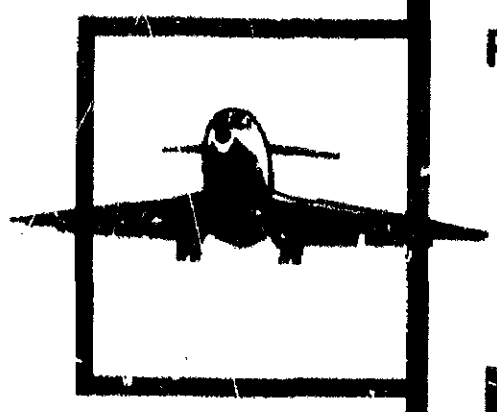

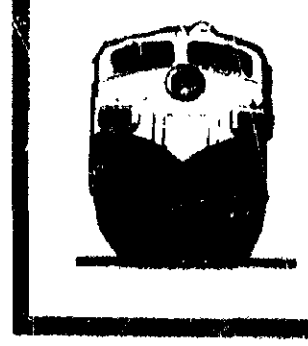

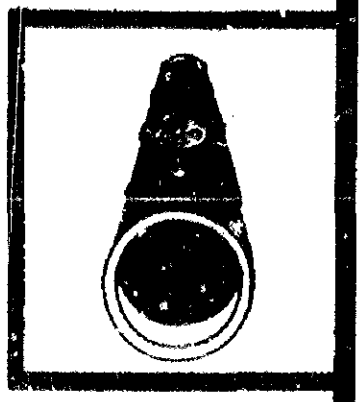

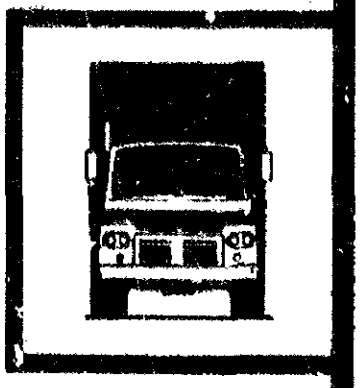

PB84-916302

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

RAILROAD ACCIDENT REPORT

REAR END COLLISION
OF SEABOARD SYSTEM RAILROAD
FREIGHT TRAINS EXTRA 8051 NORTH
AND EXTRA 1751 NORTH
SULLIVAN, INDIANA
SEPTEMBER 14, 1983

NTSB/RAR-84/02

UNITED STATES GOVERNMENT

TECHNICAL REPORT DOCUMENTATION PAGE

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15. Supplementary Notes		

16. Abstract At 5:32 a.m., e.d.t., on September 14, 1983, Seaboard System Railroad train Extra 1751 North moved onto the main track from the north end of the siding at Sullivan, Indiana, and proceeded northward. About 5:37 a.m., after Extra 1751 North had attained a speed of approximately 18 mph and had traveled 1,939 feet beyond the siding switch, Seaboard train Extra 8051 North, moving about 35 mph, overtook and struck the rear caboose of Extra 1751 North. The impact derailed 2 cars and 2 cabooses of Extra 1751 North and 3 locomotive units and 25 cars of Extra 8051 North. The two crewmembers in the rear caboose of Extra 1751 North were killed, and three crewmembers on Extra 8051 North were injured.

The National Transportation Safety Board determines that the probable cause of this accident was the failure of both head-end crewmembers of Extra 8051 North to remain alert due to the use of alcohol on duty, which resulted in their failure to observe the speed restrictions imposed by the governing wayside signals and to control the movement of the train accordingly. Contributing to the cause of the accident was the lack of an alerting device on the locomotive which would have stopped the train in the event the operator failed to respond to the alarm, and the lack of a requirement for the head-end crew to communicate the wayside signal aspects to the rear-end crew.

17. Key Words alcohol; BAL; restraining devices; trainline (brakepipe); emergency brake application; train graph; CTC system; rear-end collision; caboose; absolute signal; unqualified locomotive operator; entrapped crewpersons; rear-end fatality; siding		18. Distribution Statement This document is available to the public through the National Technical Information Service Springfield, Virginia 22161	
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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

RAILROAD ACCIDENT REPORT

Adopted: May 15, 1984

REAR-END COLLISION OF SEABOARD SYSTEM RAILROAD FREIGHT TRAINS EXTRA 8051 NORTH AND EXTRA 1751 NORTH SULLIVAN, INDIANA SEPTEMBER 14, 1983

SYNOPSIS

At 5:32 a.m., c.d.t., on September 14, 1983, Seaboard System Railroad train Extra 1751 North moved onto the main track from the north end of the siding at Sullivan, Indiana, and proceeded northward. About 5:37 a.m., after Extra 1751 North had attained a speed of approximately 18 mph and had traveled 1,939 feet beyond the siding switch, Seaboard train Extra 8051 North, moving about 35 mph, overtook and struck the rear caboose of Extra 1751 North. The impact derailed 2 cars and 2 cabooses of Extra 1751 North and 3 locomotive units and 25 cars of Extra 8051 North. The two crewmembers in the rear caboose of Extra 1751 North were killed, and three crewmembers on Extra 8051 North were injured.

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INVESTIGATION

The Accident

Seaboard System Railroad (SBD) 1/ freight train Extra 8051 North arrived at Howell Yard, Evansville, Indiana, about 9 p.m., c.d.t., on September 13, 1983, from Nashville, Tennessee. Extra 8051 North had received an initial terminal inspection and brake test at Nashville, and no exceptions were taken to the condition of the equipment or brakes. The inbound engineer later reported to Safety Board and Federal Railroad Administration (FRA) investigators that the train, which consisted of 2 locomotive units and 60 cars, handled well; that the dynamic brake and the automatic and independent airbrakes worked properly; that the headlight, whistle, and bell functioned properly; and that the speedometer was accurate. Also, he said that the windows were clean and there was no debris, or particularly glass bottles, in the operating compartment of lead locomotive unit 8051 when he arrived at Howell Yard.

1/ SBD is the acronym for the Seaboard System Railroad which is comprised of the Louisville and Nashville Railroad Company, the Seaboard Coastline Railroad Company, the Clinchfield Railroad Company, the Georgia Railroad Company, and several other less extensive railroad companies.

After Extra 8051 North arrived at Howell Yard, a yard engineer boarded the lead locomotive unit, switched the train to add a third locomotive unit and 37 cars, made a satisfactory application and release brake test, and reported the results of the brake test to the outbound engineer shortly after 10:30 p.m. The yard engineer told Safety Board investigators that the operating compartment of locomotive unit 8051 had no debris, or particularly glass bottles, in it, and that the radio operated satisfactorily. Following the switching of the train, he talked to the outbound engineer. The yard engineer neither detected an odor of alcohol nor noted any unusual mannerisms being exhibited by the outbound engineer.

The outbound operating crew for Extra 8051 North was called to report for duty at 10:45 p.m. on September 13, 1983, at Howell Yard to operate the train to Danville, Illinois. The crew consisted of an engineer, head brakeman, conductor, and rear brakeman. When the conductor reported for work about 9:45 p.m., he picked up the freight waybills for Extra 8051 North and the train orders for his crew and then waited for the other crewmembers to arrive. The engineer arrived for work about 10:30 p.m., and the conductor gave him copies of the train orders. They compared their watches for a time check, and the conductor told the engineer where in the train to place cars which they were to pick up at By-Pass Junction, 9.8 miles north of Howell Yard. At the time the conductor talked to the engineer to discuss work to be done en route, to give him his train orders, and to determine his fitness for duty, he did not take any exceptions to the engineer's condition. He said that he did not detect any odor of alcohol on the engineer and that his mannerisms appeared natural to him from past work experiences with him. This talk took place in a lighted room as did his subsequent contacts with the remainder of his crew. Only the crew clerk was present when the crewmembers reported for duty. There were no supervisory personnel present to verify the crewmember's fitness for duty at this time, and it is not the practice of the SBD at Evansville to provide for a supervisor to be present at all times when crewmembers report for duty.

The head brakeman and rear brakeman arrived for work about 10:35 p.m., and the conductor instructed the head brakeman concerning the work they had to do at By-Pass Junction. During his talk with the head brakeman, the conductor did not detect any odor of alcohol. He took no exception to either crewmember's fitness for duty.

The rear brakeman also talked to the engineer and head brakeman of Extra 8051 North before they left the yard office to board the locomotive, and he neither detected an odor of alcohol nor saw any unusual mannerisms exhibited by either of the two crewmembers.

Extra 8051 North received a roll-by inspection as it departed Howell Yard at 10:58 p.m. on September 13, 1983. The train consisted of a 3-unit locomotive, 62 loaded cars, and 33 empty cars, for a total load of 6,712 tons. The engineer, who was operating the train, and the head brakeman were on the lead locomotive unit, and the conductor and rear brakeman were on the caboose. SBD operating rules (see appendix C) require the crew of a train to check the operable condition of their respective radios before departing the terminal. When the engineer of Extra 8051 North radioed the yardmaster to obtain permission to depart the yard, his radio operated to his satisfaction. Likewise, when the rear brakeman radioed the engineer that he and the conductor were on the caboose, he was satisfied with the operation of his radio. Insofar as the crew of Extra 8051 North was concerned, they had complied with the radio departure test. During a deposition hearing before Safety Board personnel, a company officer indicated that these radio communications were a sufficient test under the company operating rules.

After leaving Howell Yard, milepost (MP) 288.8, Extra 8051 North entered the siding at Harwood, Indiana, MP 283.9, to meet southbound train No. 717. After departing Harwood, the train stopped at By-Pass Junction where 4 loaded cars and 25 empty cars, amounting to 1,254 tons, were added to the train, making the train consist of 66 loaded cars and 58 empty cars, for a total load of 7,966 tons. The engineer and head brakeman performed the switching necessary for the car pickup at By-Pass Junction which involved several moves. After the switching was completed and the train had been recoupled, a satisfactory application and release brake test was made, and Extra 8051 North departed By-Pass Junction at 12:05 a.m. on September 14, 1983. The conductor took no exception to the manner in which the engineer and head brakeman performed the switching operation at By-Pass Junction.

Extra 8051 North remained on the main track at King, Indiana, MP 265.3, where it met southbound train No. 701 which was routed through the siding. At MP 248, Extra 8051 North was delayed 50 minutes because of a leaking train line 2/ on car MILW 92353, which caused the brakes to apply and stop the train. The head brakeman located the leak before the rear brakeman could walk from the rear of the train to the car. He repaired the leak sufficiently to allow the brakes to be released, and the train was able to proceed to Decker, Indiana, MP 246.3, where it was stopped on the main track to meet southbound train No. 721 which was routed through the siding. After Extra 8051 North departed Decker at 2:55 a.m., the engineer radioed the Baltimore and Ohio Railroad Company (B&O) tower operator at Vincennes, Indiana, and asked him to call the night watchman at the Essex Wire warehouse, located at MP 238, and ask him to unlock the security gate on the siding serving the warehouse so car MILW 92353 could be set out. When Extra 8051 North arrived at the Essex Wire warehouse, the gate was unlocked, and the head brakeman by radio directed the switching movements necessary to set the car out at the warehouse siding.

The conductor of Extra 8051 North reported to Federal investigators that en route from Howell Yard the radio transmission from locomotive unit 8051 was weak and noisy while the train was moving. However, this problem was not reported to the dispatcher because the crew believed that radio communications were reliable enough for them to perform their required duties. The radio communications involved in switching out the problem car were monitored by the B&O operator at Vincennes and the engineer of a following train, Extra 1751 North. They reported to Safety Board investigators that all control instructions and responses appeared to be business-like and timely.

Extra 8051 North left the Essex Wire warehouse at 3:30 a.m. and proceeded to Oaktown, Indiana, MP 220. The train dispatcher at Evansville aligned the track switch at South Oaktown 3/ to divert Extra 8051 North onto the siding where it cleared about 4:12 a.m. 4/ While Extra 8051 North was in the siding at Oaktown, northbound trains Extra 1751 North and No. 722 passed it on the main track. The conductor of Extra 8051 North was standing on the ground to inspect each of these trains as they passed, and he later stated that the rear red marker light on the caboose of each train was lighted.

2/ The airbrake pipes and hoses by which air is transmitted through the train to control the airbrakes. It is also referred to as the brakepipe.

3/ The access switches at each end of the Oaktown siding are designated South Oaktown and North Oaktown.

4/ The dispatcher's office at Evansville has a train graph which records the passing of a train at selected "OS" points. However, the passing times recorded by the dispatcher on the train sheet are taken from the dispatcher's personal watch, which in this case was about 2 minutes faster than the time graph.

The engineer stated that, because he was tired and sleepy, he turned the operation of the locomotive over to the head brakeman while Extra 8051 North was in the siding at Oaktown. The engineer then sat in the rear seat on the left side of the locomotive and dozed. He said that he remembered a train passing Extra 8051 North at Oaktown and his train leaving the siding before he fell asleep. The engineer said that he did not know the head brakeman's qualifications to operate a locomotive. However, in direct conflict with that statement he also said that the head brakeman had operated a locomotive before under his supervision and that he did so to his satisfaction.

The head brakeman did not remember whether he assumed operational control of the locomotive while it was in the siding at Oaktown, as the train was leaving the siding, or after it had left the siding. The head brakeman had not been tested for his qualifications to operate the locomotive and was not authorized to operate it. He said that he had never operated a train like Extra 8051 North, but that he had operated locomotives before on a branch line where the maximum authorized speed was 10 mph. Although the head brakeman said that he did not remember when he began operating the locomotive, he said that after Extra 1751 North passed Oaktown, Extra 8051 North received a permissive signal to reenter the main track. At 4:48 a.m. Extra 8051 North reentered the main track at North Oaktown presumably under the control of the head brakeman. The train proceeded out of the siding, and a speed not exceeding 10 mph was maintained in compliance with the operating rules. When the caboose reached the main track, the rear brakeman radioed to the enginecrew that the train was clear of the siding. The train cleared the switch detector 5/ track circuit at 4:52 a.m. At this time the train began gradually to accelerate, and the speed increased to between 35 mph and 40 mph.

The head brakeman said that he remembered seeing the first wayside signal (signal 214.6) north of Oaktown and that it displayed a clear (green) aspect. He said that he did not remember the signal aspects of any of the other three automatic wayside signals between North Oaktown and South Sullivan, Indiana, 6/ or the signal governing SBD train movements across the Illinois Central Gulf Railroad (ICG) grade crossing at milepost 204.49. An Indiana State statute (38-6-4-1) requires that a locomotive's whistle be blown at least four times beginning not less than 80 rods (1,320 feet) from a grade crossing and that the locomotive's bell be rung continuously. The head brakeman said that he did not remember whether he blew the whistle and/or rang the bell, and he did not remember the throttle positions he used while operating the locomotive. The head brakeman said that he must have fallen asleep. This sleep lasted for approximately 15 to 20 minutes. He stated that the first he could recall after seeing signal 214.6 north of Oaktown was suddenly seeing the caboose of Extra 1751 North immediately ahead of him. He claimed that when he saw the caboose he put the train brakes into emergency. About 5:37 a.m., without slowing its speed, which was estimated to be about 35 mph, Extra 8051 North struck the caboose of Extra 1751 North about 1,940 feet north of the siding switch at North Sullivan. The collision point was at MP 201.32, approximately 19 miles from the Oaktown siding. None of the crewmembers took any exceptions to the manner in which the train was handled between Oaktown and Sullivan.

Extra 1751 North was called for 11:30 p.m. on September 13, 1983, at Howell Yard and departed at 12:03 a.m. on September 14, 1983. The freight train consisted of a 3-unit locomotive with 61 loaded cars and 81 empty cars, which included a deadhead (empty and not in use) caboose and a regular caboose as the rear car for the operating crew, for a

5/ The switch detector circuit is a signal circuit protecting the track switch machine and switch points to prevent its operation when the circuit is occupied or when a signal displays a proceed indication over the switch.
6/ Sullivan has a siding with access switches designated South Sullivan and North Sullivan.

total load of 8,514 tons. The crew was composed of the engineer and head brakeman, who were on the locomotive, and the conductor and rear brakeman, who were on the rear caboose.

Extra 1751 North received clear (green) signal aspects between Howell Yard and South Sullivan except where it overtook Extra 8051 North at several points. At South Sullivan, a diverging route signal aspect (red over lunar) was displayed which indicated that Extra 1751 North was to enter the siding. Extra 1751 North cleared the main track onto the siding at South Sullivan at 5:06 a.m.

Extra 1751 North remained in the siding at Sullivan until train No. 722, which was a higher priority train that had departed Howell Yard at 2 a.m., passed North Sullivan at 5:16 a.m. After No. 722 passed North Sullivan, the dispatcher coded the control equipment to align the track switch for a movement from the siding to the main track and to obtain a permissive signal for Extra 1751 North to depart Sullivan. The engineer of Extra 1751 North said that when he obtained a permissive signal to leave the siding at North Sullivan, the signal governing northward movements on the main track was at stop (red). Extra 1751 North cleared the switch detector track circuit onto the main track at North Sullivan at 5:32 a.m. The dispatcher then coded the control equipment to align the track switch at North Sullivan for the main track and to obtain a permissive signal to allow Extra 8051 North to proceed northward. The signal at North Sullivan intended for Extra 8051 North could not indicate a permissive aspect for Extra 8051 North until the caboose of Extra 1751 North had moved north of signal 198.8, the first intermediate wayside signal, 15,305 feet north of North Sullivan. The caboose of Extra 1751 North had not moved past signal 198.8 before it was overtaken and struck by Extra 8051 North.

When the the lead locomotive unit of Extra 8051 North struck the rear caboose of Extra 1751 North, the unit rotated to the east as its lead trucks derailed and turned over on its left side with the short hood headed south. The fuel tanks were punctured, and fuel oil from the punctured tanks poured into the operating compartment to a level reported to be about knee-deep and saturated the ground around the locomotive. The engineer and head brakeman were injured. The second locomotive unit came to rest on the west side of the track headed in a southeasterly direction, and the third unit was across the main track headed in a southwesterly direction. The 10 head cars of Extra 8051 North also derailed at the point of the collision. (See figures 1 and 2.) A 15-car secondary derailment beginning with the 50th through the 64th cars from the locomotive occurred at Glenora Street, a public road crossing in Sullivan located on the railroad at MP 201.75. (See figure 3.)

The rear caboose of Extra 1751 North was damaged in the collision with the lead locomotive unit of Extra 8051 North and then crushed by one of the derailed freight cars of Extra 8051 North; the two crewmembers in the caboose were killed. The second caboose and two cars of Extra 1751 North were derailed.

Broken glass from a 1.75-liter (59.2-fluid-ounce) bottle was found in the operating compartment of Extra 8051 North after the accident. The bottle label indicated that the bottle had at one time contained vodka. The bottle was taken to the Indiana State Police laboratory in Indianapolis, Indiana, for examination. Because the bottle had been immersed in fuel oil, no fingerprints could be identified. Laboratory technicians attempted to reconstruct the broken bottle, but too many pieces were missing.

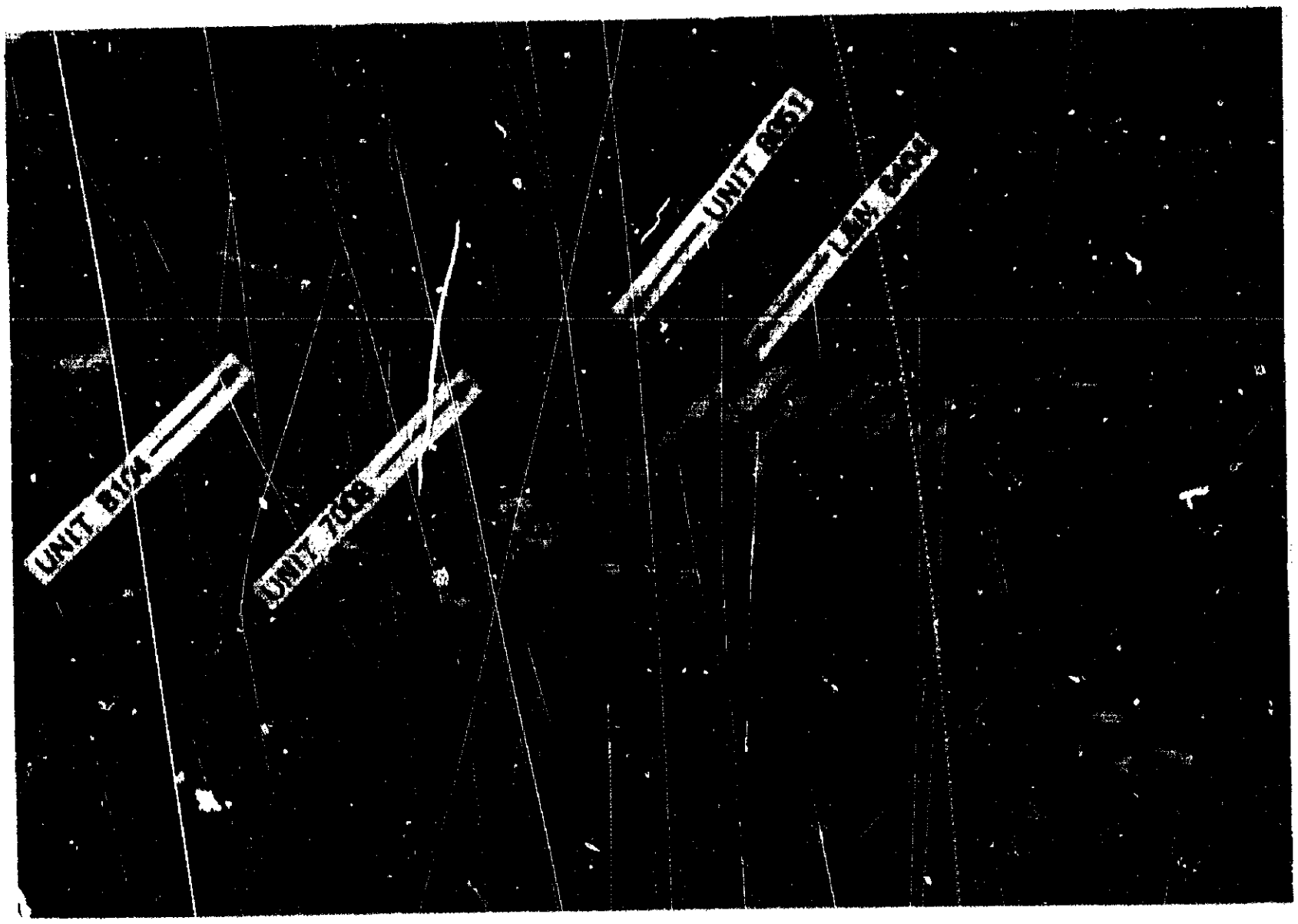


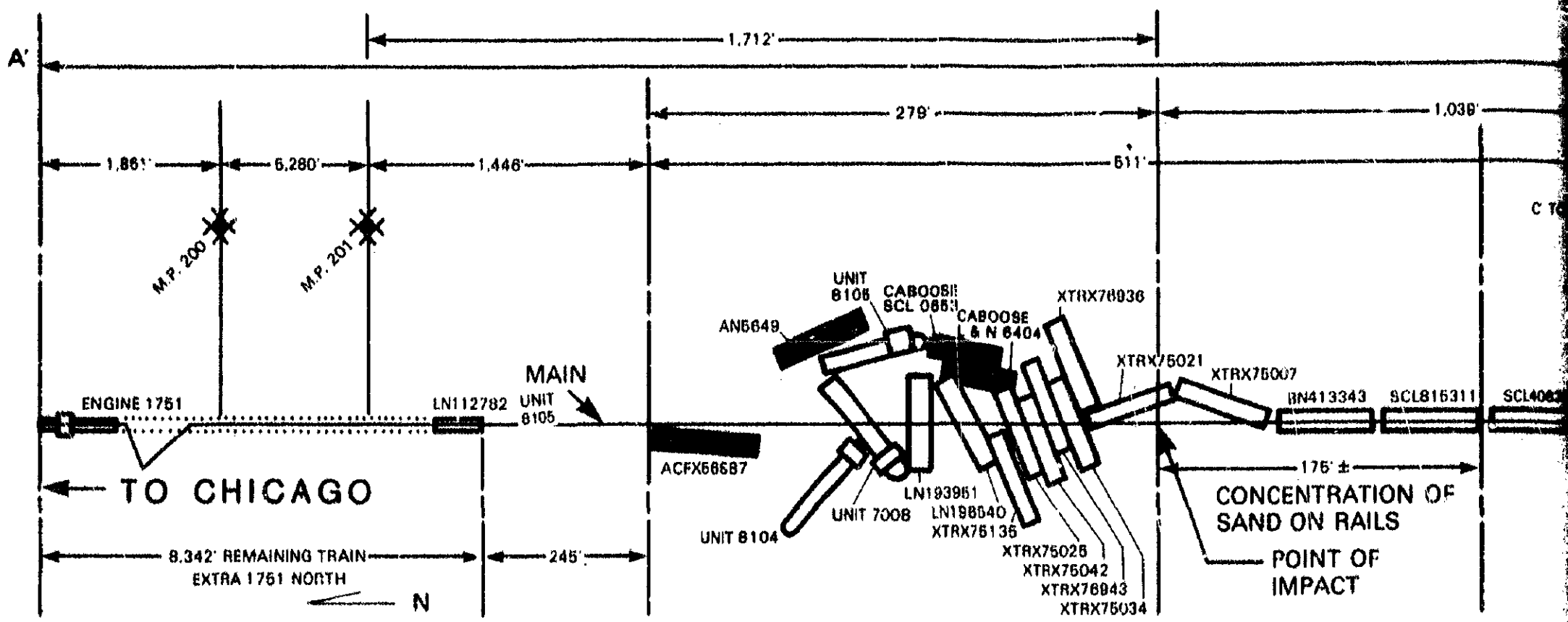
Figure 1.--Primary derailment of Extra 8051 North at point of impact.

Injuries to Persons

Injuries	Train Extra 8051 North	Train Extra 1751 North	Total
Fatal	0	2	2
Nonfatal	3	0	3
None	1	2	3
Total	4	4	8

Damage

The train came to a stop either because of the derailment of cars in Extra 8051 North or because the train's head brakeman caused the train's airbrakes to apply in emergency. In stopping, however, the secondary derailment occurred, causing damage in two parts of the train. Of the 25 cars derailed in Extra 8051 North, 16 cars were destroyed, 2 cars had light damage, and 7 cars had moderate to heavy damage. The lead locomotive unit of Extra 8051 North was heavily damaged, yet the operating compartment remained intact. The two trailing locomotive units were moderately damaged, and each unit stopped at an angle of about 45 degrees to the track.

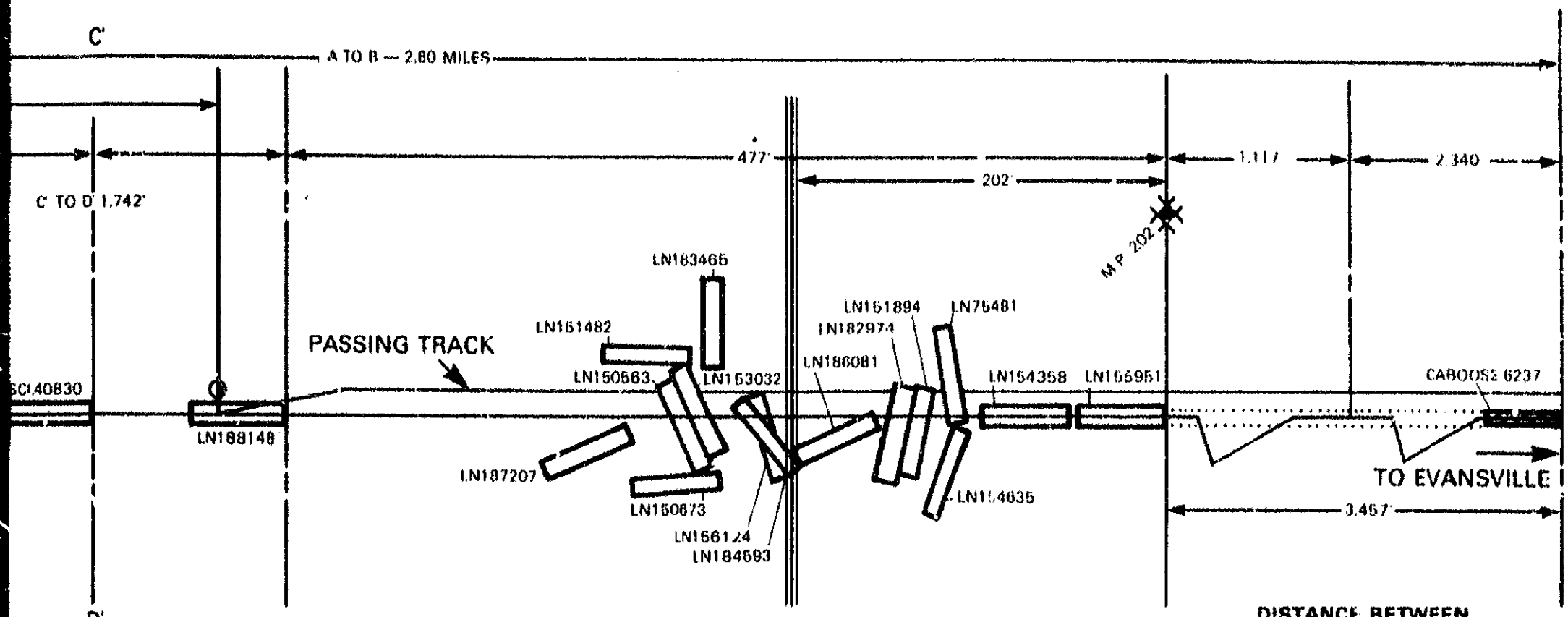


— CARS EXTRA 8051 NORTH

— CARS EXTRA 1751 NORTH

REAREND COLLISION BETWEEN SBD TRA
SEPTEMBER 14, 1983.
SCALE — 1" = 50' BETWEEN ASTERISKS

Figure 2.—Plan view of primary a



DISTANCE BETWEEN STATIONS (MILES)

STATION	MILE POST
HOWELL YARD 4.9	288.8
HARWOOD 4.5	283.9
BY-PASS JCT. 14.1	279.4
KING 17.3	265.3
MILE POST 248 1.7	248
PECKER 8.3	246.3
ESSEX WIRE 18.0	238
OAKTOWN 16.1	220
ICG CROSSING 1.24	204.9
S. SULLIVAN 1.9	203.68
N. SULLIVAN 0.42	201.78
POINT OF IMPACT	201.32

TRA D TRAINS EXTRAS 8051 AND 1751 NORTH, SULLIVAN, INDIANA

SKS RISKS ONLY

ry a nary and secondary derailment sites.

Figure 3.--Secondary derailment of Extra 3051 North at Glenora Street.

The trucks, brake equipment, and fuel tanks underneath the chassis of locomotive unit 8051 were damaged. (See figures 4 and 5.) The short hood and left side of the operating compartment of the unit were extensively damaged, and the long hood and safety appliances 7/ were bent and twisted. Also, the train line anglecock on the lead end of locomotive unit 8051 was missing. The second and third units, 8104 and 7008, received damage similar to that of the lead unit in the same general areas, but the damage was not as extensive.

When the two cabooses and the two cars ahead of the cabooses of Extra 1751 North derailed, the derailed cars caused the airbrakes of Extra 1751 North to apply in emergency, and the train stopped with no damage to the balance of the train. Although the rear caboose of Extra 1751 North was damaged considerably by the striking locomotive of Extra 8051 North, the caboose was destroyed by the overriding fourth car of Extra 8051 North, which caused the caboose roof to collapse. (See figures 6 and 7.) The two cabooses and one car were destroyed, and one car was slightly damaged. The cars of both trains stopped generally perpendicular to the track, side-by-side, with some cars parallel to or in line with the track. (See figures 1, 2, and 3.)

At the point of impact, 312 feet of track built of 112-pound jointed rail were destroyed. At the point of the secondary derailment, 273 feet of main track and 240 feet of the siding were destroyed. In addition, a paved public road crossing on county road 56 was destroyed, and some cropland with crops adjoining the railroad was damaged. The SBD estimated the railroad damage to be:

Signals	$ 20,728
Track	38,983
Equipment (including locomotive units)	764,117
Lading	58,000
Clearing Wreck	45,752
Total	$927,580

Personnel Information

The crewmembers of each train were qualified for their assignments according to the company operating rules. (See appendix B.) However, the head brakeman of Extra 8051 North was not qualified to operate a locomotive/train. Each crewmember of each train had been off duty more than 8 hours, the minimum rest period prescribed by Federal regulations (49 CFR Part 228, Hours of Service of Railroad Employees). After the expiration of the 8-hour rest period, any of the crewmembers, who had not requested to be off, were eligible to work another tour of duty, and they could expect to be called at any time depending on the number of trains being operated at that time.

The engineer of Extra 8051 North was an experienced locomotive engineer, and he was qualified on the characteristics of the territory over which the train was operated. He arose about 7 a.m. on September 13, and at 9:30 a.m. he attended a Brotherhood of Locomotive Engineers meeting at a tavern in Evansville. During the meeting, which adjourned about 11 a.m., coffee was served. After the meeting, the engineer ordered and drank two mixed drinks, each of which contained about 7/8 ounce of 80-proof vodka and grapefruit juice, according to the bartender. About noon, the engineer left the tavern and went to a bar/restaurant near Howell Yard. While he was at the bar, the engineer was served three mixed drinks, each of which contained about 3/4 ounce of 80-proof vodka and grapefruit juice, according to the bartender.

7/ Handrails, grab irons, steps, etc.

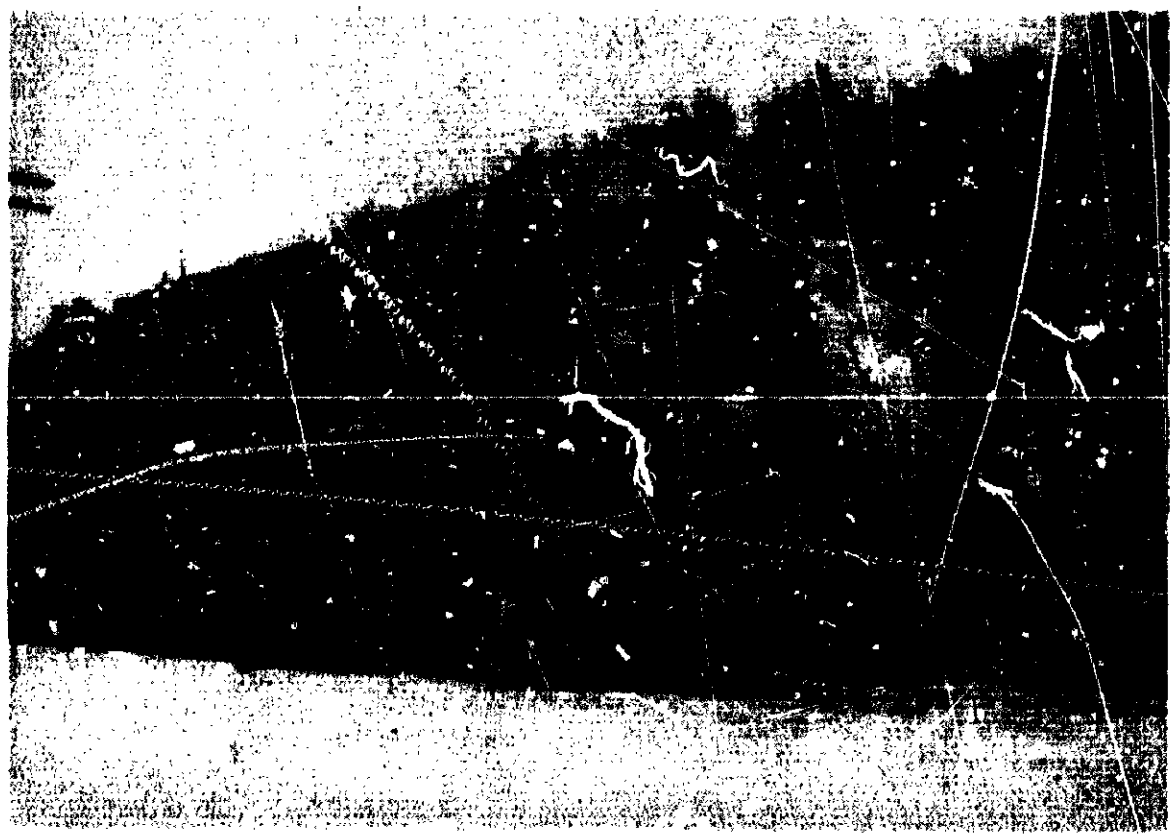


Figure 4.--Damage to the engineer's side of the lead unit, L&N 8051, of train Extra 8051 North.

Figure 5.--Damage to the fireman's side of the lead unit, L&N 8051, of train Extra 8051 North.

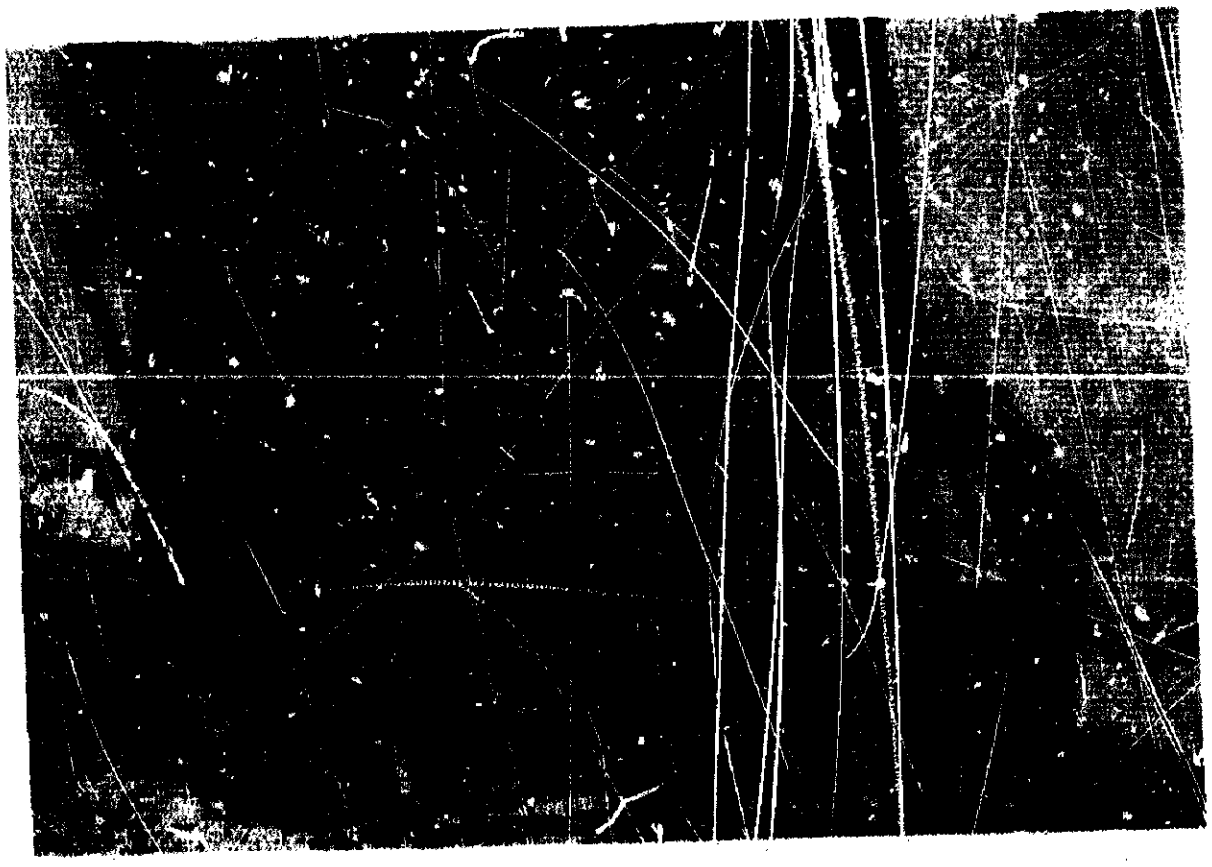


Figure 6.--Damage to "A" end of rear caboose, L&N 6404, of train Extra 1751 North.

Figure 7.—Damage to "B" end of rear caboose, L&N 6404, of train Extra 1751 North.

Between 2:30 p.m. and 3 p.m., the engineer left the bar and went to another tavern, where he was served about six mixed drinks consisting of 80-proof vodka and grapefruit juice, according to the bartender. However, the bartender said that when she noticed that the engineer was becoming intoxicated after about three drinks, each of which contained 1 ounce of vodka, she began omitting the vodka, and that the last two or three drinks contained little or no vodka in the grapefruit juice. Two SBD employee acquaintances, who happened to be at the tavern, noticed that the engineer appeared to be either ill or sleepy, because he had his head resting on the bar, and they volunteered to drive him home. He accepted their offer, and one of the acquaintances drove him home, where he arrived around 4:50 p.m. According to the person who drove him home, the engineer did not act or appear to him to be intoxicated.

The engineer went to bed between 5 p.m. and 5:30 p.m. About 8:45 p.m., his wife received a telephone call from the crew caller asking the engineer to operate Extra 8051 North. The engineer slept until 9:30 p.m., at which time he arose and prepared for work. After driving to Howell Yard, he reported for duty about 10:30 p.m.

The engineer had never been known to buy packaged alcoholic beverages from any of the three establishments he visited on September 13, and he did not purchase any that day, according to the bartenders. None of his coworkers ever recalled seeing him intoxicated, and no one indicated that they suspected he had an alcohol problem. One bartender said that she had seen him intoxicated once or twice and that on those occasions, at his request, she had called his wife to come and get him. Although the engineer admitted to FRA investigators that he considered himself to be an alcoholic, he had never told this to any of his railroad supervisors, and he had never sought help.

When the engineer was asked about the broken vodka bottle found in the operating compartment of overturned locomotive unit 8051, he denied any knowledge of it, and said that he did not have anything to drink after he left the tavern between 4:30 p.m. and 5 p.m. on September 13. The engineer operated Extra 8051 North from Howell Yard to Oaktown and handled the locomotive during the switching operations at By-Pass Junction and the Essex Wire warehouse. There were no open barrooms where alcoholic beverages could have been purchased at any of the points along the railroad where Extra 8051 North stopped en route from Howell Yard to Oaktown.

The head brakeman of Extra 8051 North had been off duty about 2 days before accepting the call for the 10:45 p.m. assignment on September 13. He said that he was well rested and that just before he ate dinner, between 6:30 p.m. and 7:30 p.m., he drank two "nominal sized" drinks of scotch and water. The call for duty came after he had consumed his drinks. When he arrived at Howell Yard about 10:35 p.m. for his assignment, no one questioned his sobriety or fitness for duty. He performed his duties during the switching operations to pick up the cars at By-Pass Junction; he located and temporarily repaired the car with the leaking train line and set it out at the Essex Wire warehouse siding; and he operated the train from Oaktown to Sullivan in a manner that did not cause concern to the conductor and rear brakeman. The head brakeman denied any knowledge of the broken vodka bottle found in the locomotive operating compartment when he was asked about it, and he said that he did not have any alcoholic beverages to drink after the two drinks he drank just before his dinner.

The conductor of Extra 8051 North had been off duty at least 36 hours before he accepted the call for the 10:45 p.m. assignment on September 13. He slept from 6:45 p.m until 9:10 p.m. on September 13 before preparing for work, and he departed his home

about 9:30 p.m. for Howell Yard. He said that the train was operated well between Howell Yard and Sullivan. He said that he did not know that the head brakeman had operated the train between Oaktown and Sullivan.

The rear brakeman of Extra 8051 North had been off duty for about 36 hours before he accepted the 10:45 p.m. assignment on September 13. He arrived at Howell Yard about 10:35 p.m., and he took no exceptions to the other crewmembers' fitness for duty. He had no criticism for the performance of the head-end crew between Howell Yard and the point of the derailment.

Train Information

The locomotive of Extra 8051 North consisted of three diesel-electric units of mixed design. Locomotive units 8051 and 3104 are 3,000-horsepower, model SD40-2 units manufactured by the Electro-Motive Division of the General Motors Corporation. Locomotive unit 7008 is a 3,000-horsepower, model C-30-7 unit manufactured by the General Electric Corporation. The train consist was composed of mixed types of equipment with ladings of mixed freight. One tank car that was picked up at By-Pass Junction contained a caustic material, but it was not derailed.

Train Extra 1751 North had three diesel-electric locomotive units. The train consist included two cabooses. The forward caboose, Seaboard Coastline Railroad (SCL) No. 0653, was a cupola type, and the rear caboose, Louisville and Nashville Railroad (L&N) No. 6404, was a bay window type. The rear caboose was equipped with a rear red marker light and a permanently mounted radio transceiver. Crewmembers also were assigned portable radio units.

The SBD does not equip its locomotives with deadman foot pedal controls, alerting devices, or speed recorders, and the devices are not required by Federal regulations. No restraining devices such as seatbelts or shoulder harnesses were used on these SBD locomotives or cabooses, and restraining devices are not required by Federal regulations.

Transceiver radios are mounted permanently in each of the locomotive units. Channel No. 2 is used by crews to communicate with the dispatcher, and channel No. 1 is used by crews to communicate with other trains, maintenance-of-way equipment, or between the locomotive and the caboose. The dispatcher is received on both channels when he transmits, but for end-to-end communications each unit would have to be tuned to Channel 1. The rear crew would not hear the engineer transmit to the dispatcher, but they would hear the dispatcher's answer to the engineer.

Track Information

The railroad between North Oaktown and the point of impact at milepost 201.32 is on undulating terrain with a series of curves ranging from 0° 30' to 1° 1'.

Method Of Operation

SBD trains Nos. 718 and 792 are scheduled second-class freight trains in the SBD's timetable No. 1, effective 12:01 a.m. on January 1, 1981. On September 14, the trains were operating ahead of schedule and thus had to operate as extra trains. Train No. 792 was designated as Extra 8051 North, and train No. 718 was designated as Extra 1751 North.

Extra 8051 North and Extra 1751 North were operated over the Chicago Sub-division of the Evansville Division of the SBD, which extends 165.7 miles northward from Evansville to Danville. The Evansville Division, formerly the Chicago and Eastern Illinois Railroad Company, was acquired by the L&N which has subsequently become part of the SBD. Trains are operated over the single main track by timetable, train orders, bulletin orders, and the aspects of automatic color light wayside signals of a Centralized Traffic Control System (CTC). The most restrictive signal aspect that can be displayed by the intermediate wayside signals is "restricted proceed," Rule 291, which indicates to an engineer that he can proceed past the "restricted proceed" aspect without stopping, but at a speed not to exceed 15 mph and to be prepared to stop short of an obstruction, such as a broken rail or a switch improperly lined. The intermediate signals are identified by a vertical number plate affixed to the signal mast. A signal without a number plate is an absolute signal. When a red (stop) aspect is displayed by an absolute signal, it means that an engineer must stop the train and not proceed past the signal without special authority from the train dispatcher. Absolute signals are located at controlled points such as entrances and exits to sidings, and they are controlled by the train dispatcher.

Absolute signals are located at North Sullivan and South Sullivan. Southward from South Sullivan, signals are located at the ICG grade crossing at MP 204.49, and intermediate signals are located at MP 206.90 (signal 207.0), MP 209.85 (signal 210.0), and MP 214.69 (signal 214.6). An absolute signal is located at North Oaktown. When the absolute signal at North Sullivan displays a red (stop) aspect, the signals in approach to North Sullivan display aspects as follows: the absolute signal at South Sullivan displays an approach (yellow) aspect, requiring a train to be operated at a speed of not more than 30 mph and prepared to stop at the next signal; the signal at the ICG crossing and signal 207.0 both display an approach medium (yellow over green) aspect requiring a train to approach the signal at South Sullivan displaying an approach aspect at a speed of not more than 30 mph; signal 210.0 displays a clear (green) aspect which allows maximum authorized speed. (See figure 8 and appendix C.) On the morning of September 14, the signal block occupied by Extra 8051 North would have caused the signal aspects to the rear to reflect the occupancy of Extra 8051 North. The engineers on trains No. 722 and Extra 1751 North did not report any discrepancies with the signal system between North Oaktown and North Sullivan on September 14.

The train dispatcher maintains a record of the times that trains pass a selected location. He obtains the times by observing a lighted "OS" light activated by the passing train. Dispatchers record train passing times from their personal watches, but a time graph also is maintained at Evansville by which "OS" times are recorded. Extra 8051 North occupied the track switch detector circuit at South Sullivan at 5:28 a.m., and occupied the track switch detector circuit at North Sullivan at 5:34 a.m.

In addition to the time chart, the dispatcher has a radio tape monitor which records all radio communications between the dispatcher and trains. The dispatcher also maintains a record of the engineers and conductors and their times on duty, the locomotive numbers, the number of loaded cars, the number of empty cars, and the tonnage hauled by a train.

Traincrews are required to report unusual circumstances or delays to the dispatcher, who makes a permanent record of significant events. Enginecrews are required to use the radio to announce to the rear crew the train's approach to hotbox and dragging equipment detectors. When the train has passed such a location, the rear crew must radio the enginecrew the reading presented to them on the readout indicator. There were no detector installations between Oaktown and Sullivan. The rear crew also is required to

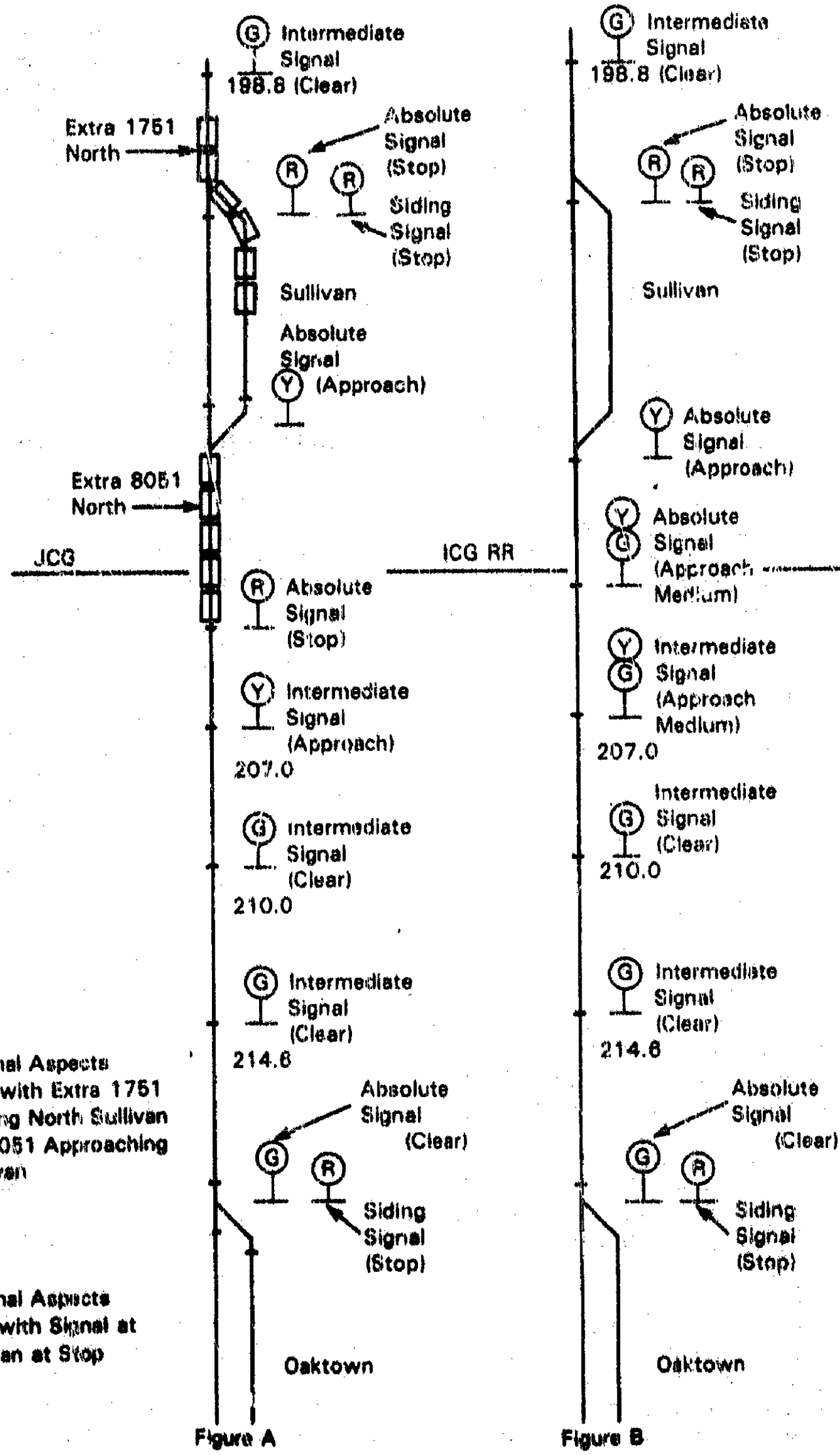


Figure A
Depicts Signal Aspects Southward with Extra 1751 North Leaving North Sullivan and Extra 8051 Approaching South Sullivan

Figure B
Depicts Signal Aspects Southward with Signal at North Sullivan at Stop

Figure 8.--Signal arrangement between Oaktown and Sullivan.

radio the engineer when the caboose has cleared a siding and when the caboose has passed a point where reduced speed is required by either a train order or bulletin order. Enginecrews are not required to radio the aspects of a wayside signal to the rear crew as a train approaches it. There is no rule prohibiting a train from leaving a terminal with an inoperative radio.

The conductor of Extra 8051 North took no exceptions to the train's handling or speed between Oaktown and Sullivan. He made a speed check at South Sullivan by observation and judgment, and he considered the speed of the train to be such that it was in compliance with the 40-mph maximum speed authorized by train order between MP 204.0 and MP 199.3.

The L&N's operating rule book continues to be used as the operational authority for SBD employees. (See appendix C.) The SBD does not authorize unqualified personnel to operate a locomotive. Operating rule No. 1010 reads, in part, "They [engineers] must not allow unauthorized persons to operate the locomotive . . . ." Also, paragraph 1 of rule G reads,

> The use of intoxicants, narcotics or any other illegal drug or drug paraphernalia by an employee subject to duty, or their possession or use while on duty, or while on company property, or while occupying facilities paid for or furnished by the company, or at any other time that such use or possession subjects the company to criticism or loss of good will, is prohibited and will subject the offender to disciplinary action, including dismissal . . . .

The SBD requires engineers to take a medical examination every 2 years if they are between the ages of 30 and 54. After age 55 they must take a medical examination annually. Conductors and brakemen are not required to take medical examinations on a scheduled basis. All crewmembers are required to be reexamined on operating rules annually. The examination, which lasts 8 hours, includes written questions and covers safety rules and handling of hazardous materials. At the time of the rules examination, the employee is given an eye examination.

The SBD has an active Alcohol and Drug Abuse Program (ADAP) administered by a director and three coordinators who identify themselves as recovering alcoholics. The program was begun on the SCL in 1966 and on the L&N in 1975. The basis for the program is a strong belief by the SBD management that alcoholism is a treatable disease and that an employee is worth treating. The participants in the program are given every assurance of confidentiality of their participation. The SBD has no authority to require an employee suspected of being intoxicated to submit to either a blood alcohol test or a breathalyzer test. However, an employee accused of violating rule G is removed from service, and he can request a test to exonerate himself if he is innocent. If an employee is suspected of violating rule G, he is withheld from service and is subjected to a formal investigation.

When higher management learns that an employee is being held out of service because he has been accused or found guilty of violating rule G, one of the ADAP coordinators is notified and he contacts the employee immediately. The employee is encouraged to enter the ADAP for treatment. The employee's service record is completely free of the word "alcoholism" if he participates in the program. During the treatment employees are given sick leave. Treatment is given at one of several special

treatment centers, and the company pays all the costs associated with the treatment except for any personal expenses an employee may incur. The treatment cycle at the center runs about 28 days for alcohol but longer for drugs.

The employee unions are supportive of the program and provide assistance to the program administrators and participants. About 40 percent of the program participants come into the program voluntarily for treatment. Twelve percent may be given an option of "take the treatment or lose your job." The other 48 percent enter the program by family referrals, supervisor referrals, and various other reasons not necessarily associated with violations of rule G. At the time of this accident investigation, SBD had about 1,400 active cases in the program. The program has a recovery rate of about 77 percent. The program is publicized to employees through handouts, mailed material, and coordinators making themselves highly visible over the SBD system.

Meteorological information

At 5:30 a.m., c.d.t., on September 14, 1983, it was twilight, and the visibility was good. The temperature at Sullivan was about 60° F, and there was no wind. There had been no rain during the night, and the rails were dry.

Medical and Pathological information

The engineer and head brakeman of Extra 8051 North were X-rayed and examined for injuries at the hospital in Sullivan. The X-rays did not reveal any severe injuries for either man as a result of this accident. The engineer had a laceration on his left ankle and a cervical sprain. The head brakeman had a contusion to his back and right wrist. The back injury caused spasms in his lower back.

The emergency room physician said that when he examined the engineer and head brakeman, he was aware of a strong odor of fuel oil which emanated from each man. However, he also detected a strong odor of alcohol from the engineer. He was not as positive about an odor of alcohol from the head brakeman, but he requested of both men that they allow him to draw a sample of blood so a blood alcohol level (BAL) test could be made. The engineer and head brakeman each refused this request and would not allow a BAL test. Because of the circumstances of the accident, the physician reported his detecting the odor of alcohol on the two patients to the Indiana State Police. The commander of the jurisdictional State police post came to the hospital, and he and an SBD supervisor, who had arrived at the hospital, also requested that the engineer and head brakeman voluntarily submit to a BAL test; again, they each refused. Consequently, the State police officer obtained a search warrant for each man in order to obtain blood for an alcohol analysis. Additionally, a court order was obtained which directed the hospital to provide the blood samples to the State police. When the the engineer and head brakeman were confronted with these legal documents, they allowed the blood samples to be drawn. The blood samples were drawn about 10 a.m. on September 14, 1983. New syringes and needles and a nonalcoholic sterilizing agent were used in drawing the blood samples. The blood samples were given to the State police officer by the hospital. Following the drawing of the blood samples, the engineer and head brakeman were given prescriptions for muscle relaxers and pain, and they were allowed to leave the hospital.

The State police officer had the blood samples, which were kept under refrigeration, flown to the State police laboratory in Indianapolis where the analysis was performed on September 15, 1983. The blood samples indicated a BAL of 0.27 percent for the engineer

and a BAL of 0.04 percent for the head brakeman. The maximum permissible BAL for an individual to operate an automobile in the State of Indiana is 0.10 percent.

The conductor of Extra 8051 North injured his wrist when he was thrown to the floor of the caboose during the accident. The rear brakeman was not injured. The conductor and rear brakeman of Extra 8051 North each requested and were given breathalyzer tests which indicated negative results.

The conductor and rear brakeman of Extra 1751 North were killed instantly as a result of internal injuries received during the collision. Toxicological tests for alcohol on the two men were negative. The engineer and head brakeman were not injured.

Survival Aspects

The chief dispatcher at Evansville notified emergency forces of the accident when he received word from railroad personnel at the scene. Word of the accident was relayed from the scene through an operator at a manned interlocking tower. An ambulance, sheriff's department officers, and state police officers responded promptly from Sullivan.

Because they had no restraining devices to restrict their movement, the conductor and rear brakeman of Extra 8051 North were thrown from their seats in the caboose when the train brakes applied in emergency. The operating compartment of the lead locomotive unit of Extra 8051 North had only minor structural deformation, and the engineer and head brakeman survived the collision with only minor injuries. They were not wearing safety restraining devices, and they were thrown about inside the operating compartment when the locomotive unit overturned. The engineer's left foot was caught and held by a piece of weather stripping between a seat and the outside wall of the operating compartment, and he could not free himself to leave the locomotive. The head brakeman was able to escape from the locomotive operating compartment without assistance, but he apparently was too confused to aid the engineer. He reported seeing fire in or near the lead locomotive unit, but no evidence was ever found to substantiate the existence of a fire. The head brakeman of Extra 1751 North and the rear brakeman of Extra 8051 North freed the engineer when they reached the locomotive.

The rear caboose of Extra 1751 North was destroyed when the fourth car behind the locomotive of Extra 8051 North landed on the caboose's roof during the derailment. The force and weight of the car collapsed the roof of the caboose into the interior and crushed the two crewmembers riding there. The conductor was pinned in his seat, and the rear brakeman was found lying partially on the floor in the caboose and extending to the ground through a separation in the caboose floor.

Tests and Research

Track.--No defects were found in the track at the accident site that could have contributed to the accident. A deposit of sand laid down by the locomotive extending 175 feet south of the point of impact was found on the rails at the primary derailment site indicating that an emergency brake application had occurred.

Locomotive.--The damaged locomotive units of Extra 8051 North were moved to Evansville where they were coupled and connected to form the locomotive that was used for Extra 8051 North on September 13. After the broken piping associated with the airbrake system was repaired, a series of operational tests was performed. The brakes on the locomotive were operationally tested using the same brake control equipment on unit

8051 that was in service at the time of the accident. The locomotive satisfactorily passed a standard airbrake departure test. In addition to the airbrake tests, unit 8051 was tested for a power disconnect which is supposed to occur in the event of an emergency brake application. If operating properly when an emergency brake application occurs, the pneumatic control (PC) switch opens, the generator field (GF) contactor opens to remove the excitation power from the generator field windings, and the throttle response (TR) module reduces the engine speed to idle. This sequence results in a removal of electrical power from the traction motors in all units of the locomotive consist. During the electrical test of unit 8051, the power disconnect sequence occurred correctly.

The documented postaccident positions of the locomotive operating controls cannot be relied upon because too many persons were in and out of the operating compartment after the accident before the control positions were documented. However, the control positions were documented as:

Control	Position
Independent brake valve	Applied
Automatic brake valve	Emergency
Reverser	Forward
Dynamic brake	Off
Double ported cut-out cock	Set for lead position

An inspection of the maintenance records of the locomotive units indicated that the locomotive units had been inspected to comply with the federally required 93-day inspection test--unit 8051 on August 6, 1983; unit 8104 on July 20, 1983; and unit 7003 on August 18, 1983.

Cars.--Of the 124 cars in Extra 8051 North, 100 cars were inspected and tested after the accident for brake performance. The other 24 cars were damaged too extensively to make brake testing possible. Approximately 5 hours after the accident, the 100 undamaged cars were checked to determine which brakes had applied at the time of the accident. Of the 100 cars checked, 79 cars still had the brakes applied (the other cars' brakes had leaked off).

An application brake test was made on the 100 cars using air supplied by a locomotive unit. After a full service application of the brakes was made, the brakes had applied on 98 of the 100 cars. When the control brake valve was placed in emergency, 99 of the 100 cars had operative brakes. The piston travel on all cars was within allowable limits.

Radio.--The radio unit on locomotive unit 8051 was checked by SBD technicians after the accident, and it was found to have good receiving sensitivity and power output, but the modulation was low. The caboose radio was not tested in the shop by the radio technicians, but it was found to be operating acceptably by SBD personnel at the accident scene during operational applications.

Sight distance.--A series of sight distance checks were performed in the accident area beginning at 5 a.m. on September 20, 1983, under the same conditions that prevailed on the day of the accident, or as nearly as they could be duplicated. A caboose similar to L&N No. 6404 and a locomotive unit similar to unit 8051 were used in the tests. After the

first test, which was made approaching the signal at North Sullivan, the caboose was placed at the point of the collision and approach sight tests were made from the locomotive at various locations. The sight distances were measured and recorded. The table below summarizes the sight distance results:

Test No.	Object	Location from which viewed	Distance (feet)
1	Signal, north end Sullivan siding	Test caboose being pushed approaching the signal from the south	6,370
2	Signal, north end Sullivan siding	Test locomotive approaching the signal from the south	6,346
3	Caboose, at point of impact	Test locomotive approaching the caboose from the south	7,550
4	Signal, south end Sullivan siding	Test locomotive approaching the signal from the south	5,838

No buildings, trees, or other obstructions interfered with the line of sight during the sight distance tests. The tests were performed by the SBD and witnessed by investigators from the SBD, the FRA, and the Safety Board.

Signals.--The signal system was tested through the Sullivan area from North Oaktown to a point 8 miles north of Sullivan. The signal circuits were checked by the SBD signal department in the presence of a signal inspector from the FRA. The signals functioned as intended, and the federally required inspections and tests were current.

Computer simulations.--The SBD ran a computer simulation for the operation of train Extra 8051 North between North Oaktown and the point of impact to determine running times if the train had been operated as it should have been, and to determine how the train was operated based on known operational data and actual train movement. The computer was provided with the length of Extra 8051 North, the tonnage, the locomotive power, braking data, and the profile gradient information for the railroad between Oaktown and the point of impact. All of the simulated runs started with the train having cleared the siding at Oaktown and moving 10 mph. In the first simulation the train was operated with the throttle positioned to accommodate the power requirements (modulated control) to operate the train as it should have been operated by a qualified locomotive engineer. The results of the simulations are shown in table 1.

ANALYSIS

General

The crewmembers of each train were qualified for their assigned duties according to SBD rules. However, the head brakeman of Extra 8051 North, who was operating the train at the time of the accident, was neither qualified nor authorized by the SBD to operate the train.

Table 1.--Results of computer simulations of train Extra 8051 North.

Simulation No.	Throttle position	Time elapsed between points indicated	Control action en route	Results of test
1	Variable	NO to NESU: 28 min 2 sec	Train speed controlled en route with dynamic brake. Train stopped at NESU with dynamic brake and a final application of airbrake.	Stopped 500 feet south of home signal at NESU
2	Variable	--	Emergency application of train airbrakes from 35 mph passing NESU	Train stopped in 980 feet
3	8	NO to SESU: 16 min 30 sec SESU to NESU: 2 min 30 sec NESU to POI: 0 min 30 sec Total time--NO to POI: 18 min 30 sec	--	Speed at POI: 51.4 mph
4	5	NO to SESU: 25 min 10 sec SESU to NESU: 4 min 20 sec NESU to POI: 0 min 40 sec Total time--NO to POI: 30 min 10 sec		Speed at POI: 36.6 mph
5	4	NO to SESU: 29 min 40 sec SESU to NESU: 6 min 0 sec NESU to POI: 0 min 45 sec Total time--NO to POI: 36 min 25 sec		Speed at POI: 32.2 mph
6	3	NO to SESU: 41 min 40 sec SESU to NESU: 9 min 0 sec SESU to POI: 0 min 50 sec Total time--NO to POI: 51 min 30 sec		Speed at POI: 28.1 mph

Legend:

NO - North Oaktown
SESU - South end of Sullivan
NESU - North end of Sullivan
POI - Point of Impact

The postaccident signal tests indicated that the last aspect displayed by the absolute signal at South Sullivan before the accident was an approach (yellow) aspect. A proper response to this signal indication would have been for the head brakeman, since he was operating the train, to have reduced the speed of the train to no more than medium speed (30 mph) and to have proceeded prepared to stop at North Sullivan. The last aspect displayed by the absolute signal at North Sullivan, as determined by the postaccident tests, was stop (red). In order for the head brakeman to have operated the train past the absolute stop signal, special authority would have been required from the train dispatcher. Such authority was neither requested nor granted. The head brakeman should have stopped the train in approach to this signal, but he did not.

The results of the sight and distance tests indicated that there were no obstructions to the viewing of the signal aspects approaching Sullivan. If the head brakeman had been alert approaching Sullivan, had been qualified to operate a locomotive, and had been experienced in train handling, he should not have had difficulty in properly controlling the speed and movement of Extra 8051 North.

The results of the mechanical tests indicated that the train brakes operated properly and the train could have been stopped if an attempt had been made to stop it following a normal operating procedure. No defects were found in the track at the accident site.

In summary, the results of all tests indicated that the failure of the train to be stopped was not the fault of the signal system, the train's mechanical condition, the track, the radio, or a lack of sight distance.

Train Operation

The head brakeman of Extra 8051 North admitted that, although he was not a qualified engineer, he had operated trains before on a branch line where the maximum authorized speed was 10 mph. The engineer of Extra 8051 North acknowledged that the head brakeman had operated a locomotive under his supervision in the past. SBD operating rule No. 1010 prohibits an unqualified and unauthorized person from operating a locomotive (train). It is primarily the engineer's responsibility to insure that this rule is not violated, but all employees are charged with the responsibility to obey this and all other company operating rules. Therefore, the engineer and head brakeman should have been fully aware that an operating rule was being violated. Neither the conductor nor the rear brakeman had any idea that the control of the locomotive had been delegated by the engineer to the head brakeman at Oaktown.

Nevertheless, the head brakeman agreed to and operated the locomotive from Oaktown to Sullivan over undulating terrain. The undulating terrain requires that the operator have some train handling skill to prevent damaging slack action in the train. Neither crewmember on the caboose complained about a rough ride, and the speed of the train also was maintained within acceptable limits according to the conductor. Since the engineer was qualified on the region and knew the characteristics of the railroad, he must have had knowledge of the head brakeman's ability to operate a locomotive and had a measure of confidence in him. Therefore, it is reasonable to conclude that the head brakeman had some experience in train handling.

In its report of an accident on the L&N at New Johnsonville, Tennessee, on December 28, 1981, 8/ the Safety Board addressed the matter of a head brakeman operating a train instead of the assigned engineer. On September 15, 1982, the Safety Board recommended that the L&N,

> Determine if unqualified employees are operating locomotives with or without cars. If so, initiate corrective action so that Louisville and Nashville employees will be in conformance with the company operating rule that requires a qualified locomotive engineer to be present in the operating compartment of the locomotive while the train is in operation. (R-82-99)

On November 1, 1982, the L&N responded, in summary, that it was intensifying efforts to insure compliance by employees with the rule prohibiting unqualified personnel from operating a locomotive. On May 4, 1983, the Safety Board classified Safety Recommendation R-82-99 as "Closed, Acceptable Action." The Sullivan accident demonstrates that the L&N and its successor company, the SBD, have been unsuccessful in eliminating unauthorized operation of trains. The Safety Board realizes that unless enginecrews cooperate fully, it is difficult to secure full obedience to the rule prohibiting unauthorized personnel from operating a locomotive, but the Safety Board urges the SBD to emphasize the importance of rules compliance in all aspects of train operations.

Computer simulation No. 1 (see table 1) indicates that an acceptable running time for a train such as Extra 8051 North between Oaktown and North Sullivan is about 26 minutes when the train is operated by a skilled engineer. This running time includes the engineer's complying with the speed requirements imposed by the approach medium signal aspects displayed by signal 207.0 and the signal at the ICG crossing; the approach aspect displayed by the absolute signal at South Sullivan; and the stop aspect displayed by the absolute signal at North Sullivan for which a controlled stop was made.

Computer simulation No. 2 indicates that the train could have been stopped from a speed of about 35 mph before it struck the rear of Extra 8051 North if the brakes had been applied in emergency at North Sullivan. In fact, the train could have been stopped or slowed even after the locomotive of Extra 8051 North passed a considerable distance beyond North Sullivan because of the almost 2,000 feet between the track switch at North Sullivan and the point of impact. At worst, only a hard coupling between the two trains would have resulted under this circumstance.

If the head brakeman had maintained the throttle constantly in the No. 8 position between North Oaktown and Sullivan, as shown in computer simulation No. 3, the speed of the train would have been excessive. The 18 minutes 30 seconds consumed between those points in the simulation is much less than the 36 minutes 30 seconds actually consumed by Extra 8051 North.

Computer simulation No. 4, which was based on the throttle of the train being in position No. 5, shows a transit time too fast compared to the actual time of Extra 8051 North, although the simulated train's speed is close to the estimated impact speed of 35 mph.

8/ Railroad Accident Report--"Rear-End Collision of Louisville and Nashville Railroad Company Trains No. 586 and Extra 8072 North, New Johnsonville, Tennessee, December 28, 1981" (NTSB-RAR-82-4).

Computer simulation No. 5 more nearly duplicates the actual movement of Extra 8051 North when comparing the total transit time, the time consumed between North and South Sullivan, and the estimated speed at impact. Since speed and time are factors in this simulation, it is unlikely that the head brakeman maintained a throttle position of No. 5. Therefore, he must have modulated the throttle similar to the procedure followed in simulation No. 1. Although the throttle was found in the No. 8 position after the accident, it is unlikely that this was the continuous operating position used by the head brakeman between North Oaktown and Sullivan. It is possible that he moved the throttle to the No. 8 position just before he stopped being alert.

Computer simulation No. 6 consumes too much transit time to be considered as a possible explanation of the train's operation. The time consumed between North Oaktown and Sullivan on all the simulated runs from which speeds could be calculated would be at average speeds. The speed of Extra 8051 North could have varied considerably en route. However, the conductor did not take exception to the train's speed as being excessively fast or slow.

Train Movements

The control of train movements by the train dispatcher is an important and demanding task. The dispatcher must constantly plan train movements ahead and be able to compensate for unexpected developments. The movement of a train under a CTC system is authorized by block signal aspects whose indications supersede the superiority of trains for both opposing and following movements on the same track. The train dispatcher decides the order of train movement. When the dispatcher routed Extra 8051 North onto the siding at Oaktown, it was a proper move because the progress of trains Extra 1751 North and No. 722 were being delayed by Extra 8051 North. After the passage of Extra 1751 North and No. 722, there was no reason for the dispatcher to hold Extra 8051 North at Oaktown. Therefore, properly, he allowed the train to proceed northward.

Similarly, because train No. 722 was authorized to operate at a higher speed than Extra 1751 North, it was a good operating move for the dispatcher to allow train No. 722 to pass Extra 1751 North at Sullivan. There was no operational reason for the dispatcher to hold Extra 8051 North at South Sullivan until Extra 1751 North moved onto the main track at North Sullivan. Since engineers are expected to control the movement of their trains in accordance with the aspects of wayside signals, the dispatcher had every reason to expect that the engineer of Extra 8051 North would operate his train in accordance with the observed signal aspects. If the dispatcher had held Extra 8051 North at South Sullivan until Extra 1751 North cleared at North Sullivan, it would have resulted in unnecessary delay to that train, assuming the enginecrew had been alert.

The signal at the ICG crossing south of Sullivan and intermediate wayside signal 207.0 each displayed an approach medium signal aspect because the signal for the main track at North Sullivan was displaying a stop aspect after the passage of train No. 722. These aspects should have forewarned the head brakeman of Extra 8051 North to expect an approach aspect to be displayed by the signal at South Sullivan and a stop aspect to be displayed by the signal at North Sullivan. The head brakeman did not respond to these two signals as evidenced by his passing the approach aspect displayed by the signal at South Sullivan without reducing the speed of the train to the 30-mph medium speed and preparing to stop at the next signal as required by operating rule No. 286. (See appendix C.)

The engineer of Extra 8051 North admittedly went to sleep at Oaktown, and he had no recollection of events between Oaktown and Sullivan. The head brakeman does not remember whether he assumed control of the locomotive/train in the siding or after the train left the siding at Oaktown. However, based on the engineer's statement about his remembrance of events at Oaktown, and the head brakeman's statement about receiving a signal to depart Oaktown and observing the aspect of signal 214.6 as clear, he probably assumed control of the locomotive while the train was in the siding. Additionally, the head brakeman does not remember exactly what occurred after he observed the signal aspect of signal 214.6 north of Oaktown until just before the collision. This memory loss could be attributed to either his having fallen asleep, trauma because of the accident, or the effects of alcohol. He apparently operated the train between Oaktown and the vicinity of the ICG crossing south of Sullivan satisfactorily to all those involved with the movement of the train, which is indicative of his being awake. Most probably he lost full awareness somewhere before the train approached signal 207.0, which was displaying an approach medium aspect. It is reasonable to assume that if he had recognized an approach medium signal aspect, it would have triggered a response. If he became aware of his surroundings at the time he said, i.e., just before the collision, he could have reacted and applied the train's airbrakes in emergency. It takes several seconds for the train brakes to apply and become effective after the application of brakes is initiated. The deposit of sand found on the rails is proof that an emergency brake application occurred.

The train line anglecock on the lead locomotive unit of Extra 8051 North was broken off. This must have occurred upon impact with the caboose of Extra 1751 North. This breakage would have caused an emergency brake application. When the train's airbrakes are placed into emergency from any source, sand is automatically applied to the rails. Sand was distributed for 175 feet south of the point of impact as the result of an emergency airbrake application. The span between sandpipe applicators located at the extreme ends of the locomotive is approximately 195 feet, which indicates that the locomotive moved about 20 feet past the point of impact after the sand began to apply. This fact indicates that the emergency brake application was initiated by the broken anglecock, and that even if the head brakeman made the emergency application, it was too late to be effective. Also, sand should have appeared ahead of the point of impact if the head brakeman had initiated the emergency brake application.

Alcohol Involvement

The engineer of Extra 8051 North had about 11 drinks between 11 a.m. and 4:50 p.m. on September 13. Based on the bartenders' statements about the times these drinks were served and the amount of vodka in the drinks, the Safety Board calculates that the engineer's BAL would have been only about 0.005 percent at 10:30 p.m. when he reported for work, assuming he did not consume any more alcohol between 4:50 p.m. and 10:30 p.m. The engineer contends that he did not drink any alcohol after 4:50 p.m.

However, the blood sample drawn from the engineer about 10 a.m. on September 14, 4 1/2 hours after the accident, revealed that the engineer's BAL was 0.27 percent. Using a metabolic rate of 0.015 percent per hour, 9/ the Safety Board calculates that the engineer's BAL would have been 0.33 percent at the time of the accident. Assuming that the engineer had a 0.005 percent BAL at 10:30 p.m. when he reported for work, he would have had to consume 18 ounces of an 80-proof alcoholic drink in the 6 1/2 hours between his reporting for duty and his going to sleep at Oaktown.

9/ Metabolic rate used by the National Safety Council.

Although the engineer denied having consumed any alcoholic beverages while he was on the job, the BAL results refute this, and it appears that the vodka bottle found in the wreckage of locomotive unit 8051 must have been the source of the alcohol found in the blood sample. Since the inbound engineer from Nashville and the yard engineer at Howell Yard did not see a bottle in the operating compartment of locomotive unit 8051 before or at that point, either the engineer or head brakeman must have brought it on board. There were no businesses along the railroad at points where the train stopped where alcohol could have been purchased. It cannot be ruled out that the vodka bottle may have been placed in the locomotive operating compartment after the accident. However, this is not likely. If the engineer did not bring any alcoholic beverages on board with him and he did not drink on duty, his BAL at 10:30 p.m. when he reported for duty would have been exorbitantly high and at a comatose level. (See appendix D.) When the engineer reported for work on September 13, he gave no indications from his demeanor that he had been drinking. Therefore, the Safety Board concludes that the engineer of Extra 8051 North consumed alcohol while on duty.

Although he admitted to Federal investigators that he considered himself to be an alcoholic, the engineer of Extra 8051 North had never sought professional assistance, and none of his railroad coworkers and supervisors who were contacted by Safety Board investigators acknowledged that they knew he had an alcohol problem. According to testimony of his coworkers about the engineer's use of alcohol, he either did not come to work under the influence of alcohol or he could control his mannerisms and actions to appear natural, as some alcoholics learn to do. The physician who examined the engineer at the hospital after the accident testified at a Safety Board deposition proceeding that a chronic alcoholic has some unique capabilities. It is possible that a chronic drinker might, for example, have a 0.2 percent BAL and function as if he had a "zero" percent BAL. Through sheer determination he can deceive his associates and act normal. Also, unless the liver is damaged, the digestive system of such an individual can metabolize alcohol at a faster rate than the accepted 0.015 percent per hour.

Vodka is one of the most difficult of the alcoholic beverages to detect by smell because it is almost unaltered alcohol. Consequently, it is difficult for a casual observer to detect vodka on the breath of a person who has consumed a small quantity of the beverage. Therefore, it is understandable why the conductor of Extra 8051 North and other crewmembers may not have detected traces of alcohol on the engineer's breath if he did come to work under the influence of alcohol. On the other hand, the physician who examined the two men in the hospital emergency room and the State police officer had been alerted to the presence of alcohol, and they did detect the odor of alcohol on the engineer and head brakeman. Based on their BAL's, these crewmembers had consumed a substantial quantity of alcohol before the accident. This fact also may have contributed to the ability of the doctor and police officer to detect alcohol on the two men. There was no way of determining either the type or quantity of the contents remaining in the vodka bottle at the time it was broken.

The two drinks the head brakeman said he drank before he ate supper on September 13 would have been inconsequential by 10:30 p.m. if he had nothing to drink afterward. At 10:30 p.m. when he reported to work, his BAL would have been zero percent. Since his BAL 4 1/2 hours after the accident was determined to be 0.04 percent, it would have been 0.11 percent at the time of the accident, assuming the 0.015 percent per hour metabolic rate. To have had a BAL of 0.11 percent, the head brakeman would have had to consume 8 ounces of an 80-proof alcoholic beverage between Howell Yard and the point of the collision.

Based on their projected consumption as calculated from their BAL, the engineer and head brakeman would have consumed about 26 ounces of vodka from the 59.2-ounce bottle or nearly one-half bottle. In all probability, both men were drinking after departing By-Pass Junction at 12:05 a.m. on September 14, where they picked up cars. However, the effects of the alcohol consumption eventually caused the engineer to relinquish operation of the locomotive to the head brakeman and fall asleep at approximately 4:16 a.m. The head brakeman apparently also was asleep for a period between 4:46 a.m. and 5:37 a.m. when the accident occurred. At that time, the head brakeman had been on duty more than 6 hours. A study of the work schedules of train operators indicated that the most difficult time for a person to remain alert was between 4 a.m. and 5 a.m. 10/ Experience on the job (train operation) was irrelevant and all train operators in the study admitted to dozing while operating a train.

The Safety Board has been active in efforts to bring about some measure of control over the use of alcohol and drugs in the railroad industry. Of paramount concern to the Safety Board is the protection of the public and railroad employees who are placed in life-threatening situations by some railroad employees who are under the influence of alcohol and/or drugs. As a result of its investigations of accidents involving alcohol and/or drugs, 11/ the Safety Board has issued the following Safety Recommendations:

to the Federal Railroad Administration--

Immediately promulgate a specific regulation with appropriate penalties prohibiting the use of alcohol and drugs by employees for a specified period before reporting for duty and while on duty. (R-83-30)

With the assistance of the Association of American Railroads and the Railway Labor Executives Association, develop and promulgate effective procedures to ensure that timely toxicological tests are performed on all employees responsible for the operation of the train after a railroad accident which involves a fatality, a passenger train, releases of hazardous materials, an injury, or substantial property damage. (R-83-31)

With the assistance of the Association of American Railroads and the Railway Labor Executives Association, develop and promulgate a requirement that alcohol/drug abuse involvement accident/incidents be fully reported to the FRA. (R-83-32)

10/ "The Sleep of Train Drivers: An example of the effects of irregular work schedules on sleep," J. Foret and G. Lantin. In W. P. Colquhoun, Aspects of human efficiency. London: English Universities Press, 1972. pp. 217-228.

11/ Railroad Accident Reports--"Fire Onboard Amtrak Passenger Train No. 11, Coast Starlight, Gibson, California, June 23, 1982" (NTSB/RAR-83/03); "Derailment of Illinois Central Gulf Railroad Freight Train Extra 9629 East (GS-2-28) and Release of Hazardous Materials, Livingston, Louisiana, September 28, 1982" (NTSB/RAR-83/05); "Side Collision of Two Missouri Pacific Railroad Company Freight Trains at Glaise Junction, Near Possum Grape, Arkansas, October 3, 1982" (NTSB/RAR-83/06).

to the Association of American Railroads (AAR)--

In conjunction with the Railway Labor Executives Association, assist the Federal Railroad Administration in developing a requirement that timely toxicological tests are performed on all operating employees involved in a railroad accident which involves a fatality, a passenger train, releases of hazardous materials, an injury, or substantial property damage. (R-83-28)

In conjunction with the Railway Labor Executives Association, assist the Federal Railroad Administration in developing regulations and procedures to require that alcohol/drug involvement related accidents/incidents be fully reported to the FRA so that a data base can be developed for devising and implementing effective safety countermeasures to eliminate or minimize accidents involving alcohol/drug abuse. (R-83-29)

to the Brotherhood of Locomotive Engineers (BLE)--

Establish a union policy condemning the use of alcohol and drugs by union members before reporting and while on duty. Develop and implement an active campaign to this end directed to all members. (R-83-54)

to the United Transportation Union (UTU)--

Establish a union policy condemning the use of alcohol and drugs by union members before reporting and while on duty. Develop and implement an active campaign to this end directed to all members. (R-83-56)

Actively support the development and implementation of more meaningful alcohol abuse rules and procedures to curb use of alcohol by railroad operating employees during a specific period before they report for duty and while they are on duty. (R-83-38)

to the Railway Labor Executives Association (RLEA)--

In conjunction with the Association of American Railroads, assist the Federal Railroad Administration in developing a requirement that timely toxicological tests are performed on all operating employees involved in a railroad accident which involves a fatality, passenger train, releases of hazardous materials, an injury, or substantial property damage. (R-83-33)

In conjunction with the Association of American Railroads, assist the Federal Railroad Administration in developing regulations and procedures to require that alcohol/drug involvement related accident/incidents be fully reported to the FRA so that a data base can be developed for devising and implementing effective safety countermeasures to eliminate or minimize accidents involving alcohol/drug abuse. (R-83-34)

In responding to Safety Board recommendations concerning a regulatory approach to curbing the abusive use of alcohol and drugs in the railroad industry, the FRA has expressed a desire and preference to trying a voluntary program approach to dealing with the alcohol/drug problem. The FRA and the rail labor unions have maintained consistently that the Federal government cannot regulate successfully the use of alcohol by railroad employees. However, the FRA did not rule out the development and promulgation of Federal regulations if the voluntary approach is unsuccessful in accomplishing the desired results.

On July 5, 1983, the FRA issued an Advance Notice of Proposed Rule Making (ANPRM) to seek methods to address the alcohol and drug use problem on the railroads. As part of the effort to reach a solution, public hearings were held at several locations throughout the United States during the summer of 1983. At the time of this report, the FRA has not completed any further rulemaking action as a result of the ANPRM or the public hearings, and no formal solutions have been proposed by the FRA concerning the Safety Board's Safety Recommendations R-83-30 through -32.

On November 14 and 15, 1983, following the FRA public hearings, a National Planning Committee on Voluntary Alcohol and Drug Abuse Programs composed of about 44 representatives of railroad management, the FRA, and labor unions was convened in an endeavor to arrive at a voluntary solution to the alcohol/drug use problem. This effort was aimed at developing education and awareness programs and was separate from and not in conjunction with the FRA's continuing rulemaking process. The conference organized a planning committee, steering committee, and working group. During the November meeting, attendees identified three areas on which the planning committee might focus: enhanced prevention efforts directed toward employees who are not addicted to alcohol or other drugs; collection and dissemination of information on existing prevention and rehabilitation programs; and alcohol and drug awareness training for supervisors, labor officials, and the general workforce. The attendees also identified such issues as improved program evaluation techniques and a review of discipline procedures. The committee held a second meeting in December 1983 at which time subcommittees were organized and began work.

One reason that the alcohol/drug problem has not been recognized in its true dimension is because of inaccurate statistics. For example, the FRA data for the period 1975-1982 show that only 11 of 63,000 reported accidents were said to be related to alcohol/drug abuse. 12/ These statistics are based on carrier-reported accident data, and it is seldom that a carrier attributes cause to the use of alcohol. The Safety Board believes that one circumstance that causes invalid statistical data on alcohol/drug-related accidents is the fact that toxicological tests are made only on employees who do not survive an accident. In this accident the State police officer was persistent in an attempt to have toxicological tests performed on the surviving as well as the deceased crewmembers. However, the tests were made only after the issuance of a court order and a search warrant obtained by the State police. It is clear that without the results of these toxicological tests, the degree of involvement of alcohol in this accident might have gone undetected or could not have been substantiated.

The Safety Board has recognized that a timely toxicological test is essential when investigators are attempting to reconstruct the sequence of events leading to an accident, and for the Safety Board and others to determine the probable cause of the accident. If

12/ Modern Railroads, January 1984, p. 51.

crewmembers are faced with the possibility of such a test, it may be a deterrent to the use of alcohol immediately before and while on duty. These factors led to the Board's issuance of Safety Recommendation R-83-31 to the FRA.

On March 11, 1983, the AAR responded to Safety Recommendations R-83-28 and -29 and, in essence, provided a summary of the activities within the railroad industry dealing with the problem of alcohol abuse. One of the AAR's proposed solutions to the alcohol problem has been to recommend to the FRA a certification procedure modeled after the program in effect on the Southern Pacific Transportation Company (SP). 13/ The program requires that the conductor certify that he has observed that his fellow crewmembers are not under the influence of alcohol when they report for duty. However, as commendable as the SP's effort is, the program reportedly is not as successful as desired because of peer pressure.

The Safety Board is aware of the employee assistance programs (EAP) underway in the railroad industry, and the sponsors of the programs are to be commended. The program in effect on the SBD represents a commendable effort on the SBD's part to deal with the alcohol problem. Despite this effort the program is voluntary, and it can only help those who wish to be helped. The engineer of Extra 3051 North knew of the SBD's alcohol and drug abuse program, and yet he did not volunteer to participate in it.

Although the BLE, the UTU, and the BLEA have not responded to the Safety Board's recommendations, the Board has learned that the BLE is working with railroad management on three approaches to curb the use of alcohol by its members. The BLE proposes to use an EAP, a peer referral program, and a rule G bypass agreement. The basic premise of the rule G bypass agreement is to provide a means for employees to obtain assistance for alcoholism without being penalized for violating the requirements of operating rule G. Under the provisions of a bypass agreement, employees can seek assistance through an EAP by referral of another employee or by voluntarily revealing their problem and seeking help. The bypass agreement does not insure that employees are given one "gratuitous" or nonpunitive rule G conviction before they lose their jobs. The company reserves the prerogative to discharge rule G violators, to give employees a chance to redeem themselves by entering the EAP for correction of the problem, or to reinstate employees after they have received treatment and demonstrated that they are recovering from alcoholism. The provisions of a rule G bypass agreement are negotiable between management and labor, and the agreements will vary from company to company.

The Safety Board continues to believe that a more positive, realistic, and enforceable approach to the alcohol/drug use problem is needed. A number of selfhelp programs have been in effect for several years, but the problem of alcohol and drug use continues. The Board concludes that the existing EAP's by themselves have not accomplished the task. For example, SBD employees told Safety Board investigators "off the record" that alcohol use was a problem on the Evansville Division of the SBD. However, when these employees were questioned about this problem under oath, no one said they were aware of any problem with alcohol. The SBD's EAP program, which originally began on the SCL in 1936, was not effective in this case since the engineer had not availed himself of the opportunity to enter the program.

13/ Modern Railroads, January 1984, p. 50.

Further, relying solely on fellow employees to turn in coworkers who are either drunk, drinking, or ineffective on the job because of drinking will not be fully successful. The failure of employees to report rule G violations probably accounts for the inaccurate statistical data regarding railroad accidents involving alcohol and drug use referred to earlier. The BLE is against the imposition of government regulations to deal with the control of abusive use of alcohol and drugs. The organization also supports the finding by the National Railroad Adjustment Board that testing of employees before and/or after a tour of duty for the presence of alcohol is a matter to be decided through collective bargaining. Two position statements issued by the BLE (see appendix E), though not a joint position by rail labor, typifies rail labor's approach to dealing with the alcohol/drug abuse problems.

A consensus from railroad industry groups indicates opposition to Federal legislation and enforcement programs to prevent employees from working while under the effects of alcohol or drugs. There is a resurgence of activity in the railroad industry regarding the alcohol/drug use problem in an effort to address the problem without Federal regulations. The formation of the National Planning Committee on Voluntary Alcohol and Drug Abuse Programs as a result of the November 1983 conference is another indication that railroad labor and management are trying to solve the alcohol and drug abuse problem by mutually agreeable voluntary means. The Safety Board is also aware that oftentimes committees and studies create a diversionary situation and delay corrective action to a problem. While the committee deals with the problem, the safety problem of preventing railroad employees from working when their ability is impaired by alcohol or drugs continues. The Safety Board will watch this closely. At this time, the Safety Board is not issuing any new recommendations directed toward a federally regulated alcohol and drug abuse program; however, the Board reiterates Safety Recommendations R-83-30 through -32, and encourages the FRA to review its position on the issue of Federal involvement.

Perhaps the establishment of new EAP's and renewed efforts by rail labor and management to make EAP's successful will eliminate or reduce problems related to alcohol and drug use in the railroad industry. The Safety Board urges the FRA and all other concerned groups to work closely with the National Planning Committee on Voluntary Alcohol and Drug Abuse Programs to come forward with a workable program as quickly as possible to curb the abusive use of alcohol and drugs by railroad employees while on duty. The results of the public hearings and the joint conference of November 14, 1983, should provide valuable insight into a workable solution.

Off-Duty Abstinence

The SBD has, in part, charged the engineer and head brakeman of Extra 8051 North with violating company rule G. This charge stems from that part of rule G reading. The use of intoxicants by an employee subject to duty . . . is prohibited." Employees in engine and train service 14/ have an off-duty status with separate interpretations. If an employee requests to be off duty for a period of time, he or she is not subject to or available for an assignment. In the other application, when an employee completes an assignment, he or she is relieved of that particular duty, but after 8 hours of "rest" is eligible for recall to duty and a new assignment. According to the Federal Hours of Service Law, an assignment can last up to 12 hours. When the employee is in the 8-hour rest category, according to an interpretation of rule G by an SBD supervisor, the employee is considered to be subject to duty and thus falls under the scope of rule G. Therefore, the employee should not consume alcoholic beverages during this time.

14/ Train service employees include conductors and brakemen. Engine service employees include firemen and engineers.

This is a difficult situation for any railroad employee who never really knows when he or she will be called for a tour of duty. Even though an employee is eligible to receive an assignment after 8 hours, the call for an assignment may not be received for a period far in excess of 8 hours. Employees who have regularly assigned positions can usually estimate with a fair degree of accuracy when they will be called for duty. However, extraboard employees who have no regular assignment have a much more difficult time determining when they may be called for duty. For both the regularly assigned and extraboard employees their estimated calls for duty could be drastically changed because of unexpected events occurring in train operations. Therein lies the problem. There has been no solution to correlate the drinking of alcoholic beverages with the requirement of rule G. Neither the railroads collectively nor the FRA have been specific in establishing a defined period of abstinence from alcoholic beverages before an employee reports for duty. Following a literal interpretation of rule G, unless an employee has asked to be off a period of time, he or she is not to drink alcoholic beverages. The Safety Board believes that this requirement needs to be dealt with in the industry's development of an alcohol/drug abuse program. Operating employees normally receive a call to report for duty 1 1/2 to 2 hours before they go on duty. Perhaps a preduty call of 4 to 6 hours would be suitable. If an employee were called in less time, which would be the railroad's option, and the employee had been drinking, he or she could be bypassed according to terms specified in a rule G bypass agreement, without disciplinary action.

The Safety Board has expressed concern before as a result of postaccident investigations about the lack of supervision for crewmembers when they report for or complete a tour of duty. 15/ The Board believes that a procedure for verifying a crewmember's capability of performing all facets of his or her job safely will reduce the risk of a crewmember reporting for duty under the influence of alcohol or drugs. If crewmembers know that their sobriety or stability will be scrutinized when they complete a tour of duty, it should provide an incentive for them to refrain from alcohol or drug use while on duty. While it is questionable how effective an examination of the enginecrew of Extra 8051 North might have been at Evansville, their condition most certainly would have been discernible at Danville when they completed their tour of duty. If they had expected their condition to be examined at Danville, they might have abstained from the alcoholic beverage.

On February 14, 1980, the Safety Board recommended that the Southern Pacific Transportation Company:

> Establish supervisory procedures at crew-change terminals to ensure that operating department employees coming on duty are capable of complying with all pertinent operating rules. (R-80-4) 16/

A similar recommendation (R-81-38) was made to the Norfolk and Western Railway Company (N&W) on March 4, 1981. 17/ The SP responded in a letter dated January 22,

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15/ Railroad Accident Reports: "Rear-End Collision of Southern Pacific Transportation Company Freight Trains 02-HOLAT-21 and 01-BSMFK-20, Thousand Palms, California, July 24, 1979" (NTSB-RAR-80-1); "Side Collision of Norfolk and Western Railway Company Train No. 86 with Extra 1589 West, near Welch, West Virginia, September 6, 1980" (NTSB-RAR-81-2).

16/ Railroad Accident Report--"Rear End Collision of Southern Pacific Transportation Company Freight Trains 02-HOLAT-21 and 01-BSMFK-20, Thousand Palms, California, July 24, 1979" (NTSB-RAR-80-1).

17/ Railroad Accident Report--"Side Collision of Norfolk and Western Railway Company's Train No. 86 With Extra 1589 West, near Welch, West Virginia, September 6, 1980" (NTSB-RAR-81-2).

1982, that it had increased its officer force and programs at away-from-home terminals to observe operating personnel compliance with operating rules and their physical condition before assuming duty. On May 26, 1982, the Safety Board classified Safety Recommendation R-80-4 as "Closed--Acceptable Action." In a letter dated February 16, 1983, the N&W disagreed with the implementation of Safety Recommendation R-81-38, and the Safety Board has placed that recommendation in a "Closed--Unacceptable Action" status.

Operational Aids

Had a procedure been in effect which required the engineer to radio the five wayside signal aspects between North Oaktown and North Sullivan to the conductor, the conductor might have been alerted to the inattentiveness of the engine crew and been able to take preventive action. On September 10, 1976, the Safety Board recommended that the FRA,

> Promulgate rules to require engine crews to communicate fixed signal aspects to conductors while trains are en route on signalized track. (R-76-50) 18/

On May 13, 1977, the FRA replied that "in keeping train crews alert, a diligent carrier conducted rules instruction and testing program on operating rules would be a great deal more effective than would be federally promulgated rules of the type recommended in R-76-50." The Safety Board reiterated this recommendation on April 7, 1981, following its investigation of an accident at Hermosa, Wyoming. 19/

After investigating the accident at New Johnsonville, Tennessee, on the L&N, 20/ the Safety Board recommended that the L&N (The Family Lines System):

> Require an engineer to radio the aspects displayed by all the wayside automatic and interlocking home signals affecting movement of the train to the conductor, and have the conductor acknowledge the aspect called. (R-82-100)

The L&N's response to Safety Recommendation R-82-100 indicated that it was opposed to this practice and said that, if this procedure were put into effect, it would require additional training of employees to insure compliance; that there was a danger that the crew of one train might act erroneously on information intended for the crew of another train; that the requirement would tax the radio system and perhaps block transmission of an urgent message; and that the L&N management believed that operating rule No. 34 requiring locomotive crewmembers to call signal aspects to others in the operating compartment was adequate. (See appendix C.) Despite the position expressed by the L&N, the former Clinchfield Railroad Company, which like the L&N is now part of the SBD, practices this procedure. It appears that there are conflicting practices within

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18/ Railroad Accident Report--"Head-on Collision of Two Penn Central Transportation Company Freight Trains near Pettisville, Ohio, February 4, 1976" (NTSB-RAR-76-10).
19/ Railroad Accident Report--"Rear-End Collision of Union Pacific Railroad Company Freight Trains, near Hermosa, Wyoming, October 16, 1980" (NTSB-RAR-81-3).
20/ Railroad Accident Report--"Rear-End Collision of Louisville and Nashville Railroad Company Trains No. 586 and Extra 8072 North, New Johnsonville, Tennessee, December 28, 1981" (NTSB-RAR-82-4).

the SBD system. Additionally, the Chessie System, now part of the Chessie Seaboard Exchange (CSX) and with which the SBD is affiliated, has adopted the procedure of the enginecrew calling a signal aspect to the rear crew, over the former Baltimore and Ohio Railroad Company. 21/

In addition to the issuance of Safety Recommendations R-76-50 to the FRA and R-82-100 to the L&N, similar recommendations have been issued:

to the Union Pacific Railroad (UP)--

> Establish rules and procedures which require enginecrews to communicate fixed signal aspects to conductors while trains are en route on signalized track. (R-81-41)

to the Association of American Railroads (AAR)--

> Encourage member railroads to establish rules that require enginecrews to communicate fixed signal aspects to conductors while trains are en route on signalized track. (R-81-48)

to the Missouri Pacific Railroad (MP)--

> Establish rules to require enginecrews to communicate fixed signal aspects to conductors while trains are en route on signalized track. (R-83-57)

None of the recommendation recipients has concurred in the recommendations. The Safety Board maintains its position that such a requirement would enable the conductor to better monitor the performance of the enginecrew and consequently the handling of the train. Likewise, it would serve to keep the rear crew alert. After exchanges of correspondence, the Board decided that future dialogue on this subject would not convince the recipients of the foregoing recommendations that the Board's position has merit. Consequently, the Board placed Safety Recommendations R-82-100 and R-81-48 in a "Closed—Unacceptable Action" status on February 21, 1984, and December 30, 1982, respectively. Safety Recommendations R-81-41 and R-83-57 are being held in an open status, pending further response from the respective recipients. On April 30, 1984, the FRA responded to Safety Recommendation R-76-50. Based on the response, it does not appear that the FRA will take action to fulfill the intent of the recommendation.

Therefore, as a result of its investigation of this accident, and based on a firm belief in the merit of the recommendations addressing the passing of wayside signal aspects from the head-end crew to the rear-end crew, the Safety Board will reissue the procedures outlined in the foregoing recommendations in new recommendations to the FRA, the AAR, and the SBD. The recommendation to the FRA will supersede Safety Recommendation R-76-50, which will be placed in a "Closed—Superseded" status. Copies of the new recommendations will be sent to the UP and the MP to encourage those railroads to react favorably to Safety Recommendations R-81-41 and R-83-57.

21/ Railroad Accident Report--"Head-on Collision Between Baltimore & Ohio Railroad Company Train No. 88 and the Brunswick Helper, near Germantown, Maryland, February 9, 1981" (NTSB-RAR-81-6).

Another measure that is available but not used on the SBD and a number of other railroads to prevent accidents is the deadman safety control and/or an alerting device. Historically, both of these devices have been abused and defeated by employees, and since they are not federally required, they are being removed from locomotives. However, the Safety Board believes that through a concerted effort by the railroad and supply industries, a functional, tamper-proof device can be developed. Following the investigation of an accident at Herndon, Pennsylvania, in 1972, 22/ the Safety Board recommended that the FRA:

> In cooperation with the Association of American Railroads, develop a fail-safe device to stop a train in the event that the engineer becomes incapacitated by sickness or death, or falls asleep. Regulations should be promulgated to require installation, use, and maintenance of such device. (R-73-8)

This recommendation was reiterated following the investigation of accidents at Indio, California, on June 25, 1973, and at Pacific Junction, Iowa, in 1983. 23/ On April 30, 1984, the FRA responded to Safety Recommendation R-73-8 which is being carried by the Safety Board in an "Open--Unacceptable Action" status. The Safety Board will classify this recommendation as "Closed—Superseded" as a result of a new recommendation being issued as a result of this investigation.

Survival Aspects

The locomotive operating compartment of Extra 8051 North was not deformed in the accident. The primary hazard to the engineer and head brakeman was their being thrown about because the unit was not equipped with restraining devices for occupants to use. The caboose in which the two rear crewmembers of Extra 8051 North were riding was not damaged. The conductor would not have been thrown from his seat and injured if restraining devices had been available and he had been using one. Seatbelts and shoulder harnesses could be effective in preventing crewmembers from being injured in locomotive operating compartments and cabooses.

The possibility of personnel being thrown forward in a caboose exists at any time from an impact, slack action, or an emergency brake application even when there is no derailment or accident. The danger to crewmembers of being thrown from their seats while riding in the caboose has increased in recent years because of the growing tendency of railroad management to run longer trains. There is approximately 1 foot of slack for each freight car in a train and some newer cushioned underframe freight cars yield more slack. This slack can produce a violent snap through a 150-car train. Slack action is reactive in both directions through a train so the enginecrew is also susceptible to injury from this source. Moreover, if either the locomotive or caboose overturns, a restraining device such as a seatbelt and shoulder harness could afford protection for operating personnel.

22/ Railroad Accident Report—"Head-on Collision of Two Penn Central Freight Trains at Herndon, Pennsylvania, March 12, 1972" (NTSB-RAR-73-3).

23/ Railroad Accident Reports--"Rear-End Collision of Two Southern Pacific Transportation Company Freight Trains, Indio, California, June 25, 1973" (NTSB-RAR-74-1); and "Rear-End Collision of Two Burlington Northern Railroad Company Freight Trains, Pacific Junction, Iowa, April 13, 1983" (NTSB/RAR-83/09).

The caboose of Extra 1751 North in which the two rear crewmembers of that train were riding could have withstood the crash forces of the striking locomotive more readily than it could the effects of the overriding freight car. The center sill upon which the caboose occupant space is built will withstand a high buff force because of its rigid construction, but the sides and ends do not have vertical members designed to support a weight such as a loaded freight car. The car body split under the combined impact and freight car load forces and the structural materials crushed the occupants. The separation of the floor allowed the one crewmember to fall partially to the ground.

CONCLUSIONS

Findings

1. Neither the train radio, the signal system, the track, the sight distance, nor the mechanical condition of Extra 8051 North were causal factors in this accident.

2. The head brakeman was not qualified as an engineer and therefore was operating Extra 8051 North in violation of the Seaboard System Railroad operating rules at the time of the accident.

3. The order of train movement as directed by the train dispatcher did not contribute to the cause of the accident.

4. The conductor concluded from his conversation with the engineer and head brakeman of Extra 8051 North that they were not under the influence of alcohol when they reported for duty about 10:30 p.m. on September 13, 1983.

5. The engineer and head brakeman of Extra 8051 North were under the influence of alcohol at the time of the accident based on the results of tests made on blood samples taken from them 4 1/2 hours after the accident.

6. The engineer and head brakeman consumed alcohol between the time they reported for duty on Extra 8051 North and the time of the accident.

7. Both the engineer and head brakeman were asleep and did not operate Extra 8051 North in compliance with the signal indications that required them to stop the train because of the presence of Extra 1751 North in the signal block ahead.

8. Although the engineer of Extra 8051 North said that he considered himself to be an alcoholic, he had not availed himself of help from the Seaboard System Railroad's Alcohol and Drug Abuse Program.

9. There are no Federal or railroad company requirements for toxicological tests after a serious railroad accident to determine if the railroad operating employees involved had used alcohol or drugs.

10. After this accident, toxicological tests were performed on the engineer and the head brakeman only after the issuance of a court order and a search warrant obtained by the Indiana State Police.

11. A requirement for the enginecrew of Extra 8051 North to radio the aspects of wayside signals to the rear crew should have enabled the conductor to monitor the enginecrew's alertness.

12. A functional alerting device on the locomotive of Extra 8051 North might have prevented the accident.

13. Appropriate restraining devices in the caboose and locomotive operating compartment of Extra 8051 North probably would have prevented the injury to the conductor and engine crewmembers of that train.

Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the failure of both head-end crewmembers of Extra 8051 North to remain alert due to the use of alcohol on duty, which resulted in their failure to observe the speed restrictions imposed by the governing wayside signals and to control the movement of the train accordingly. Contributing to the cause of the accident was the lack of an alerting device on the locomotive which would have stopped the train in the event the operator failed to respond to the alarm, and the lack of a requirement for the head-end crew to communicate the wayside signal aspects to the rear-end crew.

RECOMMENDATIONS

As a result of this accident investigation, the National Transportation Safety Board made the following recommendations:

--to the Federal Railroad Administration:

Promulgate rules requiring enginecrews to communicate to the rear crews the aspects displayed by all wayside signals governing the progress of the train, irrespective of the signal indication. (Class II, Priority Action) (R-84-30)

Develop and promulgate a requirement that locomotives operated in main track service be equipped with an alerting device which will stop a train if the engineer fails to respond to an alarm indicating that he or she has fallen asleep or has become incapacitated. (Class II, Priority Action) (R-84-31)

--to the Association of American Railroads:

Encourage member railroads to develop and implement rules that will require enginecrews to communicate to the rear crews the aspects displayed by all wayside signals governing the progress of the train, irrespective of the signal indication. (Class II, Priority Action) (R-84-32)

--to the Seaboard System Railroad:

Develop and implement a rule requiring enginecrews to communicate to the rear crews the aspects displayed by all wayside signals governing the progress of the train, irrespective of the signal indication. (Class II, Priority Action) (R-84-33)

Establish procedures at initial and terminal crew reporting points that will verify that crewmembers are not under the influence of alcohol or drugs and that crewmembers are or have been fully capable of performing the duties of their assignment safely. (Class II, Priority Action) (R-84-34)

As a further result of its investigation of this accident, the National Transportation Safety Board reiterates the following recommendations made to the Federal Railroad Administration on March 7, 1983:

Immediately promulgate a specific regulation with appropriate penalties prohibiting the use of alcohol and drugs by employees for a specified period before reporting for duty and while on duty. (R-83-30)

With the assistance of the Association of American Railroads and the Railway Labor Executives Association, develop and promulgate effective procedures to ensure that timely toxicological tests are performed on all employees responsible for the operation of the train after a railroad accident which involves a fatality, a passenger train, releases of hazardous materials, an injury, or substantial property damage. (R-83-31)

With the assistance of the Association of American Railroads and the Railway Labor Executives Association, develop and promulgate a requirement that alcohol/drug abuse involvement accident/incidents be fully reported to the FRA. (R-83-32)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G. H. PATRICK BURSLEY
Member

/s/ VERNON L. GROSE
Member

May 15, 1984

VERNON L. GROSE, Member, filed the following concurring and dissenting statement:

Concurring with the general thrust of the report, there are two aspects with which I respectfully dissent: (a) the excessive detail concerning how the locomotive crewmembers may have obtained and consumed alcohol during the period prior to the accident, and (b) the stated "probable cause."

It is both immaterial to the prevention of future similar accidents and irrelevant to determining what specific actions should be taken in this case to include the type of information that was sought and recited about the locomotive crew's drinking patterns. Based on BAC (blood alcohol content) tests that are quite objective, the two crewmembers were under the influence of alcohol. That evidence is sufficient for establishing causation. The how, when, why, or where of their arrival at that state is subjective and inappropriate to the investigation.

However, the major thrust of my dissent concerns the stated "probable cause." There was no singular cause to this accident, and it is highly unlikely that any accident has a singular cause. Most are very complex events that involve causative elements of man, machine, management, and media (environment). Even as adopted, the so-called singular probable cause lumps together such disparate factors as appetite satisfaction (alcohol consumption), operational decision (delegation of authority), management oversight (no communication requirement between crew members), operator oversight (ignoring wayside signals), and management decision (exclusion of automatic train control during crew incapacitation). It is encongruous to refer to such a potpourri as "the probable cause."

Perplexity with the stated probable cause is compounded by its designation of one factor as "primary" and all others as "contributory" -- with no differentiating explanation. Weighing of such factors evidently requires judgment, but the groundrules are enigmatic.

Required by 49 U.S.C. 1903 Section 304(a)(1) to determine "the cause or probable cause or causes" (emphasis added), the National Transportation Safety Board has clear mandate to recognize the reality of multiple causation of a transportation accident. While some could fear that acknowledgement of multiplicity of causation might result in an inordinate list of causes, such is not likely to be the case -- provided causes are not seen as ends in themselves. In other words, determining probable causes is an intermediate activity which should lead to specific counter-measures that will either eliminate or reduce the probability of a similar accident in the future. The recommendations issuing from this accident investigation fail to exhibit the linkage between causation and preventive action.

Ranking of causes might be desirable -- particularly if there were to be a shortage of resources required for corrective actions. Thereby, implementation of recommended actions could be based on priority. However, in this accident, ranking is not necessary. The six causes I propose lead logically to specific, feasible, and efficacious actions.

Predicated on these arguments, this alternative on probable causation is submitted:

> The National Transportation Safety Board determines that the probable causes of the accident were, without implication of relative importance: (a) incapacitation of the engineer and head brakeman due to alcohol consumption, (b) delegation of train operation to the head brakeman by

the engineer, (c) lack of enforcement of Seaboard System Operating Rule G, (d) absence of communication between locomotive crew and the train conductor (person with overall management responsibility for the train), (e) lack of either an automatic throttle cutoff or an automatically-activated warning device in the locomotive cab for situations of crew incapacitation, and (f) operation of the train at speeds in excess of governing wayside signals.

/s/ VERNON L. GROSE
Member

May 15, 1984

APPENDIXES

APPENDIX A

INVESTIGATION

The National Transportation Safety Board received notification of this accident from the Federal Railroad Administration about 3 p.m., on September 14, 1983. The accident was declared a major accident, and an investigator-in-charge from the Safety Board's Bureau of Accident Investigation and an investigator from the Safety Board's Bureau of Technology were dispatched to the scene, arriving there about 2 a.m. on September 15. These two investigators were joined later by two more investigators from the Bureau of Technology. The investigative team from the Safety Board was joined by investigators from the Federal Railroad Administration who assisted in the accident investigation.

A deposition proceeding was held as part of the investigation from October 11 through 13, 1983, for which about 15 witnesses gave testimony. The engineer and head brakeman of Extra 8051 North did not appear at the deposition proceeding; the Safety Board was informed that, on advice from their attorneys, they would not testify on the grounds of self-incrimination.

APPENDIX B

EXTRA 8051 NORTH
CREWMEMBER INFORMATION

Engineer

The engineer of Extra 8051 North was employed by the Chicago and Eastern Illinois Railroad Company (C&EI) as a fireman on August 11, 1963. He was promoted to engineer on March 31, 1969. He had no disciplinary actions recorded in his service record as of September 14, 1983. He was last examined on the operating rules on March 18, 1982. The engineer of Extra 8051 North had arrived at Howell Yard on a southbound train he had operated from Danville on September 12, 1983. At the time of the accident he did not have a regular assignment because the SBD had abolished some assignments of regular engineers over the Labor Day holiday, and he had been working as an unassigned engineer from the extra board. He was called by the crew caller as an extra engineer to operate Extra 8051 North on September 13, 1983.

Head Brakeman

The head brakeman was employed by the L&N on October 29, 1973, as a brakeman. He was promoted to conductor on September 8, 1978. His disciplinary record contains an entry of a 30-day suspension in 1976 for violation of operating rule 103A concerning the blocking of public road crossings. He was last examined on the operating rules on August 3, 1982. At the time of the accident the head brakeman was regularly assigned as head brakeman on train No. 792.

Conductor

The conductor was employed by the former C&EI on December 17, 1945, as a switchman. He transferred to road service on September 15, 1946, and was promoted to conductor on March 28, 1955. His last operating rules examination was passed satisfactorily the latter part of 1982.

Rear Brakeman

The rear brakeman was employed by the former C&EI on May 2, 1968, as a brakeman. He was promoted to conductor on January 20, 1971. He passed his last operating rules examination satisfactorily the latter part of 1982.

APPENDIX C

EXCERPTS FROM SEABOARD SYSTEM RAILROAD OPERATING RULES

The Rules herein set forth govern the railroads operated by the Louisville and Nashville Railroad Company. Except for certain revisions taking effect January 1, 1974, they took effect July 1, 1966, superseding all previous rules.

Special instructions may be issued by proper authority.

* * *

G. The use of intoxicants, narcotics or any other illegal drugs or drug paraphernalia by an employe subject to duty, or their possession or use while on duty, or while on company property, or while occupying facilities paid for or furnished by the company, or at any other time that such use or possession subjects the company to criticism or loss of good will, is prohibited and will subject the offender to disciplinary action, including dismissal.

Employes must not report for duty under the influence of any medication, including those prescribed by a doctor or dentist, that will in any way adversely alter their alertness, coordination, reaction, response or their safe performance of work; nor shall such medication be used by employes while on duty.

* * *

DEFINITIONS

* * *

SIGNAL INDICATION.—The information conveyed by the aspect of a signal.

SIGNALED SIDING.—A siding on which movements are authorized by indication of block signals. Signaled Sidings and Normal Speed at which trains may be operated on such sidings will be designated by time-table or bulletin board order.

SINGLE TRACK.—A main track on which trains are operated in both directions.

SPEED—NORMAL.—The maximum authorized speed.

SPEED—LIMITED.—A speed not exceeding 45 miles per hour.

SPEED—MEDIUM.—A speed not exceeding 30 miles per hour.

SPEED RESTRICTED.—Proceed prepared to stop short of another train, obstruction, or switch not properly lined, looking out for broken rail, not exceeding 15 miles per hour.

SPEED—SLOW.—A speed not exceeding 20 miles per hour.

* * *

34. All members of a crew in cab of engine must, and other crew members will, when practicable, communicate to each other by its name the aspect of each signal affecting the movement of their train. Signal aspects must be seen before being communicated to other members of crew.

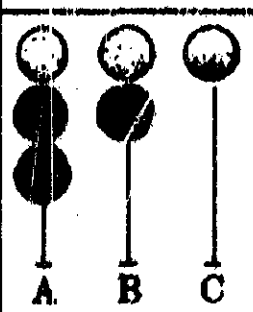
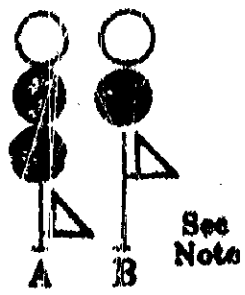
The aspect of each signal must be watched until such signal is passed and if it displays an aspect other than that first communicated, the changed aspect must be communicated as soon as it becomes clearly visible.

It is the responsibility of the engineer to know that these requirements are complied with by those in cab of engine.

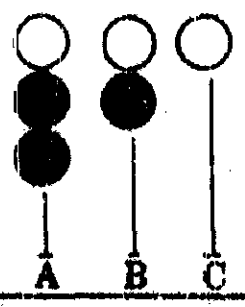
Trainmen not on engine must see the aspect of each train order signal affecting the movement of their train, and, when practicable, communicate to each other by its name the aspect of such signal.

Employes must be vigilant in keeping a lookout for signals or any other condition that may affect the movement of their train. Rev. 8-1-17

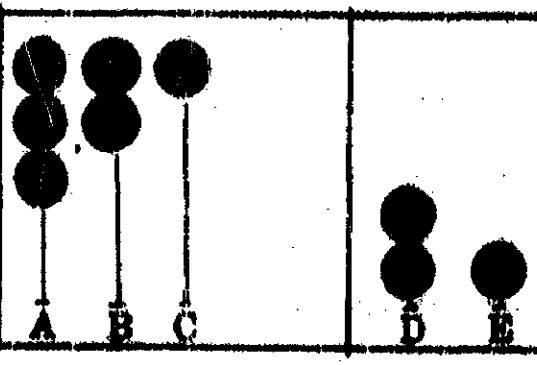
* * *

RULE	ASPECT		RULE	NAME	INDICATIONS
	HIGH SIGNAL	DWARF SIGNAL			
281			281	CLEAR	Proceed
282			282	APPROACH MEDIUM	Proceed, approaching next signal at Medium Speed, not exceeding Medium Speed through turnout. Note: If this signal is equipped with a Yellow triangle outlined in black, Limited Speed instead of Medium Speed applies.

* * *

285			285	APPROACH	Prepare to stop at next signal. Train exceeding Medium Speed must at once reduce to that speed.

* * *

292			292	STOP	STOP

* * *

703. Radios used in connection with train operation will be tested by members of both head and rear end crew at point where train is originally made up and again as soon as practicable at any point after changing crews.

At least once during each tour of duty, engineer and conductor must test radios to verify that they are operating properly on engine and caboose. These tests will consist of an exchange of voice transmissions, and each station shall be advised of quality and readability of its transmission.

Any radio not functioning properly must not be used, and each crew member and dispatcher must be notified as soon as practicable.

* * *

ENGINEERS

* * *

1010. They must not permit unauthorized persons to operate the engine. The fireman or other authorized employe on the crew may be permitted to do so with the permission and in the presence of the engineer, who will be responsible for the proper operation of the engine and handling of the train. Road foremen of engines are authorized to operate the engine to instruct or for other purposes.

APPENDIX D

STAGES OF ACUTE ALCOHOLIC INFLUENCE/INTOXICATION

Blood Alcohol Level (Percent)	Stage of Alcoholic Influence	Clinical Signs/Symptoms
0.01-0.05	Sobriety	No apparent influence. Behavior nearly normal by ordinary observation. Slight changes detectable by special tests.
0.03-0.12	Euphoria	Mild euphoria, sociability, talkativeness. Increased self-confidence; decreased inhibitions. Diminution of attention, judgment, and control. Loss of efficiency in finer performance tests.
0.9-0.25	Excitement	Emotional instability; decreased inhibitions. Loss of critical judgment. Impairment of memory and comprehension. Decreased sensitory response; increased reaction time. Some muscular incoordination.
0.18-0.30	Confusion	Disorientation, mental confusion; dizziness. Exaggerated emotional states (fear, anger, grief, etc.) Disturbance of sensation (diplopia, etc.) and of perception of color, form, motion, dimensions. Decreased pain sense. Impaired balance; muscular incoordination; staggering gait, slurred speech.
0.27-0.40	Stupor	Apathy; general inertia, approaching paralysis. Markedly decreased response to stimuli. Marked muscular incoordination; inability to stand or walk. Vomiting; incontinence of urine and feces. Impaired consciousness; sleep or stupor.

APPENDIX D

Blood Alcohol Level (Percent)	Stage of Alcoholic Influence	Clinical Signs/Symptoms
0.35-0.50	Coma	Complete unconsciousness; coma; anesthesia. Depressed or abolished reflexes. Subnormal temperature. Incontinence of urine and feces. Embarrassment of circulation and respiration. Possible death.
0.45	Death	Death from respiratory paralysis.

Committee on Alcohol
and Drugs Traffic Conference.
National Safety Council.

APPENDIX E

ARTICLES FROM THE LOCOMOTIVE ENGINEER THE BROTHERHOOD OF LOCOMOTIVE ENGINEERS

DECEMBER 16, 1983

After challenging every major U.S. railroad to join the BLE in negotiating employee assistance programs against alcohol and drug abuse, the Brotherhood has now asked the Association of American Railroads to encourage this effort.

International President John F. Sytsma, in a Nov. 21 letter to AAR President William H. Dempsey, emphasized the BLE's position that a peer-referral employee assistance program (EAP) is a far more effective solution to the problem than the indiscriminate use of detection devices.

"Some carrier officials still retain an attitude that detection devices should be used as a deterrent," Sytsma wrote. The BLE, he said, "has fought this battle, and the First Division of the National Railroad Adjustment Board . . . determined that the use of such devices is a matter to be decided through collective bargaining negotiations.

"Until the United States Congress passes a law," Sytsma stated, "or the Federal Railroad Adminstration promulgates a rule that reverses this decision, the BLE will stand fast with its position—no detection devices will be used on our members—unless, in special individual cases, compelling 'probable cause' is an element indicating a need for positive mechanical and/or scientific detection."

The BLE will not oppose any carrier's right to require on-the-scene tests for individuals who exhibit symptoms and provide sufficient probable cause to suspect alcohol or drug use, Sytsma added. Nor, he said, will the BLE oppose post-accident blood tests administered by qualified medical experts.

However, the letter states, "There exists a detection system that is more failsafe than any . . . state-of-the-art detection device. This 'system' is called the fellow worker."

Reversing the peer pressure to cover up abuse is the key to the solution, Sytsma said. Every employee must realize, he said, that "If I am caught by a fellow employee, I am either in the (assistance) program or out of a job."

This "reversed peer pressure" means that employees will no longer ignore or cover up for drinkers or drug users once they know that the transgressors can be kept off the job and given the opportunity to reprogram their lives, Sytsma explained.

The danger in using detection devices without probable cause, Sytsma said, is that it "ignores and undermines current programs effective in treating alcoholism. This attitude, proffered as a cure for the problem of railroad accidents attributable to alcohol or drug use, in fact provides no cure at all. Since it is well established that alcoholism is a disease characterized by denial, a regulation such as the one at issue will not encourage alcohol abusers to come forward and seek help."

On Sept. 22, Sytsma sent a letter to all BLE general chairmen, calling on them to initiate discussions with their respective carriers on the development of employee assistance programs, Rule G by-pass agreements and the establishment of peer-referral programs.

In his letter to the AAR president, Sytsma wrote, "We feel that a good EAP program is the foundation of a successful alcohol and drug abuse program. An EAP program serves the minority of the workers by providing them with a chance to receive help. The BLE's goal is to serve 100 percent of our members by alleviating the alcohol and drug problem."

The advantage of a practical peer-referral assistance plan is that it assures the rule-abiding majority that the troubled employee can be made to face a cross-roads in his career without necessarily facing loss of his job, according to John T. Woischke, research assistant on the staff of the BLE International Office.

Furthermore, notes Brother Woischke, such programs will encourage reporting of the occasional user, as opposed to the chronic alcoholic or addict. The occasional user can be just as dangerous if not more so, Woischke believes, because fellow employees may not comepensate for the actions of someone who does not exhibit chronic symptoms.

In his letter to the AAR president, Sytsma noted that once "a full-fledged attempt is under way to deal with this problem," carrier officials, their EAP representatives, and labor representatives could meet with the National Steering Committee to discuss adjustments, corrections and improvements.

"The BLE has reached out to the railroad industry in our Sept. 22 letter, and we now call upon all carriers in this country, through this letter to the Association of American Railroads, to cooperate in establishing or improving these programs," Sytsma wrote.

Contingent with the railroad industry's efforts, this organization will diligently pursue 'reversing peer pressure' with its members. A concerted effort toward communication and cooperation will lead us to an equitable, humane, efficient and acceptable solution to the alcohol and drug problems we face in the railroad industry.

May 4, 1984

Message from the President: Let's solve this problem now.

Railroad labor and management have been grappling with the problem of alcohol and drug use by a small percentage of employees. The government may not wait much longer for us to find a solution; one may be imposed upon us. We are concerned that any new government regulation that tries to deal with the problem will not effectively solve it and may create undue hardships for all of us as a result.

Our in-depth study of the issue indicates that the major stumbling block is the disagreement over what type of deterrent will best prevent these few employees from using alcohol and drugs while on duty or when subject to duty.

Some in rail management feel that no rule could be more explicit than the current Rule G. They would like the authority to randomly subject any employee to testing with so-called "state-of-the-art" devices. They believe this "quick-fix" solution can be an effective deterrent.

However, if we review the findings of investigators in past accidents where alcohol was a factor, we note their claim that many of the individuals were intoxicated before they reported for duty, and many were well aware that they might be called.

This raises two pertinent questions: Why are some employees willing to gamble that there will be no officials around when they go on duty, or that they will be able to avoid their notice and board the train? What prompts them to risk their own lives and the lives of many others, by boarding a train when they know they are in no condition to operate it safely?

There can be only the obvious answer: The present system does not effectively deter dangerous behavior.

The present system emphasizes detection and ignores PREVENTION. To put more teeth in the present system, through random testing, will only challenge the problem employee to beat the system. Making the consequences more drastic, under federal law, will only motivate more employees to cheat the system.

The Union Pacific Railroad's Operation Red Block is a positive program whose goal is PREVENTION. It is a promotional campaign owned, designed, and implemented by labor at the grass roots level.

Operation Red Block is not an adversary procedure where management challenges labor and both fall into the old, futile head-butting routines of the past.

Wherever a similar PREVENTION program is developed, the majority of employees who do not want to tolerate the abusers in their work place finally have a realistic option. The problem employee is placed in the hands of an Employee Assistance Program professional counselor. He is allowed to return to the job only at the discretion of this qualified person.

Should there be any testing of employees in our industry? Yes, in the following situations:

(1) After serious accidents (except grade crossing collisions, suicides and vandalism incidents)
(2) After any serious injury or fatality to a crew member (with the same exceptions)
(3) Whenever there is probable cause, as set forth in my Nov. 21, 1983 letter to the president of the Association of American Railroads.
(4) During a pre-employment background check, to preclude the hiring of anyone with a chronic alcohol or drug problem. This is strictly a railroad industry problem. Let me emphasize that the railroad industry zealously guards its prerogative to have sole control over hiring.

The BLE is prepared to meet with the Association of American Railroads to establish the aforementioned as rules, or, if necessary, to advocate them as federal law. In turn, we would like to see a genuine cooperative effort by all carriers to establish Rule G By-Pass Agreements and set up education and training programs so that PREVENTION programs using peer referrals can be implemented.

Operation Red Block and the Union Pacific EAP program are not an "off-the-shelf" product purchased as a "quick-fix" solution for the industry. They are a new departure, for never before have the people involved been given the chance to determine how to solve the problem.

For too long we have overlooked the fact that the overwhelming majority of rail employees do not easily condone on-the-job intoxication and they do not want to work with the inebriated person.

Employees can, and they will, safely and effectively handle the situation if given the chance. The tragic wrecks of the past few weeks on the Burlington Northern should go far to convince the railroad industry to fully employ the people it has on its payrolls, by encouraging them to act in their own interests and in the interest of the industry.