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RAILROAD ACCIDENT REPORT

AUTO-TRAIN CORPORATION TRAIN DERAILMENT ON THE SEABOARD COAST LINE RAILROAD

NEAR JARRATT, VIRGINIA

MAY 5, 1976

REPORT NUMBER: NTSB-RAR-76-11

UNITED STATES GOVERNMENT

7780 .A33 no. NTSB-RAR-76-11

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16. Abstract

About 6:57 a.m., on May 5, 1976, 25 automobile carriers derailed from Auto-Train Corporation's northbound train No. 4 near Jarratt, Virginia. No one was injured. The train was traveling about 72 mph on the Seaboard Coast Line Railroad (SCL).

The National Transportation Safety Board determines that the probable cause of this accident was an undetected, fractured, loose, and out-of-gauge wheel which struck the track structure. Dragging and incompletely released brakes caused the wheel to overheat at its tread; the overheating caused design stress patterns on the wheel to change and the wheel to fracture. The brakes did not fully release because of the train's length and because of the type of brake equipment used.

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WASHINGTON, D. C. 20594

RAILROAD ACCIDENT REPORT

Adopted: October 21, 1976

AUTO-TRAIN CORPORATION TRAIN DERAILMENT ON THE SEABOARD COAST LINE RAILROAD NEAR JARRATT, VIRGINIA MAY 5, 1976

SYNOPSIS

About 6:57 a.m., on May 5, 1976, 25 automobile carriers derailed from Auto-Train Corporation's northbound train No. 4 near Jarratt, Virginia. No one was injured. The train was traveling about 72 mph on the Seaboard Coast Line Railroad (SCL).

The National Transportation Safety Board determines that the probable cause of this accident was an undetected, fractured, loose, and out-of-gauge wheel which struck the track structure. Dragging and incompletely released brakes caused the wheel to overheat at its tread; the overheating caused design stress patterns on the wheel to change and the wheel to fracture. The brakes did not fully release because of the train's length and because of the type of brake equipment used.

INVESTIGATION

The Accident

On May 4, 1976, at 5:57 p.m., Auto-Train Corporation's (Auto-Train) train No. 4 departed Sanford, Florida, en route to Lorton, Virginia. It consisted of 4 diesel-electric locomotive units and 54 cars: 23 passenger cars followed by 31 automobile carriers and steam generator cars. Auto-Train employees inspected the train before it departed Sanford.

On May 5, 1976, at 5:56 a.m., the train departed Rocky Mount, North Carolina; crewmembers made running inspections of the train and discovered no discrepancies. The weather was clear.

Shortly after the train departed Jarratt, Virginia, moving northward on the east main track of the Seaboard Coast Line Railroad Company's (SCL) Rocky Mount Division, the R-3 wheel on car No. 49 dropped off the rail and struck components of the track structure. About 1.4 miles beyond this wheel derailment, near milepost (MP) 51, the train separated; 18 automobile carriers derailed and obstructed both main tracks. (See figure 1.) The train continued north for another 3,200 feet before it was stopped. Seven cars of this remaining section derailed.

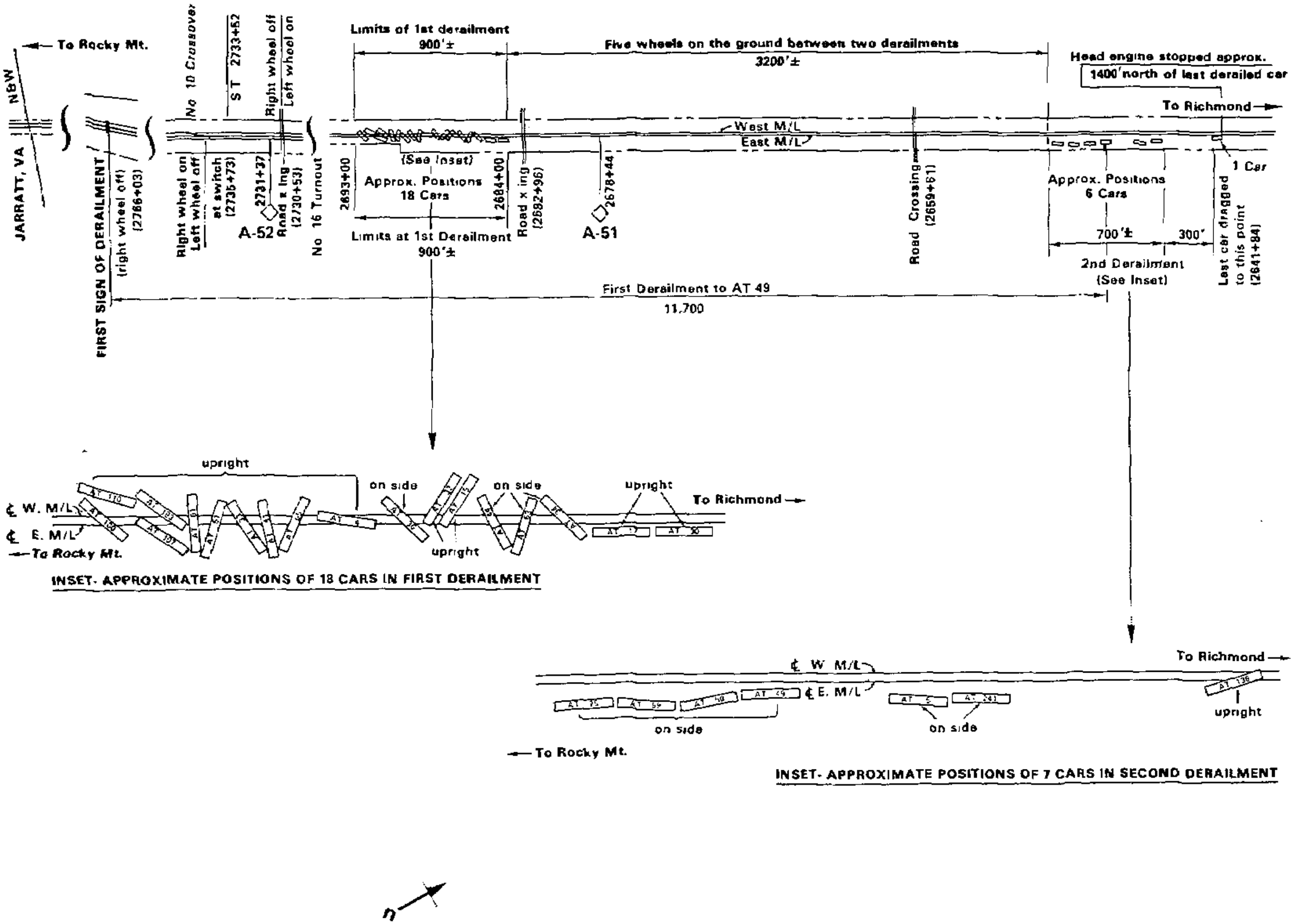

Figure 1. Plan of accident site.

SCL had two main tracks at the accident site. The 132-lb, 39-foot-long sections of rail were joined by 36-inch, 6-hole angle bars with six track bolts. The creosote track ties were spaced on 19-inch centers with 24 ties per each 39-foot rail. The roadbed was ballasted, according to American Railroad Engineering Association specifications, to a depth of 12 inches below the bottom of the ties. The track was on a 1° curve with 3-inch superelevation. The track was timbered and surfaced in 1973. The track is crossed at grade by the Norfolk and Western Railroad at Jarratt.

Damage

The 25 derailed automobile carriers were damaged heavily. Many of the automobiles in the carriers were damaged. More than 4,000 feet of track structure were either destroyed or damaged. Total property damage was estimated at more than $1,780,000.

Traincrew Information

The SCL crew consisted of a conductor, a locomotive engineer, a fireman, and trainmen. Auto-Train service personnel and two mechanical supervisors were onboard.

Train Information

The 23 passenger coaches were between the locomotive units and the automobile carriers. The passenger cars were equipped with disk wheel brakes and D22-type brake equipment. The automobile carriers were equipped with on-tread brakes and D22-type brake equipment. Some air from the braking system was diverted to operate appliances such as air-operated doors on the passenger cars.

Car No. 49, the first car to derail, was built in 1956 by Canadian Car Fabricators. It was purchased from Canadian National by Auto-Train in 1973. It weighed 88,500 lb, was 74.5 feet long, and was equipped with two trucks. The trucks were built by General Steel Castings Corporation, and were refurbished by Southern Iron Equipment Company on November 21, 1973. Auto-Train purchased the trucks from Railway Express. Each truck had four 33-inch, multiple wear, steel wheels.

The Auto-Train Corporation advised the Safety Board that Auto-Train inspectors made pre-departure and arrival inspections of the train. According to Auto-Train, a qualified inspector performed inspections that met Federal requirements and industry standards for interchange. His inspection of car No. 49 included testing the wheels with an ultrasonic testing device designed to discover wheel fractures. The test was made according to standard procedures, but no defect on the wheels of car No. 49 was detected.

Method of Operation

Before the accident, Auto-Train regularly operated trains of about 50 cars between Lorton, Virginia, and Sanford, Florida. The trains operated on regular passenger train schedules over the Richmond, Fredericksburg, and Potomac Railroad and over the SCL.

Rule 109 of the Seaboard Coast Line Railroad Company Operating Rules stipulates: "When practical, employees will inspect passing trains for defects... Defects to be looked for include brakes sticking... or any other condition which might endanger the movement of trains." Rule 110 states: "Train crews must be observant of the condition of their trains and inspect them at frequent intervals while in motion. Conductors and enginemen are responsible for having such running inspections made. When a hot box is observed or other equipment trouble is noted that might endanger the safe movement of the train, the trains must be stopped promptly and an examination made to determine whether or not it is safe to proceed."

Specific instructions were issued to engineers on the braking method to be used to insure passenger comfort. The instructions were necessary because of the length of the train and type of braking equipment used. SCL instructions state: "The length of these trains [Auto-Train] cause any attempt to graduate the brake cylinder pressure off in steps to be ineffective on the rear of the train, resulting in stuck brakes, burning of brake shoes and wheels." 1/ Auto-Train mechanical supervisors reported brake sticking on car No. 49 three times--on August 15, 1975, December 2, 1975, and January 20, 1976.

Tests and Research

After the accident the track structure was examined; examination revealed that the track, including that at Jarratt, was in good condition. However, the track structure appeared to have been damaged by a loose wheel. The cars were examined and a loose wheel was found on the trailing truck of car No. 49 on the lead wheel in the R-3 position. The wheel was gouged on the rim; its axle was marked from the wheel that had turned while off its seat. The wheel was cracked from rim to hub. (See figure 2.) The wheel immediately after the accident was not discolored halfway from rim to hub.

1/ Seaboard Coast Line Railroad Company, "Train Handling Instructions and Information Pertaining to Air Brake Equipment on Engines and Cars," Revised 8/75. Since the instruction was published, passenger equipment has been changed from the rear to the front section of the Auto-Train.

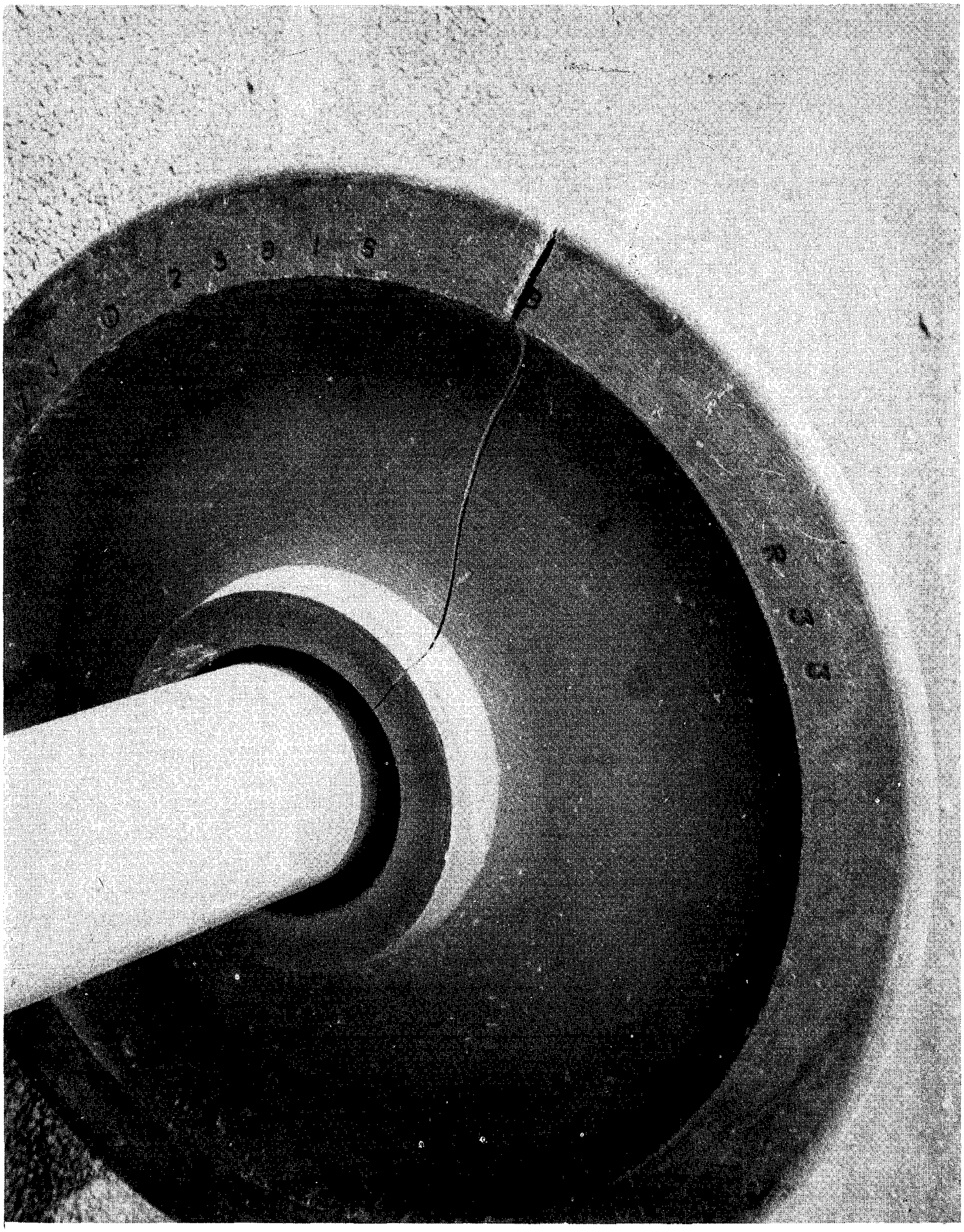

Figure 2. Back view of R-3 wheel from car No. 49.

Edgewater Steel Company (Edgewater) manufactured the wheel in October 1973. The wheel was shipped to the Seaboard Coast Line Railroad and mounted for Auto-Train on April 1, 1974. The wheel was turned on February 3, 1975, and placed on car No. 49. It was hot-stamp marked "10 73 (E) 25816 B R33." The R-3 wheel was made from Edgewater heat No. 51366 and was built to conform with Association of American Railroads' (AAR) specification M-107-74 for wrought steel wheels. The specification required that the wheel's metal contain from 0.57 to 0.67 percent carbon, from 0.60 to 0.85 percent manganese, not over 0.05 percent phosphorous, not over 0.05 percent sulfur, and not less than 0.15 percent silicon.

When the Southern Railway System Research and Test Laboratory examined the wheel after the accident, it found that the wheel met the AAR specification. It also found no manufacturing defects in the failed wheel and determined that the fracture originated at the back rim face, and propagated outward into the rim and down to the hub. (See figure 3.) The laboratory found structural change in a cross-section of the wheel. (See figure 4.) The laboratory reported that "this wheel failed as the direct result of overheating of the rim material by tread brakes."

The National Transportation Safety Board metallurgist examined part of the R-3 wheel from car No. 49 and determined that the fractured surface contained markings typical of fatigue. These markings emanated away from the bottom of the straight leg of the stamped letter "B" used to designate the class of the wheel material. Fatigue caused the crack to propagate radially into the wheel from this point of origin. The fracture outside of this fatigue region appeared typical of an overload. (See appendix A.)

The Safety Board asked Edgewater to comment on the failure. The company replied: "The hot stamped character acted as a point of stress concentration after the tread had been subjected to extended periods of overheating." It added, however, that "Any other sharp irregularities on this rim face, such as lathe dog or chuck marks, mechanical damage or machine tool marks,... can initiate a fatigue crack of this nature... if there is prolonged rim heating. Even with the elimination of these surface irregularities, failures can still occur from severe overheating of the wheel tread and flange."

Other Information

Title 49 Code of Federal Regulations (CFR) 215.43 states "A wheel is defective if it has any of the following conditions: . . . A wheel which has been overheated as evidenced by a reddish-brown discoloration from heat on front and back face of rim and plate extending into the plate one-half of the distance from the tread surface to the axle with decreasing intensity."

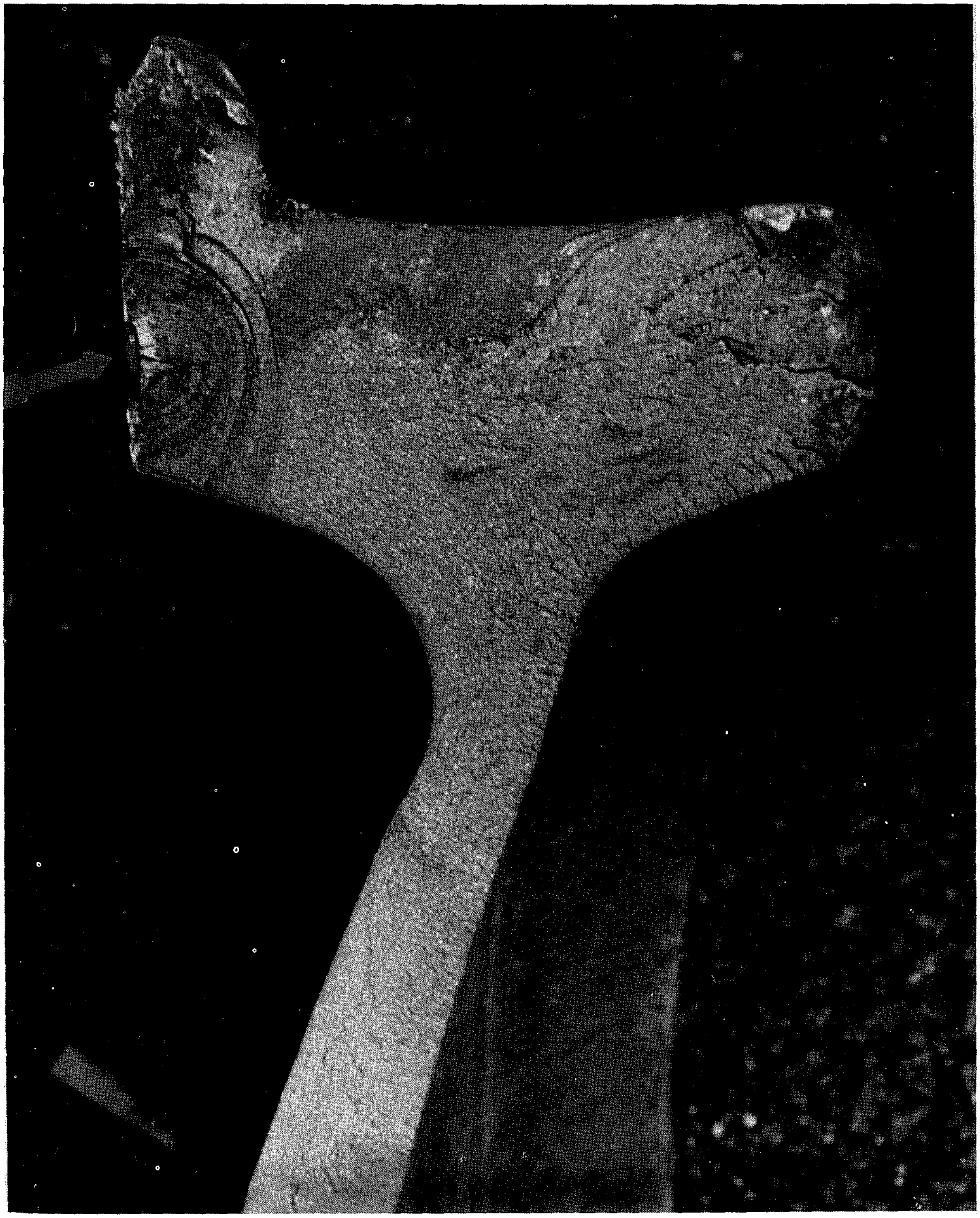

Figure 3. Cross-section of R-3 wheel from car No. 49.

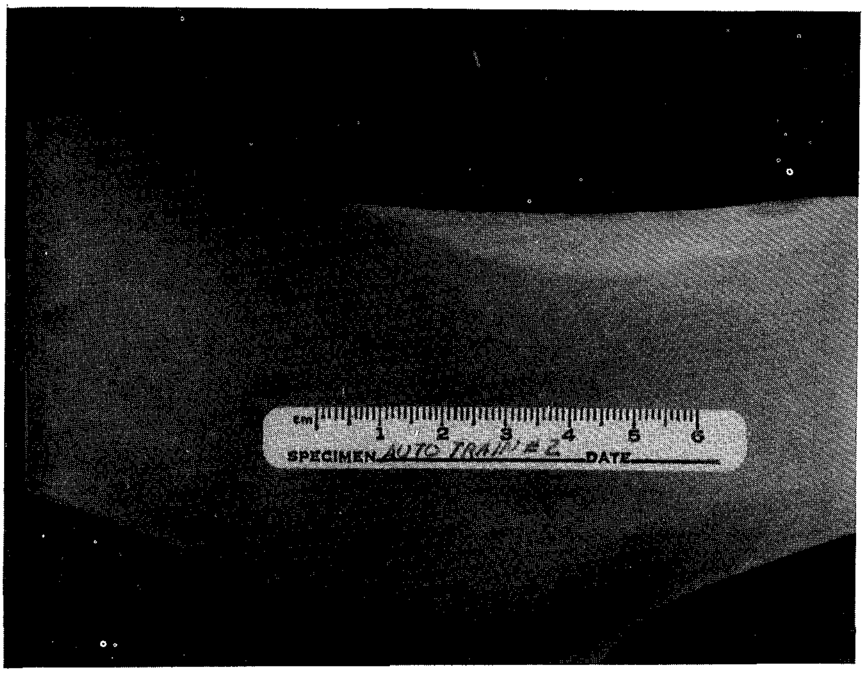

Figure 4. Cross-section of R-3 wheel from car No. 49 showing metal structure change.

The broken wheel and its mate wheel on car No. 49 did not indicate that they had overheated because neither was discolored on the front and back face of rim and plate immediately after the derailment. (See figures 2 and 5.) After the wheels were allowed to weather, oxidation began to form on the wheel rim and plate. Both the failed wheel and its mate wheel then clearly indicated they had overheated. (See figure 6.)

Figure 5. Car No. 49's R-3 wheel on the day of the derailment.

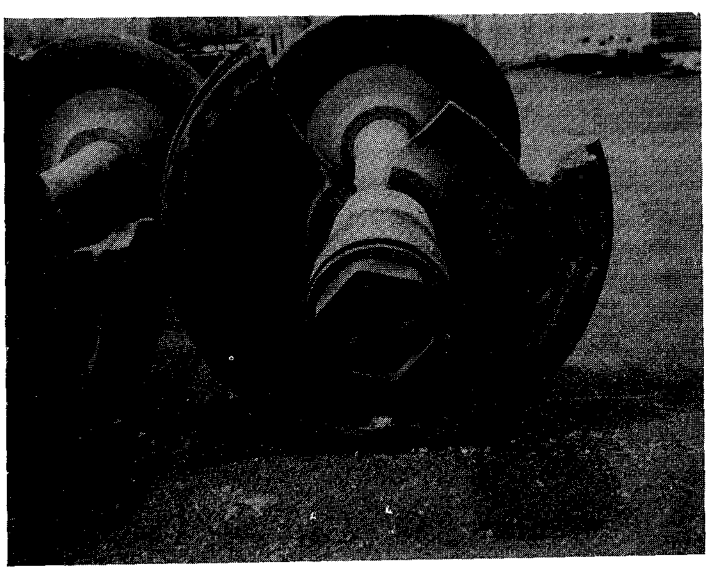

Figure 6. Lorton and Jarratt wheels after weathering.

ANALYSIS

The Derailment

The marks on the track structure indicated that an out-of-gauge wheel had dropped off the rail and had struck track structure components. The fractured wheel on car No. 49 was marked as the result of such contact with the track. It was off its seat and showed evidence of turning while in this off-seat position.

Based on the findings of the Southern Railway System Research and Test Laboratory, the Edgewater Steel Company, and the National Transportation Safety Board's report of the metal failure the Safety Board concludes that the wheel failed as the result of changes in the residual stress pattern caused by overheating of the rim material. The point of stress concentration was in the letter "B" of the manufacturer's hot stamp on the wheel.

Operations

The Safety Board examined the SCL operating rules which stipulate that crews must observe their trains for sticking brakes or other conditions that will affect train movements. The examination revealed that the procedures for handling wheels that are overheated or may have been overheated by excessive on-tread braking are not clearly defined. A wheel should be removed from service when it is known or suspected to have been overheated even though it may not evidence the reddish-brown discoloration that is presently a prerequisite for condemning overheating wheels by industry and Government standards.

The Safety Board suggested to the Auto-Train Corporation that there might be a correlation between the Jarratt accident and a similar one near Lorton, Virginia on March 7, 1976. The Safety Board recommended that Auto-Train determine "... whether there is a systematic source of excessive heating of wheels of auto-carrying cars." 2/ The Federal Railroad Administration (FRA) requested that the Auto-Train Corporation conduct brake tests to determine if the brakes were releasing on all cars. The findings of these tests indicated that improperly released brakes could cause the wheels to overheat under certain braking conditions when many cars on long trains are equipped with D22-type brake equipment and air diversion or loss occurs. As a result of these findings and as a result of its own extensive and thorough inspections, Auto-Train advised the Safety Board that it intended to convert to an ABD-type brake system on its entire auto-carrying fleet. In the meantime, Auto-Train now operates two separate sections--a passenger section and an auto-carrying section. (See appendix B.)

2/ National Transportation Safety Board Recommendations R-76-18 and -19, dated May 7, 1976.

Also, since the accident, Auto-Train has modified its wheel testing procedures to insure a more thorough examination. As of July 20, 1976, Auto-Train had removed 62 pairs of wheels on automobile carriers and 146 wheels on passenger cars.

Before the accident, neither Auto-Train Corporation's nor the Seaboard Coast Line Railroad's operating rules limited the length of passenger trains. Train No. 4 was almost a mile in length. Train employees can be separated by as much as a half mile. It is difficult to see the running gear on tangent track and, therefore, the inspections that are made by the employees are for the most part made while the train is traversing a curve. The inspections depend on the terrain and curvature of the track.

Employees that are located along the right-of-way are also expected to observe passing trains and signal the traincrew to stop if an unsafe condition is detected. The inspections of train No. 4 did not reveal the crack in the wheel even though the wheel was off its seat and in contact with the track structure for more than a mile.

These inspection techniques cannot be relied upon to detect the presence of wheels that are out-of-gauge. Other techniques that will detect wheel defects before wheels fail in service must be developed.

Federal Regulations

Federal regulations do not prescribe the method of braking to be employed or the braking system to be used when new services are instituted in the railroad industry. The FRA was aware that the Auto-Train Corporation was operating trains more than 50 cars long and that the trains were using standard passenger train brake equipment. Brake manufacturers and the FRA were aware that improperly released brakes can be encountered when operating long passenger trains.

The sticking brakes in the Auto-Train operation are apparently directly related to the length of the train, brake system, air diversion or loss, and type of brake equipment used. A revision in operating rules or Federal regulations limiting the length of trains or stipulating the type of brake equipment to be used on long passenger trains should be considered.

The wheel manufacturers, the AAR, and the FRA were aware that residual stress forces in railroad wheels can be altered from compressive to tensile when a wheel's tread is overheated excessively. However, current Federal safety controls did not prevent the operation of the train with wheels that were excessively overheated. After the derailment in Jarratt, the Auto-Train Corporation raised its wheel inspection standard; its standard now exceeds the industry standard and Federal requirements.

Since the overheated wheels on car No. 49 did not resemble the description of overheated wheels given in 49 CFR 215.43, it appears that a revision of the CFR is warranted.

CONCLUSIONS

1. The derailment occurred when the fractured wheel moved off its axle seat and struck the track structure.

2. Running inspections on long passenger trains cannot be relied upon to detect fractured or out-of-gauge wheels before derailment.

3. Train crewmembers were not aware of the wheel derailment on car No. 49 even though it occurred more than a mile before the train separated.

4. Incompletely released and dragging brakes on the wheel tread of car No. 49 probably caused the wheel to overheat.

5. The braking procedures used in conjunction with the length of the train, the diversion of air for auxiliary purposes, and the braking equipment used caused the incomplete release of the brakes.

6. Present methods of inspection cannot always detect overheating of wheels which causes changes in design stress.

7. The fracture was caused by changes in the design residual stress patterns as a result of overheating of the wheel tread.

8. The Code of Federal Regulations inadequately describes an overheated wheel.

9. The significance of wheel stamping and its relationship to wheel failure has not been established by this investigation.

10. Auto-Train did not seek, nor was it required to seek, authority to operate long passenger trains of this design.

11. The train was being operated in accordance with Seaboard Coast Line Railroad operating rules.

12. Track conditions met Federal Railroad Administration track standards.

13. Auto-Train's separation of its long train into two sections--one passenger and one auto-carrying--or the installation of ABD-type brakes to the freight equipment will eliminate the sticking brake problem.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was an undetected, fractured, loose, and out-of-gauge wheel which struck the track structure. Dragging and incompletely released brakes caused the wheel to overheat at its tread; the overheating caused design stress patterns on the wheel to change and the wheel to fracture. The brakes did not fully release because of the train's length and because of the type of brake equipment used.

RECOMMENDATIONS

As a result of this accident, on May 7, 1976, the National Transportation Safety Board recommended that the Auto-Train Corporation:

> "Immediately arrange to have all wheels of the auto-carrying cars inspected, in accordance with procedures approved by the Federal Railroad Administration, to determine if cracking as found in these two derailments is developing in any other wheels. (Class I--Urgent Followup) (R-76-18)
>
> "Determine whether there is a systematic source of excessive heating of the wheels of the auto-carrying cars and if so take immediate action to correct the condition. (Class I--Urgent Followup) (R-76-19)"

...As a result of this investigation, the National Transportation Safety Board recommended that the Federal Railroad Administration:

> "Establish national standards for the inspection of railroad wheels that will insure detection of critical conditions in wheels before inservice failures occur. (Class II--Priority Followup) (R-76-52)
>
> "Review the methods employed in marking wheels and determine if the present method of marking wheel rims is detrimental to the service life of railroad wheels. (Class II--Priority Followup) (R-76-53)
>
> "Develop a method that does not depend on crew observation that will automatically detect when a wheel(s) has failed or derailed. (Class II--Priority Followup) (R-76-54)
>
> "Revise the Code of Federal Regulations to insure that wheels exposed or suspected of being exposed to critical temperatures are removed from service. (Class I--Urgent Followup) (R-76-55)"

...that the Association of American Railroads:

"Establish a system to insure that wheels exposed to critical temperatures are removed from service before inservice failure occurs. (Class I--Urgent Followup) (R-76-56)

"Establish a system to insure that wheels exposed or suspected of being exposed to critical temperatures are reported by railroad employees. (Class II--Priority Followup) (R-76-57)"

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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October 21, 1976

APPENDIX A

NATIONAL TRANSPORTATION SAFETY BOARD
Bureau of Aviation Safety
Washington, D. C.

June 4, 1976

Metallurgical Laboratory
Report No. 76-98

METALLURGIST'S FACTUAL REPORT

A. ACCIDENT

Place	:	Jarratt, Virginia
Date	:	May 5, 1976
Train	:	Northbound Auto Train No. 4 derailment
NTSB No.	:	BSTS 76-R-46
Investigators	:	C. F. Milburn, W. G. Meeker, BSTS-30

B. COMPONENTS EXAMINED

Cracked wheel stamped 10 73 E 25816 B R33.

c. DETAILS OF EXAMINATION

1. General

The truck assembly containing the cracked wheel was examined by the undersigned on May 10, 1976, at the Southern Railway Research Laboratory. There was evidence that the wheel had moved inboard along the axle due to a relief of an interference fit between the wheel and the hub. A radial crack, gaping approximately 1/4 inch at the rim area, extended between the rim and the bore. With a cutting torch, a section was removed from the wheel to expose the entire fracture surface of the crack. Figures 1A and 2A show the section removed and transported to the NTSB Laboratory for examination.

2. Fractographic Examination

The fracture surface contained markings typical of fatigue emanating away from the bottom of the straight leg of the stamped letter "B" used to designate the class of wheel material (origin area denoted by arrows "O", Figures 1A and 2A; and brackets, Figures 3A and 4A). Propagation by fatigue was from this origin area radially into the wheel to the approximate location shown by the arrowheads in Figure 4A. The remaining fracture outside of this fatigue region appeared typical of an overload separation.

C. DETAILS OF EXAMINATION (Cont'd)

Figure 5A is a closeup view of the fracture surface in the fatigue origin area. The fracture markings indicated that the fatigue crack had initiated at multiple sites along the bottom of the stamping in the areas denoted by the brackets in Figure 5A. Detailed examination of the origin area with the aid of a scanning electron microscope (SEM) showed that the fracture surface was partially obliterated by rubbing and what appeared to be corrosion damage. The fracture appeared typical of fatigue in steel although no clear striations were evident on the fracture surface. There was evidence, however, that the fracture may have initiated in part from small discontinuities in the bottom of the stamping. Arrowheads in Figure 6A outline the bottom of what appears to be one such discontinuity.

3. Microsection through Fatigue Origin Area

A low magnification photomicrograph of a metallographic microsection through one of the fatigue origin areas is shown in Figure 7. The depth of stamping in this section measured 0.132 inch on the curved side of the letter (see Figure 7) and 0.134 inch at the origin "A" side.

Arrow "B" in Figure 8 denotes a small crack found in the section near the fatigue origin. This crack appeared to stem directly from the bottom of a "V" shaped discontinuity in the bottom of the stamp. The discontinuity was filled with an iron oxide scale.

A Knoop hardness tr verse within the 0.05 inch layer underlying the bottom of the stamp gave values ranging from 230 to 265 KHN, indicating an approximate tensile strength in this area between 103 and 115 KSI.

Hardness measurements below the machined portion of the back rim surface at a location approximately 0.25 inch from the stamping showed a decreasing hardness with distance to approximately a depth of 0.05 inch. The initial hardness at the depth of 0.005 inch was 310 KHN (135 KSI) and the hardness below 0.05 inch was approximately 278 KHN (120 KSI).

The hardness measurements and microstructural characteristics at these two locations indicated the rim surface away from the stamping was quenched and tempered to the proper hardness for a class "B" wheel and that decarburization probably existed in the immediate underlying surface of the stamp.

C. DETAILS OF EXAMINATION (Cont'd)

4. Microsection through the Tread

Figure 8 is a low magnification photomicrograph of a metallographic microsection through the tread in the area shown by section B-B in Figure 2A. The first 0.25 inch layer underlying the surface of the tread (area "H", Figure 8) contained a microstructure significantly changed by heat. Representative high magnification photomicrographs of these microstructural changes are shown in Figure 9.

Hardness measurements in this section showed that the overheated region was harder (392 KHN at 0.010 inch depth with decreasing hardness to 292 KHN at approximately 0.230 inch depth) than the underlying bulk material (292 KHN).

Attachments

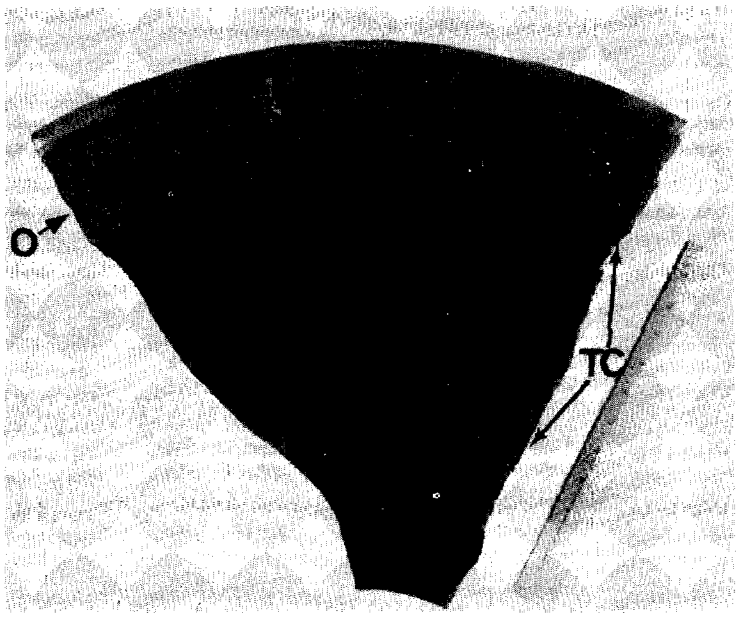

Figure 1A. Overall view of the section removed from wheel for examination. Arrow "O" denotes fatigue origin location. Arrows "TC" indicates line of torch cut made to remove section.

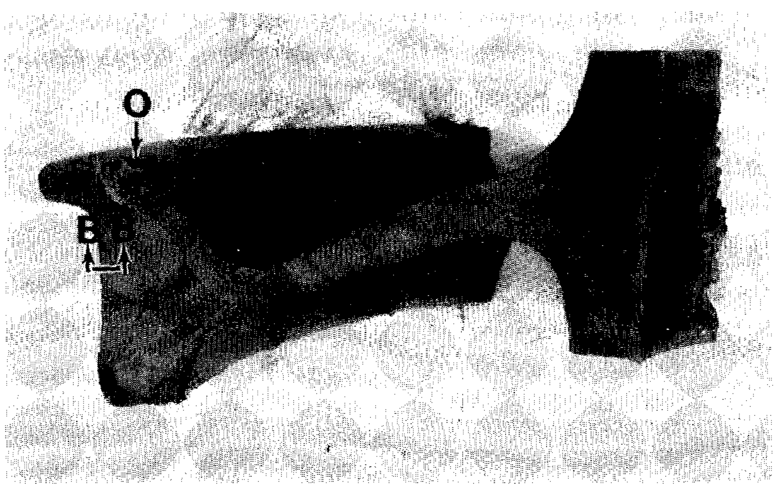

Figure 2A. View of fracture in wheel section. Arrow "O" indicates origin location. X 1/4

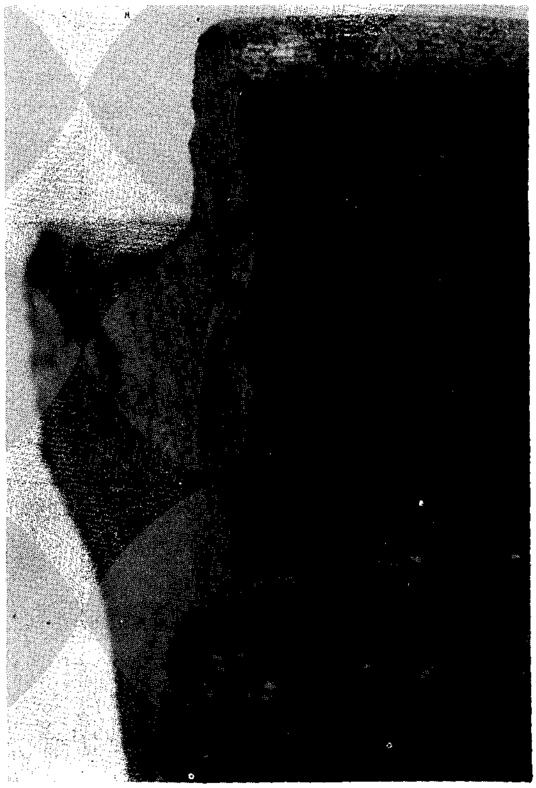

Figure 3A. Closer view of origin area shown by arrow "O" in Figure 1A. Bracket denotes origin area. X1 1/4

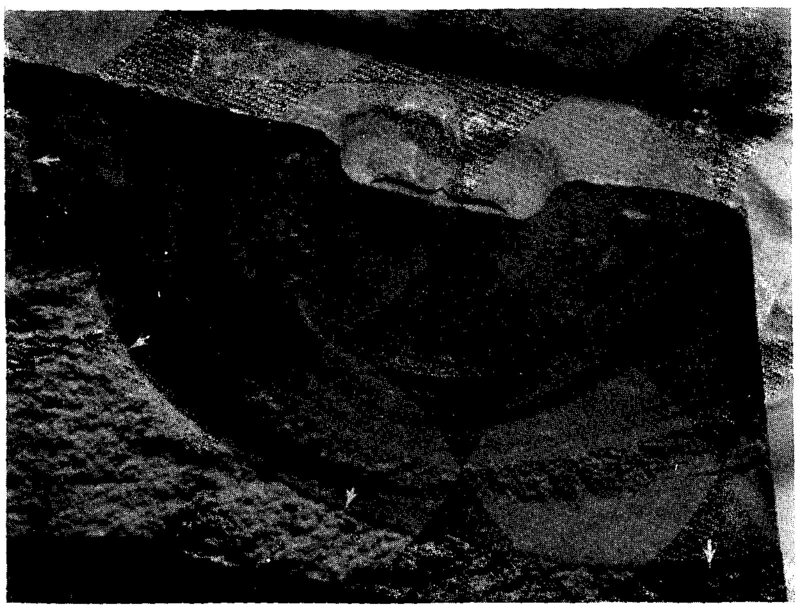

Figure 4A. Closer view of origin shown by arrow "O" in Figure 2A. Arrowheads denote extent of fatigue propagation emanating from the bracket area. X2

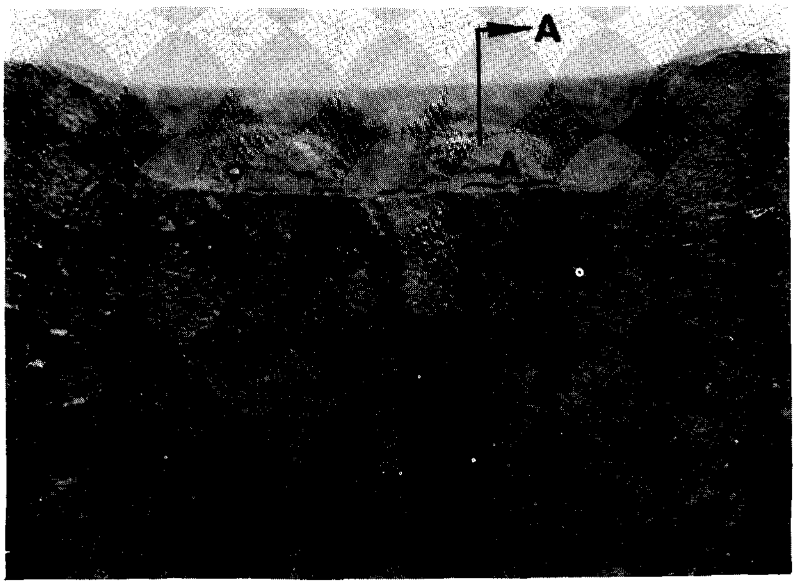

Figure 5A. Fracture surface at the fatigue origin area. Brackets indicate fatigue origin area at the bottom of the stamping. X5

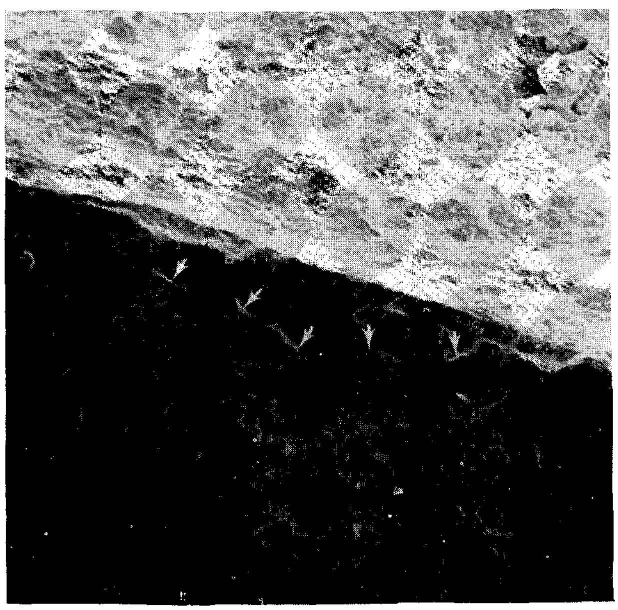

Figure 6A. SEM fractograph within the origin area shown by bracket "A" in Figure 5A. Arrowheads outline the bottom of what appears to be a small discontinuity extending from the bottom of the stamping. X100 ultrsonically cleaned in acetone.

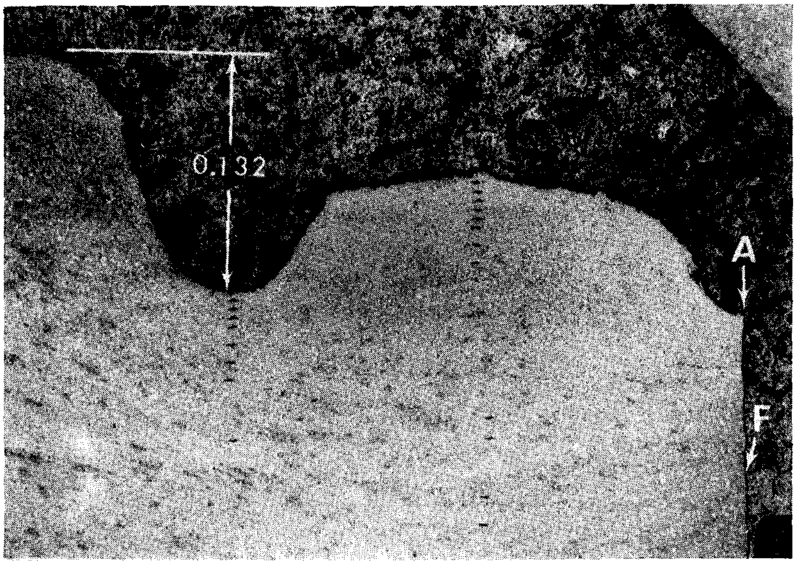

Figure 7. Metallographic microsection through stamped letter in the origin area shown by bracket "A" in Figure 5A (section A-A, Figure 5A). Arrow "A" indicates origin area in root of stamping and arrow "F" denotes the fatigue fracture surface profile. Diamond shaped marks in section are Knoop hardness indentations. X10 nital etched.

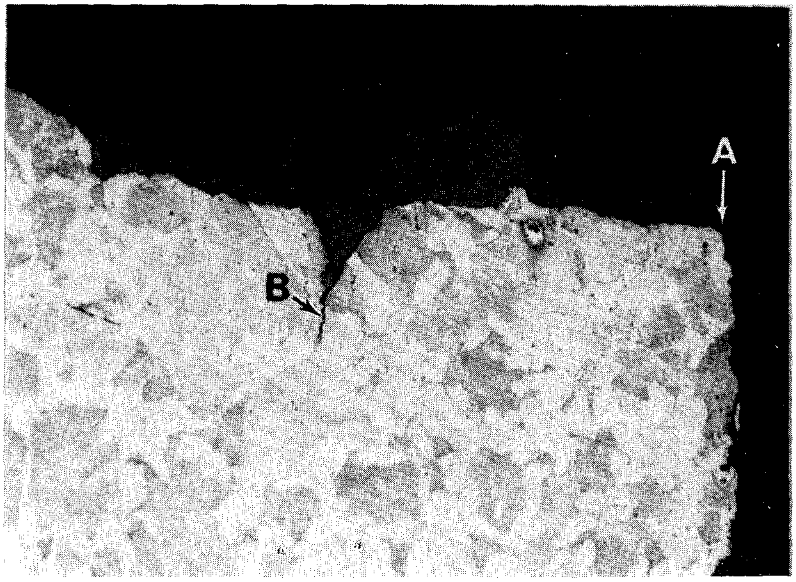

Figure 8. High magnification photomicrograph of section A-A in origin area "A". Note crack shown by arrow "B" stemming from discontinuity in stamped radius. X500 nital etched.

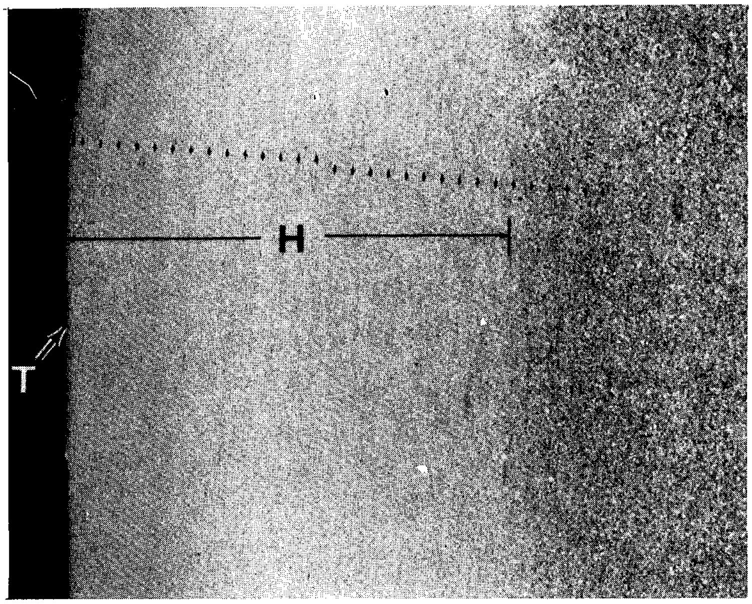

Figure 9. Metallographic microsection through the tread (section B-B, Figure 2A). Arrow "T" denotes tread surface shown in profile. Arrow "H" indicates underlying surface layer of tread significantly changed by overheating. Diamond shaped markings in section are Knoop hardness indentations. X10 nital etched.

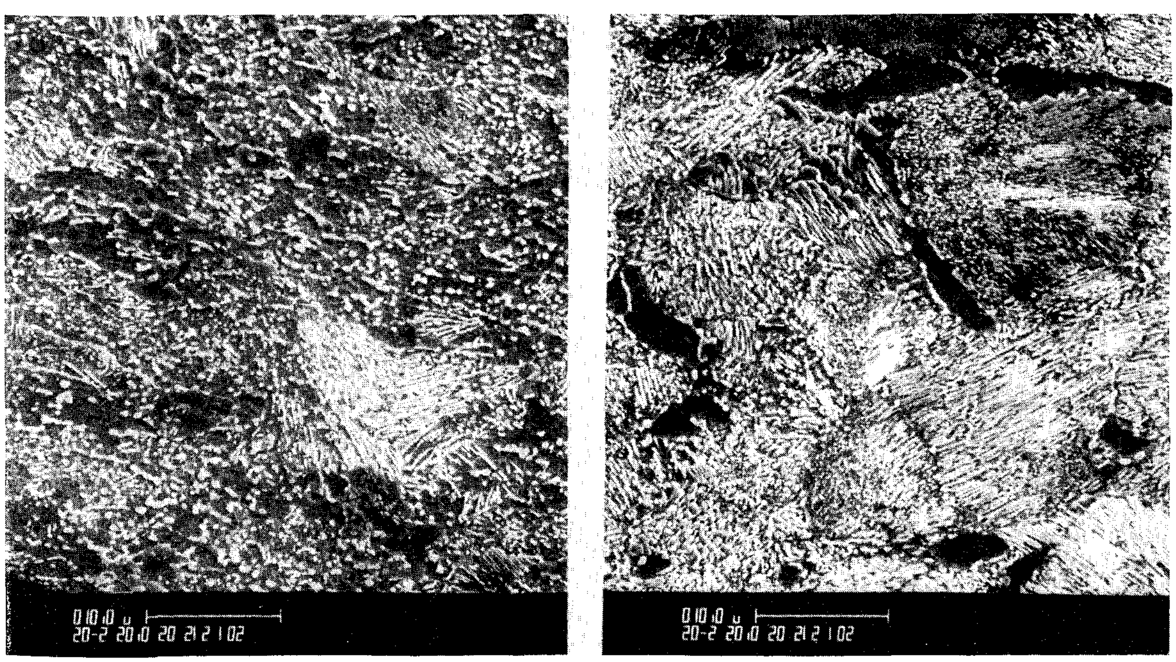

Figure 10. Comparative SEM micrographs of section B-B. Left photograph taken 0.01 inch from tread surface and is typical of area "H" Figure 9. Right photograph was taken approximately 0.5 inch from tread and is representative of microstructure to right of area "H" shown in Figure 9. X2000 nital etched.

APPENDIX B

May 20, 1976

Honorable Webster B. Todd, Jr.
  Chairman
Honorable Francis H. McAdams, Member
Honorable Philip A. Hogue, Member
Honorable Isabel A. Burgess, Member
Honorable William R. Haley, Member
National Transportation Safety Board
800 Independence Avenue, S.W.
Washington, D. C. 20594

Dear Mr. Chairman and Members:

Pursuant to recommendations made to the Auto-Train Corporation by action of the National Transportation Safety Board, in session, under date of May 7, 1976, the Corporation makes the following response:

Pursuant to Recommendation No. 1, the Corporation immediately proceeded on a program to check all wheels on both car-carrying and passenger units by the following action:

(a) Complete inspection utilizing ultrasonic sound wave machines, dye penetrant inspection, magnetic particle inspection, and daily visual inspection of all operating equipment.

(b) As a result thereof, in the last 30 days 120 sets of wheels have been changed out although the biggest majority of the wheels inspected and removed met AAR railroad standards for over-the-road service.

(c) The Corporation has established a policy in excess of the requirements of the Association of American Railroads requiring the scrapping of wheels with one inch of surface metal remaining by establishing a one and one-half inch minimum requirement for wheel removal.

(d) Any wheel with manufacturers' stamped identification which has a depth of more than three thirty seconds inch is to be taken out of service. The Corporation has further requested manufacturers to stencil wheel markings on the hub instead of the rim.

(e) Established corporate policy to purchase only Class B rim-treated wheels. This policy was established due to the fact that the brakes are on tread, most resistant to, shelling and a class wheel most resistant to thermal cracks.

To eliminate the possibility of a systematic source of excessive heat subjected to the wheels, the following policy has been established:

(a) The Corporation now applies Tempilstik paint to the front rim face of all wheels for the purpose of determining by visual inspection if any wheel is subjected to a temperature exceeding 400 degrees Fahrenheit. If heat in excess of the above figure is applied, observation will show a peeling effect and the wheel will be immediately taken out of service.

(b) The Corporation is in the process of converting our brake system on the entire auto-carrying fleet from D22 to the ABD system which is considered the most modern and efficient air brake system today.

As corporate policy to further provide the safest and most efficient rail equipment in the country, the Corporation has taken the following further actions:

(a) The operation of two separate sections; a passenger section and an auto-carrying section. The positive effect of this action is several-fold:

1. A much smoother ride for the passenger section;
2. The problem of sticking brakes and excessive heating is practically eliminated.

(b) The Corporation has entered into a temporary agreement with the carrier roads reducing the speed limit on both sections from 79 miles per hour to a maximum of 65 miles per hour.

The Corporation has further put into immediate operation a daily inspection report on all units, a copy of which is attached hereto for informational purposes to the Board.

In addition to the above mentioned actions on the part of the Corporation, an accelerated on-going heavy maintenance program to up-grade the condition of all equipment has been implemented. Our fiscal year 1977 "back shop" maintenance program budget will exceed $1 million and will result in complete overhauling of trucks, brakes, and underframes of 29 auto carriers, 19 coaches, 6 buffet cars, and 13 bedroom cars. We will continue our present program to reseal 5 locomotives every year.

The Corporation is confident, with the implementation of the above program, that Auto-Train will continue to operate the safest equipment in the United States for the benefit of the American traveling public.

Respectfully submitted,

/s/ Eugene Kerik Garfield
President
Auto-Train Corporation
1801 K Street, N.W.
Washington, D. C. 20006