SP-20
Log R-550

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: May 12, 1986
In reply refer to: R-86-9 through -12

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Chairman
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New York State Department of Transportation
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At 10:11 a.m. on May 15, 1985, a New York City Transit Authority (NYCTA) southbound eight-car subway train derailed moments after departing the DeKalb Avenue Station, Brooklyn, New York. The train had made a station stop, proceeded out of the station, and then entered a track crossover section. The first car entered the crossover, but the second car derailed at the left-hand switch, continued in a derailed condition for about 120 feet, and struck a concrete-and-steel track separation wall. The right side of the derailed car struck the wall at the unoccupied conductor's cab and severed 20 feet of the car side. The third rail was damaged for approximately 40 feet, and the third-rail wooden cover board was forced up under the derailed car. Dense smoke resulted when arcing of the damaged third rail caused a fire in the cover board and the wiring insulation on the car.

An attempt was made to restore rail service on the tracks not involved in the accident 1 hour 7 minutes after the derailment by restoring the third-rail power to the northbound tracks. However, a series of explosions occurred under the derailed car when the third rail at the accident site became energized. Twenty-six passengers and 7 employees were treated for smoke inhalation by the emergency medical services, and 16 passengers were treated at local hospitals. Damage was estimated to be $400,000. 1/

The investigation revealed that the stock rail in the replaced rail sections involving the switch of the crossover had not been seated properly when it was replaced in the old tie plates. Also, the west stock rail braces were loose, two west stock rail braces were missing, and two spikes were missing on the gauge side of the rail. Each of these conditions allowed the loose stock rail to move as several trains traveled through the crossover and on the straight normal route so that the stock rail took a set and was sitting on top of the tie plate risers and would not reseat in the tie plates because of the set. Because of the position of the stock rail, a gap was created between the switch point and the stock rail which exposed the switch point so that the wheel of the second car in the accident train struck the switch point and derailed. If either the capital improvement division foreman or the track maintenance foreman had waited to observe the first train over the replaced track, the loose condition of the stock rail would have been noted and corrections could have been made, thus avoiding the accident.

1/ For more detailed information, read Railroad Accident Report--"Derailment of New York City Transit Authority Subway Train, DeKalb Avenue Station, Brooklyn, New York, May 15, 1985" (NTSB/RAR-86/01).

The Safety Board believes that it is unreasonable for the NYCTA management to leave the determination to observe the first train over an area of track where work has been performed on a case-by-case basis to the discretion of those having performed the work. The required observation of the first train following the work done by the capital improvement forces at the switch should not have been considered discretionary by the chief engineer, but should have been absolutely mandatory as prescribed by the NYCTA rule. The Safety Board believes that a strictly enforced requirement as prescribed by the NYCTA rule for observing the first train over renewed track work is just as necessary as competent inspection of the track work. Competent inspections obviously were not performed in this instance. Had competent inspections been performed, the inadequately performed track work would have been discovered.

In its investigation of a train derailment on March 17, 1984, in the Joralemon Street Tunnel, 2/ the Safety Board learned that no one was present at the work site when the first train passed over the track following the work, even though the NYCTA employee responsible to watch the train over the track work area was in the station 1,000 feet away from the accident site. The Safety Board believes that the requirement for observing trains pass over track where work recently has been performed should be strictly enforced so that NYCTA employees responsible for signal and track work will perform such observations when required.

Based on their testimony, there was no clear understanding between the line supervisor and the track maintenance foreman as to who was responsible to inspect, report, and observe trains over the replaced rails. The two deputy superintendents who had arranged for the capital improvement division crew to perform the track work should have instructed the personnel in their divisions as to who was responsible for each part of the assignment. Because no such understanding existed, no one felt responsible to watch the first train over the replaced track, and thus, no one noted the loose condition of the stock rail. The Safety Board believes that, since the capital improvement work force which performed the track replacement was assisting the Track Maintenance Division and had no part in planning the job or ordering and delivering the material to the work site, the responsibility for the oversight to require that the work performed was satisfactory and in accordance with NYCTA standards rested with the superintendent of the Track Maintenance Division.

During its investigation of the Joralemon Street Tunnel derailment, the Safety Board issued Safety Recommendation R-84-19 on April 9, 1984, which recommended that the NYCTA:

> Require that inspectors responsible for insuring safe conditions of track know the necessary standards for maintaining those conditions.

On December 4, 1984, the NYCTA responded that its Rapid Transit Training Division has developed training courses for improving the expertise of track inspectors and track construction engineers and provides an intensive training program for "new" track inspectors. Based on those comments, the Safety Board on April 23, 1985, placed Safety Recommendation R-84-19 in an "Open--Acceptable Action" status. However, up until the time of the accident, neither the line supervisor nor the deputy superintendent had received this training. The May 15, 1985, accident demonstrated that there remain serious shortcomings, such as the lack of a competent track inspection by the line

2/ Railroad Accident Report--"Derailment of New York City Transit Authority Subway Train in the Joralemon Street Tunnel, New York, New York, March 17, 1984" (NTSB/RAR-85/07).

supervisor and the deputy superintendent and the lack of adequate track inspections conducted on the NYCTA. Therefore, the Safety Board reiterates Safety Recommendation R-84-19 and requests that the NYCTA give the recommendation its immediate attention.

The Safety Board's investigation of the Joralemon Street Tunnel accident also revealed a lack of coordination between divisions within the NYCTA Track and Structures Department. The Safety Board's report of the investigation stated:

> The coordination between the Engineering and Construction Department, which was providing the contract inspectors, and the Track and Structures Department, which was responsible for track safety, was practically nonexistent in this case.

Following the Joralemon Street Tunnel accident, the NYCTA attempted to correct the lack of coordination by consolidating the Engineering and Construction Department and the Track and Structures Department. However, at the time of the May 15, 1985, derailment, NYCTA's consolidation of both departments under one head had not yet accomplished the desired result. In this accident, the crew that performed the track work did not find sufficient stock rail braces at the work site; consequently, three braces were not installed on the rail involved in the accident. There was a breakdown in departmental followup when the track maintenance forces did not insure that the necessary material was in place. When the capital improvement crew arrived at the job site, it had no means to transport material to the site. There was an equal breakdown in departmental procedures when the line supervisor left the job site, indicating that it was ready for train movements, when, in fact, material was missing from the track. The lack of coordination among the NYCTA departments involved in the track work probably contributed to the line supervisor not informing anyone about the missing material and the failure of the two deputy superintendents to have a thorough understanding as to who was performing each part of the assignment. The Safety Board believes that the lack of coordination that was demonstrated in the Joralemon Street Tunnel accident had not been sufficiently resolved by NYCTA management at the time of the May 15, 1985, accident.

The signal maintainer stated that he made all the necessary adjustments to the signal system at the crossover location while the track work was being conducted. However, evidence indicates that the signal maintainer did not adjust the switch point throw rods properly to meet the switch throw travel and that the stock rail moved away from the stock rail, causing a gap between the switch point and the stock rail which caused the signal to continue to display a proceed indication.

When signal equipment is properly adjusted, it provides the protection necessary for safe train operation. However, train operators must depend on and place great confidence in the signal system. The 3 3/4-inch switch point throw for the normal switch point position and the 4-inch reverse switch point throw found after the accident indicated that the signal maintainer had not adjusted the switch point position throw by closing the point 1/8 inch and that he left the switch point open before adjusting the reverse lock rod. This accident and other accidents investigated by the Safety Board indicate that the NYCTA is not adequately supervising its employees and is allowing them to use improper procedures for inspection and maintenance of its signal system.

A potentially dangerous situation developed when power was restored to the third rail on track No. F1 at the accident site before the derailed car had been rerailed and while NYCTA personnel where at the derailed train. The incident occurred because the power maintainer at the Hudson substation did not know that the substation's auxiliary breaker had a unique resistance loop through which power would be restored to the southbound tracks when power was restored to the northbound tracks. Both the power maintainer and his supervisor were aware that the power maintainer had not been adequately trained, that he was unprepared for the demands of the job, and that he needed additional training. For the NYCTA management to allow the power maintainer to fill such a responsible position without the necessary training and supervision was inexcusable. The assistant supervisor at the Hudson Station knew the power maintainer needed more training and acknowledged he had some responsibility for training. Nevertheless, although the assistant supervisor was present when the auxilary breaker was closed, he did not inquire about the instructions the power maintainer had received from the system operator or accompany him when he went to restore power. If the assistant supervisor had done so, he probably would have seen that track No. F1 would be energized through the test resistance loop and he would have taken action to prevent the track from being energized.

NYCTA management has taken action to discipline the track foreman, the signal maintainer, and the power maintainer for the improper practices that were used in the replacement of the track, the adjustment of the signal system, and the energizing of the third rail at the accident site when the intent was to energize only the northbound tracks. So many failures by employees to properly perform their job tasks indicate that the NYCTA management has failed to properly supervise employees in their duties, especially since (1) before the derailment, a deputy superintendent of the track department had inspected the track and had taken no exception to the work that had been done, (2) an assistant supervisor of the power department, who was present at the substation, understood that the power maintainer was not fully qualified, but yet did not monitor the activities of the maintainer, and (3) there was a lack of qualified power maintenance personnel to man the substation. Until NYCTA management accepts responsibility for the quality of employee performance necessary to operate the NYCTA system in a safe and reliable manner, situations such as those that developed in this accident will continue to develop and may result in more accidents.

The lack of supervision of NYCTA employees has been noted in previous accidents investigated by the Safety Board. In its special investigation report of September 22, 1981, involving eight subway fires on the NYCTA, 3/ the Safety Board stated, in part:

> . . . without . . . increased surveillance and quality control, the performance and effectiveness of the maintenance program is not likely to improve significantly.

In its report of the Joralemon Street Tunnel derailment, the Safety Board stated,

> . . . evidence does not explain how or why procedures had become so lax that train operators and their supervisors passed the improperly installed and missing slow signs numerous times without reporting the deficiencies . . . This accident and the previous accidents indicate that lack of training and supervision of employees is not limited to only one department but pervades the NYCTA system.

3/ Special Investigation Report--"Eight Subway Fires on New York City Transit Authority with Evacuation of Passengers" (NTSB/SIR-81/5).

Inadequate supervision was demonstrated in this accident and indicates that poor management oversight extends throughout the NYCTA. In the 1981 report on eight subway fires, the mechanical department was noted to lack competent supervision; in the Joralemon Street Tunnel derailment, it was the operating department; and in this accident, it was the track, signal and power departments that had problems with lack of adequate supervision that resulted in the derailment and in the inadvertent energizing of the third rail at the accident site. Throughout these accidents, the undetected poor workmanship by the individuals involved was the result of poor supervision.

Top executives of the NYCTA have taken some action to correct management and supervisor performance. The Car Equipment Department management has been reorganized, and the Track Construction and Track Maintenance Department has been combined with the Track and Structures Department. These changes were made to improve communications and to provide a more efficient management structure. Also, the Safety Department was elevated to a level that reports directly to the Chief Operating Officer. However, at the time of this accident, the management reorganization had not made a significant change at the worker level.

The lack of adequately trained NYCTA employees has been noted in previous accidents and special investigations. At the Safety Board's public hearing on Rail Rapid Transit Safety in July 1980, an NYCTA motorman testified:

> NYCTA has never provided adequate emergency training to employees . . . that NYCTA has emergency procedures on paper, but that employees receive no hands-on training.

At the same hearing, a representative of NYCTA management testified:

> The success of any operation depends on the skilled, trained people that we have. The best developed procedures are just so much paper if the personnel that must apply them do not do it effectively.

In the special investigation of eight subway fires in 1980 and 1981, the Safety Board noted the shortcomings of motormen and conductors to respond to emergencies. As a result of that special investigation, the Safety Board recommended that the NYCTA:

> In conducting "hands on" training of employees for responding to emergencies, assign top priority to the training of motormen and conductors. (Class I, Urgent Action) (R-81-106)
>
> Provide training to motormen and conductors to enable them to evaluate emergencies, communicate vital information immediately to appropriate authorities, and ascertain when conditions require the immediate evacuation of passengers. (Class II, Priority Action) (R-81-107)

Following an indication from the NYCTA that operating personnel, particularly motormen and conductors, were being trained to be familiar with and respond to a fire situation and to evacuate passengers during emergency situations, the Board ultimately placed Safety Recommendation R-81-107 in a "Closed--Acceptable Action" status on May 29, 1984. According to the NYCTA, this training included refresher courses on standard operating procedures, safety sessions, and a film tailored to teach employees

emergency procedures they would be expected to carry out. Because it was concerned, however, that the "hands on" training was not proceeding as quickly as it could, the Board urged the NYCTA to revise its schedule for training. The NYCTA stated that it reviewed and consequently revised its schedule for "hands on" training and indicated in a September 5, 1985, letter that by the end of 1986 over 1,900 operators and conductors will have received "hands on" training. Based on these indications, the Board placed Safety Recommendation R-81-106 in a "Closed--Acceptable Action" status. In this accident, however, the train operator (motorman) stated that he had not been to the NYCTA school for firefighting and that he could not make the decision to evacuate passengers because only command center or supervisory personnel could make that decision.

In a report of an accident involving the rear-end collision of two NYCTA trains on July 3, 1981, 4/ the Safety Board made the following statement:

> The Safety Board believes that the NYCTA should immediately review the events of this accident and establish training and operating procedures to avoid the confusion and conflicting instructions in future situations of this type.

Also, the Safety Board recommended that the NYCTA:

> Train operating department personnel in the differences between the two train control systems used on the New York City Transit Authority System. (Class II, Priority Action) (R-82-35)

Safety Recommendation R-82-35 is currently being held in an "Open--Acceptable Action" status pending receipt of information on the number of operators who have to date received this training.

In the Joralemon Street Tunnel Derailment, track inspectors were identified as requiring training. In September 1981, following the special investigation of NYCTA equipment department training, the Safety Board recommended that the NYCTA:

> Establish a systemwide program of initial and recurrent training for car repairmen, car inspectors, maintenance foreman, and quality assurance personnel. (Class II, Priority Action) (R-81-103)

The NYCTA developed such a training program, and the Safety Board ultimately placed Safety Recommendation R-81-103 in a "Closed--Acceptable Action" status on May 29, 1984. In December 1984, during its special investigation of NYCTA subway fires, the Safety Board reviewed the program further, found it to be thorough, and concluded that the program was an excellent effort by the NYCTA management to bring the training for the equipment department personnel up to a level necessary for the employees to be able to perform the work on cars in a satisfactory manner.

The Safety Board believes that the May 15, 1985, accident, like the previous accidents referred to, demonstrates the continuing failure of the NYCTA management to understand the critical importance to safety of such factors as adequate staffing and shift scheduling, formal classroom and on-the-job training programs, evaluation of personnel qualifications and experience, emergency procedures and drills, and close

4/ Railroad Accident Report--"Rear-end Collision of New York City Transit Authority Subway Trains 142NL and 132NL, Brooklyn, New York, July 3, 1981" (NTSB/RAR-82/02).

review and assessment of supervisory and organizational functions. Apparently, the lessons of past accidents that have been embodied in many Safety Recommendations to the NYCTA have not been sufficient to produce a "top-down" management commitment to improving safety of operations and maintenance through a systematic review and analysis of its training, staff, supervisory, and inspection requirements. Furthermore, where training programs and procedures have been developed in response to previous Safety Recommendations, it appears that the new programs have been poorly implemented with little assessment of their effectiveness and no assurance that all employees needing training will receive it in a timely fashion. In the May 15 accident, the train operator, with 14 years of experience operating trains, had not received any training in firefighting and did not understand his responsibility for the evacuation of passengers. This accident also demonstrated that the line supervisor and deputy superintendent did not make a competent track inspection of the work performed. The line supervisor did not bring a track gauge to the job site, and redid not gauge or align the replaced track. The power maintainer, because of his lack of experience as a helper in manual substations, could not answer the questions on the examination that pertained to manually-operated substations. After failing the examination twice, he asked questions in order to be able to answer the examination questions and successfully passed the examination on the third try without any practical experience or training. He received only on-the-job training and was unqualified to be a power maintainer at the Hudson substation. Since the foreman, who normally would have conducted the on-the-job training of this power maintainer, had been on leave and his position had not been filled for several months, the few occasions in which the power maintainer was given the opportunity to observe one of the two regular Hudson substation power maintainers at work on their respective 12-hour shifts hardly qualifies to be called an "on-the-job" training program.

On May 1, 1984, the New York State Public Transportation Safety Board (NYSPTSB) was established as an independent agency within the State of New York with the specific responsibility for overseeing the safety of local public transportation. The Board has long believed that rail rapid transit safety is primarily a local responsibility that is best handled by the State and local decisionmakers and issued a recommendation in 1981 to the State of New York to that effect. The Board believes that the inadequate supervision of employees and the inadequate training of employees that has been revealed as a result of the May 15 accident investigation, previous accident investigations, and special studies are areas of concern that the NYSPTSB should address immediately. Moreover, the Safety Board is aware that the NYSPTSB, in exercising its role as overseer of rail rapid transit safety, has required the NYCTA to submit a safety plan for approval. The Safety Board has been informed that, based on a preliminary review of the plan, the NYSPTSB does not consider the plan satisfactory. The Safety Board believes that, as part of its ongoing review of the NYCTA safety plan, the NYSPTSB should require the NYCTA to include in its safety plan an outline of training programs for all operating personnel and an outline of the supervisory and management structure of the NYCTA system for all departments.

As a result of its investigation, the National Transportation Safety Board recommends that the New York State Public Transportation Safety Board:

> Evaluate the training programs of all track, signal, and operating personnel to determine if they are adequate to provide for the safe operations of trains, and require the New York City Transit Authority to institute the necessary changes. (Class III, Longer-Term Action) (R-86-9)

Require the New York City Transit Authority to include in the safety plan submitted to the New York State Public Transportation Safety Board its program for training employees involved in train operations. (Class II, Priority Action) (R-86-10)

Evaluate the supervision of New York City Transit Authority employees to determine if the supervision is adequate to assure that work performed is in accordance with New York City Transit Authority rules and procedures. (Class III, Longer-Term Action) (R-86-11)

Require the New York City Transit Authority to include in the safety plan submitted to the New York State Public Transportation Safety Board its program for improving management coordination between departments that are performing comparable functions or joint systemwide programs. (Class II, Priority Action) (R-86-12)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, Member, concurred in these recommendations.

By: Jim Burnett
Chairman