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National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: July 20, 1990

In reply refer to: R-90-12 through -21

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About 7:36 a.m., Pacific daylight time, on May 12, 1989, Southern Pacific Transportation Company (SP) freight train 1-MJLBP-111, which consisted of a four-unit locomotive on the head end of the train, 69 hopper cars loaded with trona, and a two-unit helper locomotive on the rear of the train, derailed at milepost 486.8, in San Bernardino, California. The entire train, with the exception of the rear-end locomotive, was destroyed as a result of the derailment. Seven homes located in the adjacent neighborhood were totally destroyed and four others were extensively damaged. Of the five crewmembers onboard the train, two on the head end of the train were killed, one received serious injuries, and the two on the rear end of the train received minor injuries. Of eight residents in their homes at the time of the accident, two were killed and one received serious injuries as a result of being trapped under debris for 15 hours. Local officials evacuated homes in the surrounding area because of a concern that a 14-inch pipeline owned by the Calnev Pipe Line Company, which was transporting gasoline and was located under the wreckage, may have been damaged during the accident sequence or was susceptible to being damaged during wreckage clearing operations. Residents were allowed to return to their homes within 24 hours of the derailment.

About 8:05 a.m., on May 25, 1989, 13 days after the train derailment, the 14-inch pipeline ruptured at the site of the derailment, released its product, and ignited. As a result of the release and ignition of gasoline, 2 residents were killed, 3 received serious injuries, and 16 reported minor injuries. Eleven homes in the adjacent neighborhood were destroyed, 3 received moderate fire and smoke damage, and 3 received smoke damage only.

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In addition, 21 motor vehicles were destroyed. Residents within a four-block area of the rupture were evacuated by local officials.¹

There was no communication between the head-end engineer and the helper engineer after the train departed Oban and during the descent down the grade. The helper engineer testified that there was no need for communication because he could observe the brake pipe gauge and determine what action the head-end engineer was taking. When the train speed reached about 40 mph, the helper engineer initiated an emergency brake application without communicating with the head-end engineer. Although the head-end engineer testified that he was about to initiate an emergency brake application, the Safety Board is concerned that no communication was initiated by either crewmember when it was obvious that an emergency situation was developing.

The Safety Board notes that the SP now requires the road and helper engineer(s) to communicate the condition of their units and train to determine maximum authorized speed and train handling requirements. The Safety Board recognizes that this rule should ensure that the engineers are aware of the condition of the dynamic brakes on the locomotives in their train; the Board remains concerned, however, that vital information, as was evident in this accident, may not be relayed to and from the dispatcher. Apparently engineers are required to inform dispatchers of any defective locomotive condition, but the helper engineer in this accident did not make sure that the dispatcher had been informed. Further, although the assistant chief dispatcher in this accident had some concern regarding the accurate tonnage of the train, he did not relay this concern to the operating crew of Extra 7551 East. Therefore, the Safety Board believes that the SP should develop explicit procedures that require the dispatcher and the operating crew to communicate vital information concerning the condition of the train.

At the time of the train derailment, the estimation and placement of weights of loaded cars into the car file of the computer system was an accepted practice on the SP. After the train derailment, SP revised the computer system so that regardless of the weights estimated and placed into the file, the computer will automatically update the tonnage to the maximum capacity of the car. According to the director of clerical operations, the maximum tonnage figure will remain in the car file of the computer until the shipper's bill of lading is received and only when the bill of lading indicates a shipper-certified weight will the maximum tonnage figure be adjusted to reflect the shipper-certified weight. If an estimated weight is indicated on the shipper's bill of lading, the maximum tonnage figure will remain in the car file of the computer system until the car has been weighed. Although the Safety Board notes that the SP has taken steps to improve the system in place at the time of the derailment, the Board remains concerned that inaccurate information concerning the trailing tonnage of a train can

¹For more detailed information, read Railroad Accident Report-- "Derailment of Southern Pacific Transportation Company Freight Train on May 12, 1989, and Subsequent Rupture of Calnev Petroleum Pipeline on May 25, 1989, at San Bernardino, California" (NTSB/RAR-90/02).

still be generated and given to the operating crew. The current system does not provide an adequate method of generating accurate trailing tonnage information.

Opportunity for error still exists after the computer has automatically updated the tonnage figure to the maximum capacity of the car. If a yard clerk (1) receives a shipper's bill of lading without weights listed, and (2) estimates the weights without indicating the weights are estimated, when that document is transmitted to the billing office in Los Angeles, the billing clerk could assume, as occurred in this accident, that the weights listed are shipper-certified weights. If the billing clerk then elects to list the individual weights, as shown on the document from the yard clerk, the estimated weights would override the maximum tonnage figure that was automatically generated at the time the cars were released. Consequently, even with the changes made by SP after the train derailment, a traincrew's tonnage profile document, which is generated based on information in the car file of the computer system, could still reflect inaccurate information concerning the trailing tonnage of the train. The Safety Board recognizes that this most likely would occur when a unit train is involved; yet the opportunity for error still exists with the system currently in place. Therefore, the Safety Board believes that the SP should take immediate steps to improve the method of providing accurate trailing tonnage information to traincrews.

The use of the maximum tonnage figure until a car has been weighed, in the event the shipper's bill of lading reflects estimated weights, raises additional concerns regarding the efficiency and safety of train operations. If the maximum tonnage figure remains in the car file of the computer system, this information will dictate, in essence, the number of axles of dynamic brakes needed to operate a train down a grade. It is conceivable, therefore, that the actual weight of a train could be substantially less than what is indicated on the tonnage profile document, based on the maximum tonnage figures. As a result, more locomotive units to provide power and dynamic braking could be assigned to a train than are needed. While the margin of safety would appear to be increased by this procedure, the Safety Board questions whether or not the SP has studied the ramifications of this procedure in terms of traincrews becoming overly reliant on the increase in power and dynamic braking capability and in terms of operating a railroad efficiently. On the other hand, operating personnel may become increasingly wary of a tonnage profile document knowing that the document may not contain accurate information concerning tons per operative brake. One additional point to consider is the overloading of cars. If, for example, each car in a unit train is loaded to a weight that is higher than the maximum figure contained in the computer, the actual trailing tonnage of the train could be considerably higher than the weight listed on the tonnage profile generated by the computer. Accordingly, the Safety Board urges the SP to examine the ramifications of any method proposed to provide accurate trailing tonnage information to traincrews.

The purpose of the interlock that nullified the dynamic brakes after an emergency application of the air brakes was to prevent the wheels from sliding. This had some validity when dynamic braking was new and before

engineer training became formalized. However, engineers in the industry are now trained to automatically release locomotive brakes in a trainline emergency. Other railroads, such as the Union Pacific and the Burlington Northern, recognize the importance of retaining dynamic brakes to ensure that some retardation is still available if brake shoes burn away. Consequently, the Safety Board believes that the SP should eliminate the dynamic brake/emergency interlock on all locomotive units to ensure the availability of at least one braking system at all times.

The investigation revealed that updating the computer system with information regarding defective locomotive conditions did not appear to receive priority attention. Furthermore, conflicting testimony by SP personnel suggests that the responsibility for updating the computer had not been well delineated. According to the assistant chief dispatcher involved in this accident, it is not his responsibility to place that information into the computer. He stated he does so on occasion or gives the information to a clerk in the office who will update the computer when convenient to do so. According to the chief mechanical officer, however, the dispatcher is responsible for updating the computer when he receives information from engineers concerning locomotive defects. The Safety Board believes that the computer system should accurately reflect the condition of locomotive units and that SP should develop a procedure to ensure such information is entered into the computer system in a timely manner and to clearly designate the responsibility for doing so.

The Safety Board's review of the training program for engineers revealed that, overall, the program was well conceived and offered a balance of classroom instruction and simulator training. Refresher training programs were also offered with the 1-week program geared for engineers who worked predominantly in mountainous terrain. The Board's investigation of this accident, however, revealed shortcomings in the program.

Of concern to the Safety Board was the head-end engineer's testimony that he had never been placed in an emergency situation during simulator training. The assistant manager for training testified that emergency situations incorporated into the simulator training are predicated on the premise that once the brakes are applied in emergency, the train will stop; consequently, engineers are not taught to recover their dynamic brakes after an emergency application of the train brakes have been made. If the assistant manager's statement accurately reflects SP's position regarding simulator training, the Safety Board believes that SP is not attaining maximum benefit from its simulator training program. During simulator training, crewmembers should be confronted with several operating parameters, including emergency situations that require the crewmembers to make appropriate decisions and to take appropriate actions. Contrary to what occurred in this accident, crewmembers should be trained and instructed to work as a team and communicate to arrive at the most suitable solution to the emergency at hand. The Safety Board believes that the head-end engineer of Extra 7551 East should have been provided adequate training and instructions regarding options during emergency situations, including the recovery of dynamic brakes. The SP, therefore, should review its training program for

engineers and incorporate emergency situations into the simulator portion of the program that will require crewmembers to respond appropriately to various operating parameters.

The investigation revealed that yard clerks had been provided no formal guidance regarding the weights of various commodities that were being transported by the SP or how the practice of estimating weights could possibly affect the safety of train operations. The discrepancy between the actual weights of the cars and the weights estimated by the yard clerks indicate that even on-the-job training was not accomplishing a degree of consistency. The Safety Board notes that the change in the computer system and the tendency of shippers to deal directly with the billing office in Los Angeles rather than with the clerks in outlying areas should minimize the type of errors with the bill of lading information that occurred in this accident. The Safety Board believes, however, that because clerks in outlying areas may continue to receive bill of lading information from shippers, SP should emphasize to its employees the importance of (1) obtaining the actual weights from shippers, and (2) the importance of indicating on the bill of lading if the weights listed are shipper-certified or estimated weights. Furthermore, shippers should be alerted to the importance of providing accurate weight information on the bill of lading they submit.

SP's oversight of train operations is primarily accomplished through efficiency testing, train rides, and a review of event recorders. However, the investigation also revealed that there is no consistent method or written policy regarding the number and types of efficiency tests that are to be made (particularly on grade operations), no policy regarding the number of check rides that should be made with engineers, and no policy regarding the review of event recorders.

The Safety Board is concerned that without specific guidance or a written policy regarding efficiency tests, check rides, and a review of event recorders, SP management may not detect certain operating practices that are not in compliance with operating rules. For example, Rule 61.E, in effect at the time of the train derailment, stated, "The amount of brake retarding force used to balance the grade normally should not exceed one half (50 percent) of the normal full service train brake available if dynamic brake and pressure maintaining are operative." Testimony by the head-end engineer indicated, however, that he had in the past exceeded 50 percent of the full service train brake available, and that engineers routinely exceeded the 50 percent. Although testimony also indicated that this rule was not to be interpreted as mandatory, the Safety Board believes that had a specific policy regarding oversight of train operations been in place--through efficiency checks, check rides, or a review of event recorder tapes--the practice of exceeding 50 percent of the full service train brake available may have been detected by supervisors and corrective action may have been taken. The Safety Board believes that riding with an engineer only once a year or reviewing an event recorder tape only when an apparent violation occurs is not adequate supervisory oversight. Consequently, the Safety Board

believes that the SP should review its supervisory oversight of train operations and provide specific guidance regarding efficiency tests, check rides, and the review of event recorder tapes.

The Safety Board has previously addressed the issue of supervisory oversight of train operations with the SP. On November 18, 1986, as a result of its investigation of the derailment on June 9, 1985, of a St. Louis Southwestern Railway Company freight train near Pine Bluff, Arkansas, the Safety Board issued the following Safety Recommendation to the SP:

R-86-42

Provide intensive full-time supervisory oversight of its mainline train operations with particular emphasis placed on the enforcement of speed restrictions and operating rules.

In its response of September 8, 1987, the SP advised the Safety Board, in part, of the following:

A comprehensive program to control speed as well as overall rules compliance has been initiated. This program...includes efficiency testing by all of our officers, both individually and as teams, to insure rules compliance both day and night. Our officers are required to make a preponderant number of their tests during hours of darkness.

Team testing is done by assigning our officers in groups of four with one officer designated as captain...They test all areas of the division, on a random basis to ensure no patterns are established that would nullify the surprise element....

Our road foremen of engines are required to ride 12-15 trains each month, concentrating on those engineers with lesser skills in train handling techniques, air brakes and rules knowledge. This program is designed to upgrade all of our enginemen to a high level of performance....

A large percentage of our locomotives are now equipped with event recorders. The tapes are captured at strategic locations and all of them are read and evaluated by our road foremen of engines for speed violation and train handling techniques....

The safety recommendation was being held in an "Open--Acceptable Action" status pending completion of the Board's investigation of an accident at Yuma, Arizona, in which supervisory oversight was again raised as an issue. The SP informed the Board that as a result of the Yuma accident, the company was placing an officer on duty 24 hours a day at the Yuma yard office. The results of the investigation of the San Bernardino accident again suggest that the SP needs to examine supervisory oversight of train operations. In view of the new safety recommendation being issued in this report, Safety Recommendation R-86-42 has been classified as "Closed--Unacceptable Action/Superseded."

The head-end engineer had been qualified over the territory by making one trip with a supervisor from Bakersfield to Tehachapi; this trip did not include the area in which the accident occurred. The Safety Board believes that supervisors cannot assess adequately the ability of engineers to operate trains properly over an entire territory by making one short ride with an engineer. In territory with mountainous terrain, supervisors, at a minimum, should ride with an engineer in both directions on the mountain grade before qualifying an engineer for the entire territory. Further, the ride should be performed on a train that is comparable in size and trailing tonnage to those typically most difficult to operate on that territory. Consequently, the Safety Board believes that the SP should revise its procedures accordingly for qualifying engineers.

Although the medical condition of the train crewmembers was not considered a factor in the train derailment, the Safety Board's investigation raised some concern regarding the current SP physical examination policy. Both the head-end and helper engineers had received physical examinations about 3 years before the accident. Since their respective physical examinations 17 years, 18 years, and 29 years before the accident, the conductor, the head-end brakeman, and the helper brakeman had not been required by the company to undergo any further physical examinations. Also, there is no record that the assistant chief dispatcher had ever received a company physical examination. The Safety Board is concerned that without the requirement that employees receive comprehensive periodic physical examinations, medical conditions may arise, go undetected, and conceivably affect an employee's ability to perform duties. The Safety Board has previously addressed this issue. In its investigation of the head-end collision of two Consolidated Rail Corporation freight trains near Thompsettown, Pennsylvania, on January 14, 1988, the Safety Board stated:

The motivation for requiring periodic company physical examinations has always been the fact that the safe operation of railroads demands a proper level of employee fitness. Unless employees are seriously ill or injured, they cannot be expected to seek regular physical examinations. More than ever, railroad employees should be subject to more stringent physical standards and regular, more comprehensive physical examinations by practitioners who understand what the employees do and under what circumstances they have to do it.

The Safety Board believes, therefore, that the SP should require its operating crews and employees in safety-sensitive positions to receive periodic comprehensive physical examinations.

The train dispatcher on duty at the time of the derailment, the assistant chief dispatcher who arranged the movement of Extra 7551 East, and the clerks who estimated the weights of the hopper cars and who prepared the shipper's bill of lading were not requested to submit to toxicological testing nor were they required to be tested. The Safety Board's concern about the potential involvement of alcohol and other drugs in all railroad operations has been well documented. The Safety Board believes that

employees in safety-sensitive positions that can affect the movement of trains--including supervisors and managers, train dispatchers, maintenance-of-way employees, clerks who handle hazardous materials shipments or who are responsible for recording vital information concerning the makeup of trains--should be required to submit to toxicological testing. Recommendations have been addressed to the FRA that it include in its alcohol and drug abuse regulations all persons in safety-sensitive positions, as a result of a Safety Board study on alcohol/drug use and its impact on railroad safety.² Although the Safety Board concludes that alcohol and drugs were not a factor in the train derailment on May 12, 1989, the Safety Board believes that the SP should revise its rules to require postaccident toxicological testing of all employees in safety-sensitive positions.

Therefore, the National Transportation Safety Board recommends that the Southern Pacific Transportation Company:

Develop explicit procedures that require the dispatcher and the operating crew to communicate vital information concerning the condition of the train that may impact on the crew's decisionmaking and train handling including, but not limited to, the number of locomotive units with functioning dynamic brakes and the trailing tonnage of the train. (Class II, Priority Action) (R-90-12)

Improve the method of developing accurate trailing tonnage information to be provided to traincrews. (Class II, Priority Action) (R-90-13)

Eliminate the dynamic brake/emergency interlock on all locomotive units. (Class II, Priority Action) (R-90-14)

Develop a procedure that will ensure that information concerning defective locomotive conditions is entered into the computer system in a timely manner and that the responsibility for doing so is clearly delegated. (Class II, Priority Action) (R-90-15)

Review the training program for engineers and incorporate emergency situations into the simulator portion of the program that will require engineers to respond appropriately to various operating parameters, including the recovery of dynamic braking. (Class II, Priority Action) (R-90-16)

Review the supervisory oversight of train operations and provide specific guidance regarding the number and types of efficiency tests, check rides, and the review of event recorder tapes. (Class II, Priority Action) (R-90-17)

² For more information, read Safety Study--"Alcohol/Drug Use and Its Impact on Railroad Safety" (NTSB/SS-88/04).

Require postaccident toxicological testing of all employees in safety-sensitive positions, including dispatchers and clerks who are responsible for preparing accurate train documents. (Class II, Priority Action) (R-90-18)

Revise the procedures for qualifying engineers to require that supervisors ride with an engineer in both directions on mountain grade territory before qualifying the engineer over the entire territory and that the ride be performed on a train that is comparable in size and trailing tonnage to those typically most difficult to operate on that territory. (Class II, Priority Action) (R-90-19)

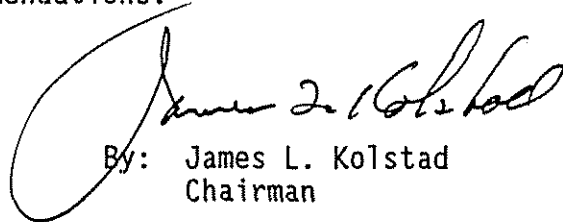
Require operating crews and employees in safety-sensitive positions to receive periodic comprehensive physical examinations. (Class II, Priority Action) (R-90-20)

Require the appropriate employees to obtain the actual weight of cars and product from shippers and to indicate on the bill of lading if the weights listed are shipper-certified or estimated weights. (Class II, Priority Action) (R-90-21)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "... to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations R-90-12 through -21.

Also, the Safety Board issued Safety Recommendations R-90-22 through -25 to the Federal Railroad Administration; R-90-26 and -27 to the Association of American Railroads; P-20-22 and -23 to the Calnev Pipeline Company; I-90-18 and -19 to the City of San Bernardino; P-90-24 and -25 to the Research and Special Programs Administration; and I-90-20 to the National Association of Counties and the National League of Cities. The Safety Board also reiterated Safety Recommendations P-84-26, P-87-6, P-87-7, and P-87-22 to the Research and Special Programs Administration and R-89-50 to the Federal Railroad Administration.

KOLSTAD, Chairman, COUGHLIN, Vice Chairman, and LAUBER and BURNETT, Members, concurred in these recommendations.



By: James L. Kolstad
Chairman