wyoming

The noise level in the train dispatchers' work area was excessive due to the proximity of each desk to the adjacent desk. Communication between dispatchers was disruptive because dispatchers did not use an intercom system but shouted instructions and information between desks.

Workload Levels

Each office and each desk had its own unique characteristic for workload and the manner in which duties were distributed by the office staff. Chief dispatchers were sensitive to the level of responsibility assigned to each position in their office. They frequently shifted assignments or provided help to positions which were overburden or needed assistance. In many cases, the workload could not be divided or transferred to another desk. The control machines were stationary and dividing part of a machine or territory was impossible. In other cases, the office had a high workload and there were no more people or positions to shift the work to. In addition, workload may not occur regularly on the same assignments or shifts. Heavy traffic or maintenance-of-way activity can occur on any desk. FRA observed procedures at 128 desks during the assessment.

Workloads within an office varied greatly from desk to desk. The average responsibilities for the office may not reflect the workloads of any one position. At some locations the workload

was routinely higher on particular positions or shifts. At one position FRA observed a dispatcher handle 46 trains during the 8-hour shift. Another desk on a different shift handled as few as 5. One position issued 153 track and time authorities or track warrants during one shift while also handling 20 freight and 2 passenger trains. Another position handled 18 trains and did not issue any train orders or other authorities.

Workload cannot be measured exclusively by the number of trains handled or the number of authorities issued. Other duties assigned to the position can place burdens which effect productivity. Some dispatcher positions in Sacramento, North Platte, Salt Lake City and Kansas City, Kansas were required to monitor readout units for field defective equipment detectors. Some locations must deal with the communication difficulties of a foreign railroad operating over their territory. At times dispatchers are required to handle territory with which they are unfamiliar. Radio congestion or other communication problems added to workloads.

Dispatchers at many locations were called upon to work their rest days. At Portland, Oregon, dispatchers were asked to give up vacation time in order to protect positions because of lack of personnel. Although not directly related to workload, loss of off-duty time can effect an individuals productivity on the job. Through all this, the employees must deal with the constant possibility of office consolidations, and the resulting move of home and family.

Computer Aided Dispatching System

A special concern was noted with train identification on some of the computer aided dispatching systems (CADS). Radio identification of trains is accomplished by use of the locomotive number. This provides a positive identification which cannot be assured by use of symbols or code names for trains. It is possible to have two trains on the same territory with the same symbols. The video display of the trains and territories for dispatchers at the Portland office identified each train by its manifest symbol. The dispatchers had to maintain personal notes or "cheat sheets" in order to relate the locomotive number to the manifest symbol. Prior to CADS, the train sheet provided this information to the dispatcher. The train sheet is no longer maintained. Locomotive numbers must be retrieved from the computer or the dispatcher must use personal notes. Several instances were observed where a dispatcher assumed that he was communicating with one train but was actually addressing a second train. In one case a dispatcher authorized a train to hand operate a dual control switch when the train he had intended to communicate with was two stations away.

VI. COMMUNICATIONS

Union Pacific normally uses a single designated radio channel to handle all communication dealing with train operations. Train crews use the channel to communicate between crew members regarding the work assignment and details of movements to be made. The channel is also used for communication between trains and with maintenance of way crews having track authority on main tracks on which the train is operating. In addition to the routine train operations communication on this channel, the channel is used by the train dispatchers and other employees to transmit and receive mandatory directives, instructions and information regarding on-track movements. The dispatchers do not have an exclusive channel for use in delivering train orders or other mandatory directives.

The carrier had numerous base and wayside radio stations as part of its communications network. All locomotives were equipped with radios so train crews could have near continuous contact with the train dispatchers and the operating supervisors. Relay towers supplemented the radio network by providing for extended broadcasts to distant locations and remote areas where radio reception would have otherwise been limited.

Dispatchers' consoles were equipped with the radio equipment needed to monitor and use the carriers' radio channels. The consoles were also equipped with company telephones, commercial telephones and access to a mobile radio telephone system used by supervisors and certain maintenance personnel. The mobile telephone system had provided some relief to the volume of radio traffic on those channels used for train operations.

Radio Procedures

The assessment disclosed that the radio procedures used by the train dispatchers were generally of better quality than those used by other employees. Although their radio procedures were above average, dispatchers did not attempt to improve the quality of procedures used by other employees. When employees failed to properly identify themselves or failed to use proper procedures during the radio transmissions, dispatchers made no attempt to correct or reprimand the employees.

The most common deficiency noted during the assessment was failure of employees initiating and receiving transmissions to properly identify themselves. Dispatchers failed to name the railroad or its abbreviation, name the office, or state the location of the office. Employees other than dispatchers failed to state the name of the railroad and identify the train, motorcar, portable radio or station broadcasting.

Dispatchers usually closed transmissions with the word "over" when a response was expected and the word "out" when no response was expected. Use of the words "over" and "out" by non-dispatching personnel was not as common. Failure to properly close transmissions was repeatedly noted by FRA inspectors during the assessments at North Little Rock, North Platte, Sacramento, Salt Lake City, Spring, and Cheyenne. Of particular note at Salt Lake City was the practice of interrupting communications in progress. Non-dispatching personnel at Salt Lake City were repeatedly heard initiating transmissions without first listening to the channel to ensure that it was not already in use. Another concern was the practice of train dispatchers at North Little Rock and Sacramento. These dispatchers did not correct employees who failed to repeat instructions received over the radio. Repeating instructions is required by federal regulation and carrier rule.

The amount of communications over a radio channel can be a major concern to all who use the channel. Congestion can delay communications and in extreme cases can cause interruptions, overlapping transmissions, over rides, and general confusion. Such problems were not found to be pervasive on Union Pacific but were noted sporadically. The problem occurred most frequently during the day and afternoon shifts when maintenance-of-way personnel where requesting and releasing track authority. If train movements were heavy, the radio channel often became flooded with conversations. The dispatcher was continuously granting and releasing main track authority to maintenance-of-way crews as each train passed. During one 8-hour period at the North Little Rock dispatching office, a dispatcher was observed issuing 153 track and time permits in addition to his other duties.

Adding to the problem of crowded radio channels were wayside defective equipment detectors with automatic voice readouts over the radio, routine mechanical department communication and the operations by yard personnel at stations and terminals. The assessment noted that overcrowded radio channels interfered with safe communications for operations at Kansas City, Kansas; Kansas City, Missouri; North Little Rock; Salt Lake City; and Spring.

VII. CONDITIONS OF CONCERN AND RECOMMENDATIONS

Concern UP-01: During the assessment, FRA noted that dispatchers were periodically required to work on their assigned rest days. The number of rest days worked per position were highest at North Little Rock, Sacramento, Portland, and Kansas City, MO. In addition, dispatchers were not able to take familiarization trips over their assigned territory. In over 43 per cent of the dispatcher positions examined, the dispatcher had not taken a road trip within two years as specified by the carrier's program. In over 33 per cent of the cases, the dispatcher had not ridden

his territory in over three years. It appeared that the carrier lacked sufficient staff at certain locations to fill vacancies due to illness, vacation, training or familiarization road trips.

Recommendation: Union Pacific should review the staffing levels of its' dispatching offices to assure that sufficient personnel are available to meet the work force needs.

Concern UP-02: Union Pacific had no records of performing operational tests at North Little Rock, Sacramento, Portland, Salt Lake City, Cheyenne and Kansas City, MO. No uniformity existed in the testing program from one office to another. The number and type of operating practices deficiencies observed by FRA during the assessment disclosed significant compliance deficiencies. The carrier was not complying with 49 CFR Part 217, which specifies that the railroad must periodically conduct operational tests and inspections to determine the extent of compliance with its operating rules, timetables and timetable special instructions.

Recommendation: The carrier must initiate an operational testing program for train dispatchers which specifies the number and type of tests to be performed, the method of performing the tests, and provides for the maintenance of records to indicate the results of the tests.

Concern UP-03: The assessment noted widespread non-compliance with the Radio Standards and Procedures Regulations, 49 CFR Part 220. The most common failures dealt with improper identification when initiating or receiving a transmission and failure to close a transmission in the required manner. Of particular concern was the practice noted at Salt Lake City where employees repeatedly initiated transmissions without first ensuring that the channel was not already in use. Dispatchers at North Little Rock and Sacramento failed to require employees who received instructions to repeat the instructions.

Recommendation: The carrier should initiate a program to identify employees who do not comply with the radio regulations. Action should be taken to assure the employees understand the regulations and comply with their requirements.

Concern UP-4: FRA determined that the carrier's program for periodically training its dispatchers on the meaning and application of its operating rules is not uniform from office to office. Attendance at the class was mandatory at only six of the nine offices. Although the carrier program calls for attendance at a rules class every two years, the train dispatchers at Sacramento had not attended a class for 34 months. The Federal regulations require that a carrier periodically instruct its employees in the meaning and application of its operating rules.

Recommendation: Union Pacific must ensure that each office has a plan to instruct the dispatchers on the operating rules in accordance with a program filed with FRA.

Concern UP-5: The condition of certain offices was not conducive to a safe working environment. Egress from two desks at Kansas City, MO, was so restricted as to endanger an employee attempting to leave the area in an emergency situation. In the same office, electrical wiring was exposed and not properly secured. Noise levels were a concern at the dispatchers' work stations in North Platte; Cheyenne; Kansas City, KS; and Kansas City, MO. The noise level at North Platte, Cheyenne and Kansas City, KS, could be partially attributed to dispatchers shouting instructions to each other, which disturbed other dispatchers in the room.

Recommendation: Steps should be taken to assure a safe egress from each dispatchers' position at the office at Kansas City, MO. Electrical wiring should be examined and repaired. At locations with unusually high noise levels, the carrier should install barriers or sound absorption material to reduce the noise level. Dispatchers should be furnished and encouraged to use intercom systems between desks.

Concern UP-6: Blocking devices on two of the CTC control consoles at Cheyenne were ineffective and would allow the switch and signal levers to be changed while the blocking devices were in place.

Recommendation: Union Pacific should take the action necessary to ensure that the blocking devices function as they are intended.

Concern UP-7: Some dispatchers' positions were required to handle very high workload levels due to unusual conditions. The workload could not be shifted or reassigned to another dispatcher due to the design of the control machine.

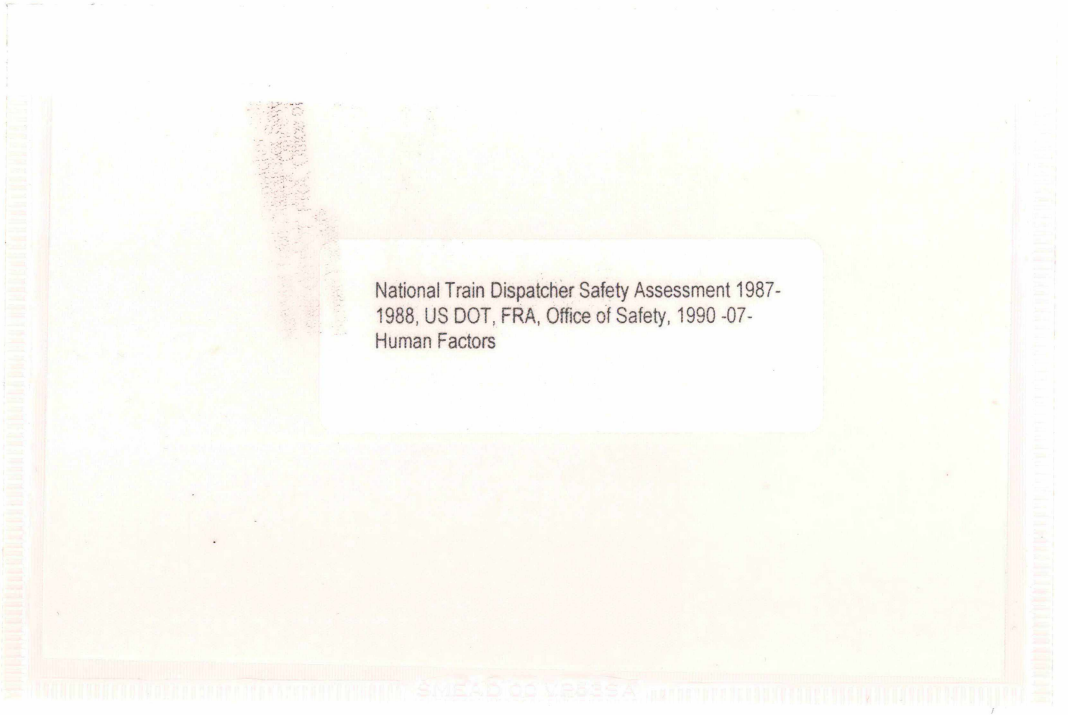
Recommendation: The carrier should ensure that any future dispatching equipment be designed to allow territory to be shifted from one dispatching desk to another as workload or circumstances require.

Concern UP-8: Computer aided dispatching systems (CADS) and other computer display systems use train symbols or code names to identify trains. The dispatcher must use personal notes or retrieve from a computer terminal the locomotive number for the train in order to communicate with the train. The lack of a positive identification readily available to the dispatcher resulted in communication being misdirected and instructions being misunderstood.

Recommendation: The display panel for a dispatching district should identify the locomotive number of any trains operating through the territory. Union Pacific should ensure that its systems are designed or redesigned to provide positive identification of each train movement.

Concern UP-9: The carrier's computer system does not maintain the record of train orders after an order has been annulled. Without train order books or a computer record, the dispatcher on a following shift or another dispatching district could not retrieve the order for other crews carrying or effected by the order.

Recommendation: Union Pacific should provide for a system of computer retrieval so train dispatchers can review a train order even though the order has been annulled.



National Train Dispatcher Safety Assessment 1987-1988, US DOT, FRA, Office of Safety, 1990 -07- Human Factors