COMPLIANCE & OPERATING RULES: RESULTS OF A FOCUS GROUP

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PREFACE

This interim report presents the results of a focus group session on railroad operating rules and compliance. In addition, it summarizes information gathered from structured interviews with various railroad managers, government officials, and other individuals concerned with the management of railroad safety.

The focus group session was tape recorded and then transcribed verbatim. Participants included first-line and mid-level operating rules officials from Class I, II, and III railroads. The Volpe National Transportation Systems Center in Cambridge, Massachusetts funded the project.

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EXECUTIVE SUMMARY

A focus group to discuss the general issue of compliance and operating rules was held at the 1996 Bi-annual Operating Rules Association meeting of North American railroads. Twelve operating rules officers participated, representing Class I, II, and III railroads. Five questions were posed: 1) What are some rule compliance problems? 2) How has management achieved rule compliance? 3) What have been some of the major roadblocks in achieving rule compliance? 4) What have been some important guidelines established among management for achieving rule compliance? 5) Is there a need for developing guidelines on rule compliance, made available to all railroads?

Participants identified restricted-speed violations as the most common rule compliance problem. Typical consequences of restricted speed violations reported include running through stop signals, switches, and de-rails. To achieve rule effective compliance, comprehensive programs that included random drug and alcohol tests, efficiency tests, supervisory observations, new employee training, and annual rules exams were suggested.

When questioned about major roadblocks to rule compliance, participants suggested senior management tends to emphasize productivity over safety, which may be creating an organizational culture that unintentionally encourages operating rule violations. Similarly, developing a culture that embeds positive safety behaviors through consistent and equitable discipline, positive reinforcement, and personal contact seemed an important strategy for achieving rule compliance. Developing guidelines on achieving a higher level of rule compliance was felt to be unnecessary. Participants agreed that informal guidelines already exist and are currently in use on most railroads.

Follow-up discussions with operating rules officers, and interviews with other railroad safety representatives, indicated senior management may be influencing unsafe work behavior by unintentionally encouraging operating rule violations. Apparently, senior managers pressure middle managers for improved productivity. Then, first line supervisors pressure operating employees, and sometimes overlook, or even encourage operating rule violations. When operating employees hear these mixed signals from immediate supervisors -- indicating it is okay to violate operating rules sometimes, and other times it is not okay -- they may be more likely to engage in unsafe behaviors.

Overall, results of the focus group session and follow-up interviews indicate operating rules managers and line supervisors understand the major compliance problems with railroad operating rules. Also, they generally practice effective methods for achieving rule compliance. However, it was suggested that mundane clerical responsibilities and tasks often take them away from the personal contact, train observations, and other supervisory practices necessary for effective rules compliance monitoring. Thus, although line supervisors may have the knowledge to improve operating rule compliance, they may not always have the means of doing so.

The enforcement of rule compliance can be made even more difficult in an organizational culture that rewards and encourages the "bending" of operating rules. Until further studies are completed that determine the extent to which the railroad culture influences unsafe work behavior, and until rules managers and line supervisors are assured adequate resources for enforcing rule compliance, operating employees may continue to doubt management's intentions about whether to comply or not comply with railroad operating rules.

INTRODUCTION

Background

In railroad operations, nearly every aspect of employee behavior is governed by railroad operating rules. Accordingly, when employees perform their job duties and tasks in an unsafe manner, they are almost always in violation of one or more operating and safety rules. By definition, human-factors related accidents and incidents are caused, or influenced, by unsafe work behavior and attitudes, as opposed to sole causes from inclement weather, undetected faulty track, or other non-behavior related factors. Therefore, *nearly all human-factor accidents and injuries are the consequence of one or more operating or safety rule violations.*

According to the Federal Railroad Administration's most recent Accident and Incident Bulletin, human factors accounted for more than a third of all reported train accidents, resulting in close to $50 million in damages to the American railroad industry in 1995.[1] The accident rate (accidents per million train miles) is also higher for human factors than for any other causal category (See Table 1).

Research indicates unsafe work behavior can be influenced by any number of factors, including temperature, workload, time of day, and specific job tasks to name a few (Ramsey, 1983). Unsafe work behavior has also been likened to the organizational culture and to organizational processes (Andrews, 1997; Marske, 1997). To reduce unsafe work behaviors in railroad operations necessitates one must understand not only the reasons that employees do not comply with railroad operating rules, but also the process of rule compliance within the context of the railroad system, particularly the development of railroad rules.

History of Railroad Operating Rules

By the 1850's, railroad operating "rules" in North America, often printed as pamphlets or on the back of a time card, had evolved to near universal application. On April 14th, 1887, representatives of the 48 railroads voted for the adoption of what is now known as the Standard Code of Operating Rules. Thus, all railroad rule books in North America today have as their foundation the Standard Code of Operating rules in both development and application (Shaw, 1978).

The Standard Code, however, was never intended to be used as a working rulebook. Rather, its primary intention was to standardize operating practices to the extent practicable while still preserving the flexibility of individual railroads to either modify or omit rules at their discretion. Even rulebooks with identical phraseology could be interpreted and applied differently on different railroads. Although used like a bible, the Standard Code was primarily a matrix document, from which the industry could establish standard verbiage and a common numbering system. Until recently, in fact,

[1] Railroads must file monthly accident/incident reports with the Federal Railroad Administration's (FRA) Office of Safety for train accidents over $6,300. Bulletin 164 is a summary of accident/incident data reported by 679 railroads for calendar year 1995.

railroads almost never deviated from the original numbering system (D. Yachechak, personal communication, March, 1997).

At present, most Class I railroads in the U.S. use two "standard" rulebooks, the Northeast Operating Rules Advisory Committee (NORAC) rulebook and the General Code of Operating Rules (GCOR). CONRAIL, Amtrak, and several commuter and short line railroads in the northeastern United States use the NORAC rulebook. The General Code book, on the other hand, is used by every Class I railroad west of the Mississippi, most of the Class II railroads, and numerous shortline railroads. CSX, Norfolk Southern, Illinois Central, and Florida East Coast, on the other hand, have adopted their own rulebooks.

Table 1: Frequency and Severity of All Train Accidents by Cause

	FREQUENCY		SEVERITY[2] ($ in millions)		ACCIDENT RATE (millions of train miles)
CAUSE	n	%	n	%	
Human Factors	**944**	**(35.5)**	**$47.9**	**(24%)**	**1.41**
Track & Signal	883	(33.2%)	$64.1	(32.2%)	1.32
Equipment	279	(10.5%)	$37.2	(18.7^)	.42
Highway/ Rail	200	(7.5%)	$10.1	(5.0%)	.24
Other	353	(13.3%)	40.1	(20.1%)	.53
TOTAL	2.659	\100%	$199.4	100%	3.92

Note: Data adapted from Accident/Incident Bulletin No. 164, Calendar Year 1995 (p. 16), U.S. Department of Transportation, Federal Railroad Administration, August 1996. Data includes Human-factor and Non-Human-factor Accidents.

[2] Severity refers to property damages only, not to loss of life or personal injury.

Mergers and Operating Rules

Mergers of major railroad companies in recent years resulted not only in the merging of different railroad lines and operating rulebooks, it also resulted in the merging of different railroad cultures and operating practices. Although it appears on the surface that most railroads have adopted a common code of operating rules, major differences still exist in the application, and consequently, the compliance of these operating rules. Moreover, different management styles can clash when organizational cultures merge, as was the case with the Burlington Northern Santa Fe merger (Machalaba, 1997). This leaves surviving operating rules managers in a tenuous position, uncertain as to how specific rules should be applied on their newly formed railroad. These different management philosophies may also influence different levels of compliance from one railroad to the next.

As railroad operating environments become increasingly complex – from mergers, new technology, and other external forces – operating rules will continue to change in both number and frequency. "The sheer number of operating rules that employees must now commit to memory is enormous" (D. Yachechak, personal communication, March, 1997). And with fewer employees to handle the same workload, these individuals may no longer have the luxury to look up rules when performing their duties, perhaps further complicating both their ability and their desire to comply with these rules.

Because of these factors, and because operating rules are an inherent and critical part of operational safety, various government and academic sources have been pressuring railroads to establish more standard railroad operating rules (Gamst, 1993). A standard set of operating rules, it was argued, would minimize the confusion that exists when employees operate over joint lines and are governed by two rule books instead of one. Both operating rules managers and government officials have expressed particular concern with different rules governing identical, or similar, signal aspects on different railroads.

Standardizing railroad operating rules, it has been suggested, might do several things, including: 1) increasing the mobility and ease of transition for both railroad labor and railroad management when transferring from one railroad to another; 2) reduce training costs and operating rule development; 3) improve safety practices when railroads and railroad rule books merge; and 4) improve the overall delivery system across interchange points, regions and yards.

In response to pressures for standardization, both NORAC and GCOR recently hired consultants to rewrite and reorganize their operating rulebooks. Two major benefits have been reported from these new versions of the operating rule book: 1) an increase in the clarity and understanding of operating rules, and 2) an increase in the ease in which an employee can look up unfamiliar operating rules.

The extent to which these and other benefits have been obtained, however, remains uncertain. Assuming the revised rule books do enhance the clarity and understanding of operating rules, other important questions still remain. Given a factual understanding of operating rules, how well are employees able to conceptually apply the rules? How often do operating employees purposely violate rules, even though they both understand them and know how to apply them? What influences operating employees to

knowingly violate operating rules? How often do rule violations lead to accidents or injuries that otherwise could have been prevented?

Considering the diversity of operating practices in the railroad industry today, representatives of the railroad industry have argued that both GCOR and NORAC should be used just as the Standard Code was originally used. These rule books, they argue, should be used as a general guide to standardizing operating practices, while still preserving the flexibility of individual railroads to either modify or omit rules at their discretion.

Should standard operating rules not be needed, the major question that remains is whether or not *a process* has been established for maintaining quality in operating rule development. This is especially important with the implementation of constantly changing equipment and technology, which forces the need for more rapid rule changes. Therefore, the question that must be asked is whether or not guidelines are needed for the development, writing, testing, application, and *representation* of operating rules. What kinds of guidelines should be developed, if at all? If necessary, what should be the process for developing those guidelines?

Purpose & Scope

The purpose of this report is to discuss the results from a focus group on compliance and railroad operating rules, held at the 1996 Bi-annual Operating Rules Association (ORA) of North America in Atlantic City, New Jersey. Although the findings do not answer many of the questions raised earlier in this report, they do explore some of the possible influences on unsafe work behavior and help explain why employees do not always comply with railroad operating rules.

The scope of this report not only covers in detail the results from the focus group session, but also highlights information gathered from structured interviews conducted both prior to and following the focus group session. In general, this report aims to: 1) explore various influences on non-compliance to operating rules, and 2) explore attitudes toward developing guidelines that may assist operating rules managers in their efforts to help maintain rules compliance.

METHODS

Structured Interviews

Prior to the Focus Group session, structured interviews were conducted with representatives from the Association of American Railroads (AAR), the National Transportation Safety Board (NTSB), the Federal Railroad Administration (FRA), and other interest groups to identify important issues involving railroad operating rules. In these interviews, rule compliance consistently arose as a major concern. Follow-up interviews were also conducted with several individuals to further clarify and better understand some of the issues discussed during the focus group.

Focus Group Questions

Pilot questions were developed for the Focus Group, and were distributed to operating rules experts for comment prior to holding the focus group session. These pilot questions were then revised for use during the actual focus group. The resulting questions were carefully selected and phrased to stimulate thoughtful and spontaneous communication among the participants.

Although the moderator posed follow-up questions, the following five questions were used as foundation questions for the focus group:

Q1: *What are some of the major types of rule compliance problems that lead to serious accidents or common personal injuries?*

Q2: *How has railroad management achieved rule compliance?*

Q3: *What have been some of the major roadblocks in achieving rule compliance?*

Q4: *What have been some important guidelines established among management for achieving rule compliance?*

Q5: *Do you see a need for developing a common set of guidelines on rule compliance, made available to all railroads?*

Focus Groups Participants

Attendants at the 1996 Bi-annual Operating Rules Association (ORA) of North America meeting, held in Atlantic City, New Jersey, were invited to participate. Fifty two people attended the meeting, representing Class I, II, and III railroads. Twelve people elected to participate in the focus group session. Participants included Managers and Directors of Operating Rules, Safety and Training, and Transportation Services. All participants were members of the ORA and had direct responsibilities in either developing operating rules, or in supervising the conduct and safety of employees.

Conducting the Focus Group

Prior to starting the Focus Group session, anonymity was assured. Participants provided only that information relating to job title and class of railroad. The process for conducting a focus group was then explained, including a description of ideas typically generated from mediated discussion in such a small group setting (Krueger, 1988). The focus group session lasted approximately one and one-half hours, was tape-recorded and then transcribed verbatim.

Limitations

Methodology for conducting this study was adopted from program evaluation standards established by the Joint Committee on Standards for Educational Evaluation, including standards on utility, feasibility, propriety, and accuracy (Saunders, 1994). However, because the results presented in this report are based upon combined information from structured interviews, focus group comments, and other informal interviews, it is inherently qualitative in nature. Even though consistent response patterns and general agreement were noted among interviewees and focus group participants, no conclusive statements can be made regarding the causes of non-compliance with railroad operating rules.

On the other hand, focus group participants had considerable expertise in both the understanding and application of railroad operating rules. Their opinions are highly valued among their peers. It seems logical that any insights shared during this discussion group would suggest important areas for further study.

FINDINGS

Note: The following findings are summarized from the focus group session and follow-up conversations with participants. The findings are not necessarily in order of importance.

Question 1: What are some of the major types of rule compliance problems that lead to serious accidents or common personal injuries?

1. Restricted speed.

The original definition of restricted speed, which first appeared in the Association of American Railroad's Standard Code in 1924 (Yachechak, 1996), is as follows "Proceed prepared to stop short of train, obstruction, or anything that may require the speed of the train or engine to be reduced."

NORAC currently defines restricted speed as "Prepared to stop within one-half the range of vision — short of a train, obstruction, or switch improperly lined. Be on the lookout for broken rail. Speed must not exceed 20 MPH outside interlocking limits, or 15 MPH within interlocking limits. This speed applies to the entire movement."

The General Code describes restricted speed as follows: "When a train or engine is required to move at restricted speed, movement must be made at a speed that allows stopping within half the range of vision short of: train engine, railroad car, men or equipment fouling the track, stop signal, or derail or switch not properly lined. The crew must keep a lookout for broken rail and not exceed 20 MPH."

Restricted speed was the first topic discussed when asked about rule compliance problems. Some of the most common violations of restricted speed reported include *failure to comply with stop signals, run-through switches, and run-over derails*. One person noted that he thought many people tended to apply restricted speed in terms of miles per hour rather than generally being prepared to stop.

It was also noted that restricted-speed violations rarely occurred in isolation. Rather, a series of violations usually occurred that would lead up to a restricted-speed violation. For example, a train dispatcher may have failed to provide requested blocking protection for workers within restricted-speed territory, resulting in a train collision with equipment on the track while operating under 20 MPH. Although the engineer was operating the train under 20 MPH, as is required by the restricted-speed rule, workers or equipment on the track may not have been anticipated. Not being able to stop within one-half the range of vision was a clear violation of restricted speed. On the other hand, the dispatcher did not provide proper blocking protection to the workers on the track. In this case, two rule violations occurred and both the engineer and dispatcher were partly to blame for the accident.

1. Restricted speed (continued).

Accident data from FRA's 1995 *Accident/Incident Bulletin* support operating managers concern about restricted-speed accidents. In fact, the vast majority of human-factor train accidents (85%) occur under 10 MPH! Table 2 summarizes human-factor train accidents by speed. Note that 96% of human-factor train accidents in the yards and 94% of human-factor train accidents on industry/sidings occurred less than 10 MPH. Even the majority of human-factor train accidents on the main line (51%) occur under 10 MPH, 75% under 20 MPH.

Table 2: Human-factor Train Accidents[3] by Speed

	MAIN LINE		YARDS		INDUSTRY/ SIDINGS		ALL TRACKS	
SPEED	N	%	n	%	n	%	n	%
1-10 MPH	114	(51%)	598	(96%)	77	(94%)	789	(85%)
11-20 MPH	54	(24%)	16	(3%)	4	(5%)	74	(8%)
21-30 MPH	24	(11%)	4	(1%)	—	—	28	(3%)
31-40 MPH	16	(7%)	1	—	1	(1%)	18	(2%)
41-50 MPH	6	(3%)	1	—	—	—	7	(1%)
> 50 MPH	9	(4%)	—	—	—	—	9	(1%)
TOTAL	223	100%	620	100%	82	100%	925	100%

Note: Data adapted from Accident/Incident Bulletin No. 164, Calendar Year 1995 (p. 34), U.S. Department of Transportation, Federal Railroad Administration, August 1996.

[3] Train accidents refers only to on-track equipment and consists. It does not include any data with motor vehicle collisions with trains.

1. Restricted speed (continued).

Table 3 summarizes all derailments and collisions on main line track by speed, including non-human-factor accidents. Similar to Table 2, nearly sixty percent of all derailments, and almost half of all collisions occurred under 20 MPH.[4] *The majority of main line derailments, regardless of cause, occurred under 10 MPH.* Almost one-fourth of the collisions occurred under 10 MPH. All human-factor collisions and derailments that occurred under 20 MPH are considered violations of restricted speed.

Table 3: Train Derailments and Collisions on Main Line Track by Speed

	DERAILMENTS (in thousands)		COLLISIONS (in thousands)	
SPEED	n	%	n	%
1-10 MPH	273	(39%)	17	(22.7%)
11-20 MPH	133	(19%)	20	(26.7%)
21-30 MPH	112	(16%)	13	(17.3%)
31-40 MPH	80	(11%)	9	(12.0%)
41-50 MPH	68	(10%)	10	(13.3%)
> 50 MPH	30	(4%)	6	(8.0%)
TOTAL	696	100%	75	100%

Note: Data adapted from Accident/Incident Bulletin No. 164, Calendar Year 1995 (p. 23), U.S. Department of Transportation, Federal Railroad Administration, August 1996. Includes Human-factor and Non-Human-factor Accidents.

[4] Derailment is defined in the *Accident/Incident Bulletin* as "A derailment occurs when one or more than one unit of rolling stock equipment leaves the rails during train operations for a cause other than collision, explosion, or fire. Collision is defined in the FRA Guide to Accident Reporting as "an impact between on-track equipment consists while both are on rails and where one of the consists is operating under train movement rules or is subject to the protection afforded to trains."

2. Compliance with radio rules. Participants agreed that compliance with radio rules was a common problem with operating rule violations, but that much of the problem was lack of enforcement. Radio miscommunication and misunderstandings, for example, have lead to serious accidents. Instructions such as "High ball, everybody's in the clear," without train or unit number identification, can be mistaken to be another train when overheard by another train crew. If the crew who overheard those instructions assumed that message was for them and began proceeding, they might operate in such a way that could lead to an accident. In the FRA's 1995 *Accident/Incident Bulletin*, however, improper radio communications accounts for less than one percent of human-factor train accidents.

3. Securing equipment. Some felt securing equipment was not taken seriously on many railroads. One individual commented that "There's alot more [trains and engines] that are running away that nobody knows about because if there's no harm, no problem ... it's the attitude I see that's the problem." Failure to provide sufficient hand brakes accounted for almost 5% of the human-factor accidents, more than five times as what was caused by radio compliance rules (FRA 1995 *Accident/Incident Bulletin*).

4. Failure to provide proper blocking protection. Providing proper blocking protection was another concern mentioned, especially if a train dispatcher or operator does not provide the proper authority to operate a train within certain track areas when requested. Proper block protection is required by railroad operating rules, but no causal category is assigned on the FRA accident/incident reporting form.

5. Common assumptions in operating practices. People gave specific examples of how an accident occurred and what rules were violated. Many examples were due to what one person described as "assumptions." When crews do not properly identify their train or engine number, other operating crews or workmen may make assumptions about which train the message applies to without confirming the train's identity.

   Of particular concern were situations in which crews would leave main line switches open (not lining back a switch for the main line movement) in order to expedite the movement of trains, transferring the responsibility over to another crew. When a train leaves a railroad yard from a yard switching track as opposed to the main line, the crew on that train usually has the responsibility to ensure that the switch is lined for the main line and not one of the yard tracks. With cabooses no longer being used, and no one at the rear of the train, the engineer must now stop the train when it's past the main line switch, and then wait for the conductor or brakeman to walk back up to the head end again (sometimes up to a mile and one-half). This can cause considerable delay. To expedite movement, the responsibility for lining the switch back to the main line is often turned over to someone from another crew still working in the yard.

   Accidents happen when the yard crew with the responsibility to line the switch for the main track doesn't do so, for one reason or another. Another crew on a train that is approaching the switch on the main track will often *assume* that the track is lined for the main line, which it usually is, and may run through the switch when it is not lined

properly. This can cause extensive damage to the switch requiring immediate repair. If the train crew does not realize they ran through the switch, or does not tell anyone for fear of being disciplined, it could easily cause a serious derailment or personal injury the next time a train goes over the switch. While the crew who ran through the switch is obviously responsible for violating the restricted-speed rule (i.e. "... prepared to stop ..."), other violations and *assumptions occurred prior to this violation*, which were important contributing factors that led up to the accident.

Question 2: How has railroad management achieved rule compliance?

1. Random Drug and Alcohol Tests. Most agreed that random drug and alcohol tests have probably had the largest impact on railroad safety over the past several years.

2. Annual Rules Tests. Annual rules exams were considered an effective method of reinforcing important safety rules, "raising the level of awareness of the rules." Creating *real world tests and good instruction* were suggested as an important factors in the annual rules exam. Good instruction provides a basis *for understanding rules*. Annual exams also seemed to be a good opportunity to discuss critical safety issues that may have surfaced in the past year. As such, these sessions also become an important means of information gathering for the rules examiners, helping them keep in touch with problems out on the road.

3. Supervisor Observations. Many felt that supervisor observations and positive face to face interaction were critical for effective management of rules compliance. As one participant explained, "People for the most part want to understand how to do their job correctly. And sometimes, especially with the new employees, just someone to take them aside and talk to them and explain to them how to do it correctly ... they will follow. The old hand, the guy who's been at it for a number of years, takes a different type of coaching. But I don't think we need to approach people punitively."

   Caution was suggested, however, to use *quality efficiency tests*, and not rely on quotas and numbers. Supervisors should do something that "challenges the employee to put on his thinking cap and respond to a situation." There was also an expressed interest in teaching some of the first line supervisors how to do quality efficiency testing. "Not ten tests a month, or a quarter, with each rule being a test. That's not ten tests. That's one test. People are going back to big numbers for the FRA ... Make a quality test. Make the test mean something. Don't rely on quotas and numbers."

4. New Employee Training. Having introductory rules classes for new employees, sending them out in the field, and then bringing them back in for follow-up testing, appears to have added benefits. Not only do they get immediate feedback from the "old heads" about how and why to do things, but new employees also teach the old heads..Moreover, new employees would bring back vital information from the field about common safety practices and safety violations. This information is difficult for a supervisor to obtain, since most train operations are unsupervised.

Question 3: What have been some of the major roadblocks in achieving rule compliance?

1. Ambiguous communications. "Mixed signals" were described as a major barriers to rule compliance. To some extent, it appears that a culture has been created on some railroads which fosters a tendency for supervisors to send confusing messages to operating employees – ambiguous messages that imply it is okay to comply with operating rules under some conditions and not okay under other conditions.

   Also, different levels of employees appear to have different motivations and pressures to not comply with the rules at times. The yardmaster, train master, and train dispatchers, for example, may be under pressure from their supervisors to get the train out of town, and indirectly encourage employees to cut corners on rule compliance to speed up operations. Acknowledging this pressure, the conductor or engineer may send a similar message to their brakemen.

   One participant explained it like this. "It's a militaristic environment, really, that the railroad runs under. And the fact is that you have commands that come down from the top. And most of the time in transportation those commands are to move the trains. And to get the train from A to B in a certain amount of time. And when you're not doing it, you know, to the requirements that come in to that ... the operating rules, or whatever, get overridden by that command."

   Another participant followed up this comment by saying "What happens is our supervisors forget, and our general managers and our superintendents forget, that the real command that comes down first is Safety First. And when they lose sight of that because of equipment priorities, you have a supervisor ... now this takes you up to a V.P. or higher, who says now you either meet goals or I'll find somebody who will. That's when the real mixed signal comes in. Now ... now you've taken people who are supposed to be managing people, who are supposed to be producing for us, and they don't really know which way to turn." Still another participant explained that "You still have a whole climate of people [operating employees] out there who are convinced that the only reason you're interested in safety is the bottom line of the company."

2. Ignorance of Responsibilities. Ignorance seemed to be a common denominator in how these mixed signals, or mixed communications, get disseminated. It was also noted that many of the supervisors, such as yardmasters, dispatchers, and operators, are behind computers and have very little face to face interaction with the employees they directly supervise. Some complained that these supervisors don't realize they are leaders and that they have an important role in communicating rule compliance.

3. Employees' desire for short cuts. Too often, employees are also motivated to get the job done quickly. Any number of factors can increase employee motivation to violate, or bend, operating rules in return for increased productivity. If it's too cold or too warm, there may be a desire operate unsafely if it will reduce their discomfort.

Similarly, getting a train to a terminal in less time often has little or no impact on one's wages. Consequently, the sooner one gets the job done, the more money they effectively make per hour. Or just the opposite may occur. Once one starts overtime, the desire may be to stretch out the time it takes to perform an operation as long as possible. In either case, safety becomes secondary. When these personal motivations are coupled with supervisor pressure for increased productivity, both of which encourage a bending of the rules, participants believe unsafe behaviors are much more likely to follow.

4. Too much Paperwork. A reduction in the workforce seems to have had an impact on mid-management as well as on operating crews. As one focus group participant said, "... what is really happening is that there are fewer trainmasters, fewer roadmasters. Paperwork is killing them. It's keeping them at the desk. And they're working 28 hours a day, instead of maybe 18 or 16 like we used to." When this happens, the quality of supervisor observations are reduced. Safety related errors are also more likely to occur when operators, dispatchers, and yardmasters are overloaded with tasks previously performed by someone else.

5. Lack of enforcement. One participant described lack of enforcement in the following way. "We know when guys are taking shortcuts. No mistake about it. We know it. Question is ... are we responding to it? And are we consistent enough in our approach, our discipline approach?"

   In follow-up conversations to the focus groups, two other participants from a major railroad explained that one of the consequences of overloading supervisors with paperwork and other work previously completed by administrative staff, is problems with enforcement. Supervisors are fully aware of the extra work required of them when following-up on observations of non-compliance. Enforcing compliance means discipline, and discipline means lots of time and paperwork. In other words, while they may fully intend to enforce rule compliance, the resources may not always be available to them for performing these functions.

   Mixed signals was another reason why management may not enforce operating rules. One participant explained it the following way. "I know in most cases that people [supervisors] are not responding as they should. Because of mixed signals. I know that." What he was saying was that senior management sends mixed signals to first line supervisors regarding safety vs. productivity. Consequently, supervisors may be reluctant to enforce rule compliance when rule non-compliance improves productivity, especially if the supervisor perceives little risk in non-compliance. This tendency may be compounded when the perceived rewards are much greater for efficient operations than for safe operations.

6. Required quotas. Required quotas, some suggested, encouraged supervisors to perform non-essential efficiency tests rather than safety-oriented tests.

Question 4: What have been some important guidelines established among management for achieving rule compliance?

1. Consistent and Equitable Discipline. Participants recognized the importance for consistent and equitable discipline, an approach long advocated by behavioral psychologists. Also, the emphasis was clearly toward reinforcing positive safety behaviors as opposed to punishing unsafe, or non-compliant, behaviors.

2. Immediate consequences for rule violations. When serious rule violations were apparent, immediate discipline was recommended. There should be no question about the disciplinary consequences of serious rule violations. One or two examples, they said, is all it takes to make this message understood.

3. Positive Reinforcement. Everyone also agreed on the importance of positive reinforcement during or after any employee observations. "When you observe somebody and they do the job well, you just don't go off and disappear. You need to tell that man that he was observed, and he did a good job today."

4. Personal Contact. Establishing personal contact and getting to know your employees, it was suggested, helped make this positive interaction much easier. This also fosters a more natural communication process that helps the immediate supervisor identify problem areas with the rules that may be difficult to do with simple observations.

5. Yearly Evaluations of Critical Incidents. A participant from a small railroad described their procedures for evaluating critical incidents in the preceding year, and then creating a testing program for the subsequent year that tests the compliance of major failures from the previous year . It was suggested that this method of test development helped them keep their rule compliance failures to a minimum.

6. Fostering Positive Safety Attitudes. People realized that to change unsafe behavior you must also change the attitudes that lead to unsafe behaviors. Rules classes, they noted, were the place to do this. "Until you get the guy convinced on the ground that what he's doing he's doing for himself ... he's doing it for his family ... then you're still gonna have the guy not paying attention."

7. Peer Respect Toward Safety. One proposal for embedding safety behavior, and thus rule compliance, was to develop a culture of peer respect toward on-the-job safety. "What I'd really like to see you do is apply this to the rest of the rules. Because railroaders, safe railroaders, do things because they're right. That's the way to do it in my book ... Apply it to their inner logic, their inner reasons as to why they comply. The very basic of rules."

Question 5: Do you see a need for developing a common set of guidelines on rule compliance, made available to all railroads?

1. Guidelines are not needed. Most participants did not see a need for developing a common set of guidelines on rule compliance, perhaps because they perceived the notion of guidelines as a federal regulation. Table 4 highlights typical comments to the question about the perceived need for developing guidelines on rule compliance.

Table 4: Typical Comments About Developing Common Guidelines on Rule Compliance (See Appendix I)

"The best guidelines in the world won't work if you don't change the attitude of the people who have the rules to abide by these guidelines."

"I guess what we're all saying is that we don't need regulations to comply with the rules."

"Regulations create rules. More rules creates confusion."

" accidents are not caused by the guidelines that currently exist. They are caused by non-compliance with guidelines ... it's non-compliance that's the problem."

"So ... somebody else writing those guidelines doesn't work."

"You don't need a bookshelf policy."

"We don't wanna get over-regulated."

2. General guidelines are currently in use on many railroads. Although people disagreed with a need for developing a common set of guidelines for rule compliance, collectively they clearly had a number of good ideas that could be included in a handbook of guidelines if one were to be developed. Table 5 highlights some of the typical comments about suggestions and practices unwritten currently used by some rules managers, which could easily be established as general guidelines.

Table 5: Typical Comments About Existing Guidelines (Written and Unwritten) on Rule Compliance

"It [safety] comes from the top. And it can't get lost in the middle."

"Until you get the guy convinced on the ground that what he's doing, he's doing for himself ... he's doing it for his family ... then you're still gonna have the guy not paying attention [to the rules]."

"Apply it to their inner logic, their inner reasons as to why they comply."

"... they [operating employees] may not be aware of the consequences. They can't envision anybody can get killed by what's really goin on."

"Alot of first line supervisors have ... never been taught how to deal with ... pursuing enforcement, or pursuing compliance, I guess."

"Teach ... first line supervisors how to do quality efficiency testing. Don't rely on quotas or numbers."

"The discipline has to be understood. And it has to be handled equitably."

"... not approaching your employee from a punitive point of view, but from a coaching or instructing point of view."

"When you observe somebody and they do the job well . . . You need to tell that man that he was observed, and he did a good job today."

"When you have instructional training you have to have time for questions, for examples."

"Creating real world tests. Doing things out there in the real world that challenges the employee to put on his thinking cap and respond ..."

"... create a testing program for the subsequent year that will test the compliance of those failures in the previous year."

OTHER FINDINGS

Note: The following findings are supplemental findings to the specific questions asked during the focus group session and are not necessarily in order of importance.

1. Event recorders may not be fully utilized as a means of supervisor observations. Event recorders are those "black boxes" on locomotives that record just about every type of performance activity except radio communications, including speed, throttle position, dynamic braking, air braking, etc. Management, however, rarely uses this information unless there is a specific reason to so, such as an accident or an observation suspecting speeding. It is possible that analytical software could be utilized to measure both safety and productivity performance of locomotive engineers. Standards and guidelines could be established for rule compliance and productivity. If used on random basis, similar to alcohol and drug tests, engineers may be much more likely to comply with operating rules.

2. Various individual, environmental, and organizational factors may be influencing when and under what circumstances employees do not comply with operating rules. In the focus group session, as well as in follow-up conversations, participants suggested a variety of reasons why employees do not comply with operating rules. These include pressures from management, weather, desire for overtime, desire to get off early, desire to reduce workload, anger or hostility toward the company, personal or family problems, and others. In other words, multiple factors may be at work at any given time, influencing an employee not to comply with the rules. It is possible that employees make conscious risk/benefit decisions whether or not to comply with operating rules, depending on the perceived weight of particular influences at the time. At other times, risk-taking behavior may be habitual, or automatic, without much thought about the specific risk factors.

3. Senior management may have created a culture on some railroads that encourages the violation of, or the bending of, operating rules. It is apparent that both senior management and immediate supervisors can directly influence employee safety behavior. Senior management, at times, pressures immediate supervisors to operate more efficiently, overemphasizing productivity over safety. Immediate supervisors may then pressure operating employees to operate more efficiently, sometimes sending mixed messages about whether to comply or not to comply with operating rules. Because of this, it is possible that a corporate culture has been created on some railroads which encourages employees to violate operating rules.

4. No forum exists for operating rules managers from different railroads to discuss operating rules issues on a regular basis. Since its founding in 1969, the ORA has met twice a year, as compared to once a year with other professional organizations, because of the frequency with which operating rules change in the railroad industry. There is no day-to-day formal mechanism in place to foster on-going discussion and support. Many ORA members at the 1996 meeting in Atlantic City emphasized the

importance of personal interactions among peers to keep abreast of current issues. Little interaction, however, occurs outside the bi-annual meetings. Some suggested that the fear of litigation among senior management may be prohibiting the development of any formalized method of regular communications among ORA members, especially anything in written form, which would be open to discovery.

5. Although a formal process exists on most railroads for changing or adding rules, the identification of rules that need to be changed or added is very much an informal process, and neither process is well documented. Under NORAC's constitution and by-laws, specific procedures are described for making permanent rule changes. GCOR's constitution and by-laws have similar procedures for making permanent rule changes. Although the process for making temporary rule changes is essentially identical from railroad to railroad, little documentation of this process exists. Usually, operating rule changes progress from track bulletins, to general orders, to timetables, and, finally, to the operating rulebook (e.g. NORAC or GCOR). Although minor differences may exist in terms and procedures, the process is much the same across railroads.

   However, rules that need to be changed or added must first be identified. This process is also very similar across railroads, and includes a wide variety of formal and informal mechanisms, including: "morning meetings", suggestions from operating personnel via either personal conversation or written communication, pressures from the FRA in the form of reports or personal communications, NTSB recommendations from accident reports, suggestions from the Association of American Railroads (AAR), not to mention pressures from various media and public interest groups. While the sheer number of ways in which problem operating rules can be identified is obviously large, there appears to be a lack of coordination of these vastly different efforts. Without coordinated effort, substantial time may elapse before senior rules and operating managers are notified about potentially serious problem areas.

RECOMMENDATIONS

Note: The following recommendations are based on the focus group session and individual interviews both prior to and after holding the focus group session. Some of the recommendations are from individual interviewees or focus group participants.

1. Conduct additional focus groups. Conducting additional focus groups that include a cross section of railroad management may help identify organizational and cultural influences that encourage unsafe behavior; this may also help educate senior management about their possible influences on safety behaviors.

2. Evaluate the use of event recorders as a means for monitoring operating rule compliance. Software for analyzing data from event recorders, such as speed and brake applications, already exists. This software could be used to randomly monitor excessive speed and other rule violations of locomotive engineers. This may be a more reliable and cost effective approach to minimizing some rule violations.

3. Establish better *internet* communications. Operating rules managers need to communicate *between organizations and operating environments* on a more regular basis, rather than bi-annual meetings. Issues such as compliance, implementation of new technology, and operating rule development need on-going discussion. Internet user groups are common among professional groups and associations. This communications format provides timely information on current issues, assists in problem-solving, and helps find answers to questions that may be difficult to obtain otherwise. Procedural and communication guidelines are often established beforehand, to meet the particular needs and goals of the group.

4. Establish better *intranet* communications. Operating rules managers also need a consistent and effective means of communicating *within the organization*. Intranet communications are becoming a much-heralded tool for improving communications within organizations. As railroad operations become more complex, with ever-evolving rules and safety issues, consistent and reliable communications become increasingly important.

5. Investigate the extent to which personal, environmental, and organizational factors influence unsafe work behavior in railroad operations. When operating employees knowingly violate operating rules, they may be influenced by personal, organizational, or environmental factors. It is important to understand the extent to which this occurs, which factors are most influential, and how the organization can more effectively influence positive work behavior.

6. Investigate how corporate culture may be encouraging operating rule violations. Senior managers may be a major factor in the development of an organizational culture that rewards unsafe behavior. It is important to understand whether or not this culture exists on some railroads, and if so, how it develops. Understanding this process will aid the development of strategies to counteract these problems.

7. Evaluate existing training methods and materials as a means of embedding positive safety habits and attitudes. If organizational factors are influencing unsafe work behavior, methods need to be developed for embedding positive safety habits to help override organizational influences when the do occur. For example, the operating rule for conducting a job safety preview could be utilized by operating supervisors as a reinforcement tool for job safety. When supervisors encounter train crews and conduct a job safety preview with them, safety behavior is automatically reinforced with no fear of punishment. In this way, positive safety attitudes and habits could be more firmly developed among operating crews.

8. Document the process for identifying operating rules that need to be changed or added. Documenting the various ways, both formal and informal, of identifying circumstances where operating rules need to be changed or added, can be an effective means of coordinating these efforts, and thus improve the process itself. As the introduction of new technology continues to increase, the need for more rapid rule changes also increases. Without proper documentation of the existing process, the process itself may not progress in a manner that is conducive either to expeditious identification of deficiencies in operating rules, or to making the necessary rule changes themselves.

9. Establish a near incident database. By their very nature, railroad accidents are rare events. To determine the probable cause of these rare events, one must make any number of assumptions, which inevitably reduces the level of certainty. It stands to reason that many more near accidents, or close calls, occur for every actual accident. Establishing a process for reporting near incidents would increase the population data set from which to study. With a larger population of incidents (and near incidents) to study, assumptions can be minimized, and true probable causes more likely determined. The Federal Aviation Administration has such a reporting system for near incidents. It may be possible to adopt at least some of the procedures established for the aviation industry to the railroad industry. It may be possible for this same reporting system to be used as a means of reporting dangerous situations.

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