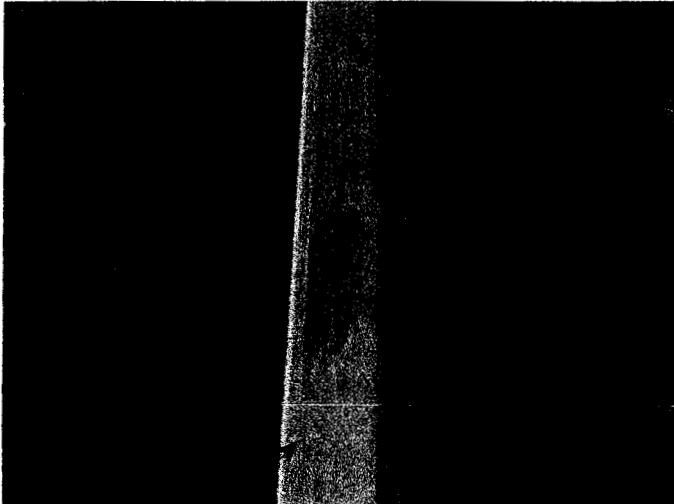
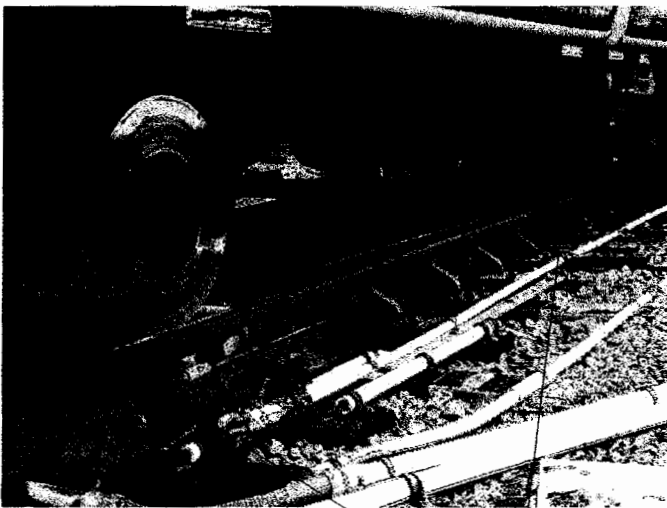


Department of System Safety and Risk Protection
Final Report
Derailment Of Train #308, Westbound Yard Lead Track
Alexandria, Virginia
~~May 2, 2003~~ 4/17/03



Point of derailment



Note: last truck of lead car 5056 located on the stock rail and first truck of 5057 on the open switch point.

INCIDENT DESCRIPTION

At 9:43am, a Yellow line train that consisted of cars #5056-5057/5082-5083/5041-5040 was deadheading into the Alexandria Yard. A work crew on the adjacent yard lead track heard a loud bang as train #308 was proceeding through Westbound Yard Lead, (WBYL), towards Alexandria Yard. The supervisor of the work crew called OCC on the radio and reported a code black/black. OCC notified the operator of train #308 to stop the train and do a walk-around inspection and report findings to OCC.

FINDINGS

Derailment train (#308) speed was 19mph in C14 turnout then averaged steady 11mph through derailment area and the following 900+ feet. Only two of the five track circuits between point of derailment and resting location (C98-3A switch) failed to pick up behind 308.

The speed command through the interlocking at C14 onto the inbound (westbound) yard lead is 22 MPH. Upon exiting the C14 interlocking, the speed command changes to 15 MPH and remains 15 MPH for the next 2,350 feet. The derailment took place near the middle of that 2,350 feet. Then with clear track ahead, at IYL-525, the speed increases to 28 MPH.

The design radius for the curve #33 at the point of derailment is 320.00'. The radius at the time of the derailment was 260.36' for the low rail, and 273.41' for the high rail. The track gauge at the point of derailment was 57 1/2".

The inspection of car 5057 was completed and was found to be in tolerance.

The operator of train #308, found that the front truck of car 5057 had derailed and climbed back



Damage to lead wheel of car 5057 and traction motor cover.

onto the trailing switch point of switch #3A.

The derailed train traveled about 3,000 feet to its final rest point.

The operator was transported for a post incident test.

There were no injuries.

The damage caused by the derailed train included:

TRACKS

- sheared track bolts
- damaged "C" bonds
- WEZE bonds
- Loop circuit cables
- ATC command cables and clamps

RAIL CAR

- Third rail collector shoe assembly
- train wheel
- traction motor housing

PROBABLE CAUSE

Lack of restraining rail in curve and no lubrication on the tracks

RECOMMENDATIONS

TRST - Install restraining rail on all curves < 455 degrees radius leading to mainline tracks.

TRST - lubricate all curves on the gauge face.

WMATA PERSONNEL ON THE SCENE

COORAIL-	L. Proctor
TRST -	D. Painter
	L. Testa
	D. Gibson
	L. Fuller
RTRA -	B. J. Collins
	A. J. Collins
CMNT -	J. Paulus
ENGA -	H. Lupia
	P. Porcillo
SARP -	R. Keele

Derailment Report of Car 5057



August 2003

Written by: R. Sarunac, Ph.D.

III. Conclusions and Recommendations

Investigation and the available data analysis couldn't identify any single deviation, or combination of the first five (5) major suspected factors contributing to the derailment factors that lead to the car 5057 derailment, i.e., the wheel climb. There were five (5) major suspected and two (2) minor casual factors contributing to the derailment/wheel climb at the end of curve #33 between the Eisenhower Avenue station and the Alexandria Yard. These factors are listed below:

1. Newly trued wheels
2. Dry track/rail
3. Shallow new wheel flange angle
4. Train speed at or exceeding the curve speed limit
5. Deviation of the truck at the POD
6. Leveling system "dead band"
7. Sudden change from the propulsion (P3) to brake (B4)

Considering all previously stated findings the investigation team recommendations address the most dominating contributing factors. The most important is to increase the wheel climb derailment safety limit (for the extreme conditions) by the following measures:

1. Install Restraining Rail (at critical locations)
2. Lubricate Wheel Flange
3. Optimize Wheel/Rail Interface
4. Revisit Wheel Truing Practices-Required Surface Roughness (not stand alone)
5. Review the Secondary Suspension Leveling System design characteristics

Restraining Rail Installation

Special track work, i.e., the restraining rail installation in the tight curves should minimize abovementioned type of derailment, however the lubrication is still desired/required (LCF modifiers). Even the restraining rails are in use in other locations, it is recommended to estimate the impact of the additional forces due to inboard bearing truck design.

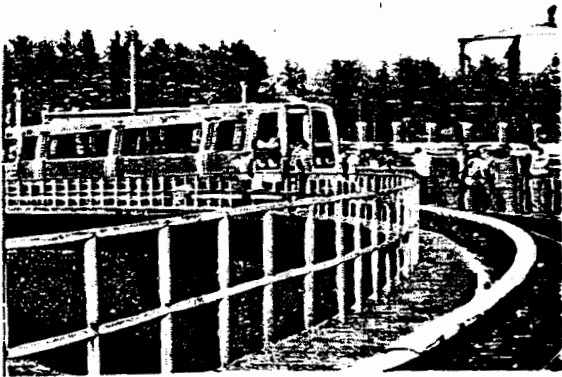
Wheel Flange Lubrication

The high coefficient of friction related to the freshly trued wheels (in this case rough flange surface) could be minimized by lubrication in the tight curves. Wayside or vehicle borne lubrication equipment (LCF modifiers) could be installed. Lubrication alone would significantly decrease a risk of this type derailment.

Wheel/Rail Interface Optimization

Since the WMATA rail transit system is a closed loop system, that provides the opportunity to custom design and maintain an optimal wheel/rail interface by optimizing the contact geometry and managing friction. For instance a wheel profile with a flange angle of 68-70 degrees would increase the L/V derailment limit to a level that would

Department of System Safety and Risk Protection
Final Report
DERAILMENT
ALEXANDRIA YARD LEAD
DECEMBER 9, 2003



RAILCAR 5062 on West Yard Lead

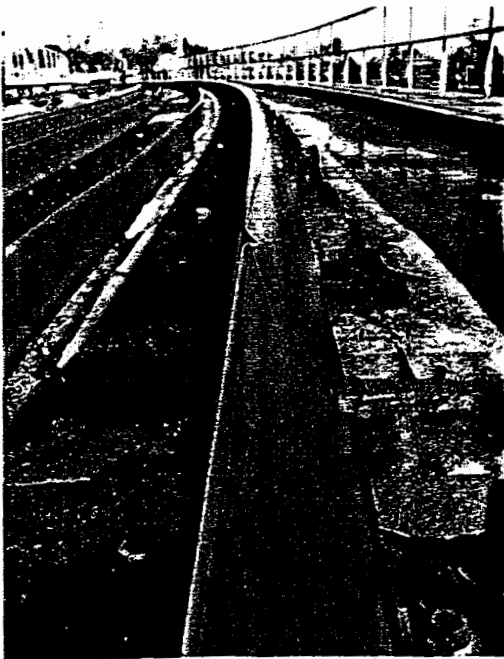


Photo shows wheel marks on top of rail at point of derail.

Description

On December 09, 2003, at approximately 9:50 a.m. rail car 5062 derailed on west lead track. Car 5062 was traveling from Eisenhower Ave Station to the Alexandria Yard on west lead track and derailed at chain marker 7+20 stopping at chain marker 9+45(225 feet). The #4 wheel on #2 axle of the front truck on car 5062 derailed.

Damage :

Undetermined Truck/wheel damage

Wayside damage includes:

- Two (2) Marker Coils
- 200 feet of track stud bolts.
- Numerous third rail cover boards.

Probable Cause:

High coefficient of friction caused by colder than normal temperatures and unlubricated rail on a 320' radius unrestrained rail. The investigation is continuing, looking at track and vehicle conditions.

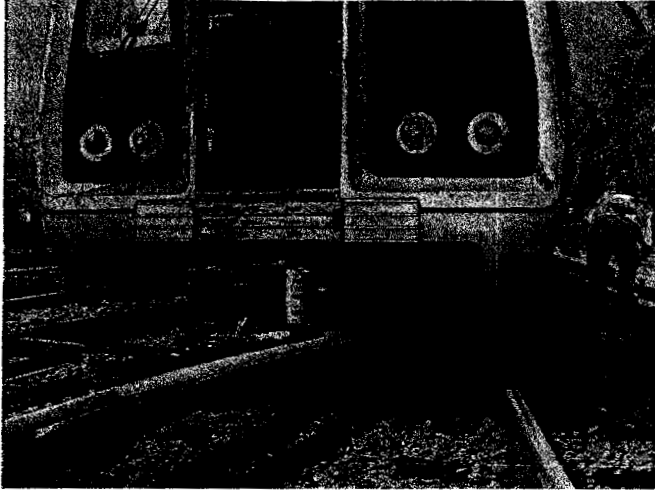
The Train Operator was taken for Post Incident Medical Testing.

The railcar numbers are as follows:.
5136/37, 5114/15, 5063/62

Recommendations:

Lubricate track in this area, and install guardrail.

Department of System Safety and Risk Protection
Investigation Committee Summary Report
Derailment, Red Line, Silver Spring, Pocket Track
August 19, 2004



Car 5186, front trucks derailed in the pocket track, Silver Spring, MD, 08/19/04.



View of front derailed trucks of Car 5186.

INCIDENT DESCRIPTION

On August 19, 2004 at approximately 2:16 PM, the front trucks of lead Car 5186 derailed on track 3 (middle) just north of the Silver Spring Station. No passengers were aboard and the train operator was not injured. The train traveled approximately 62 feet before coming to a stop.

FINDINGS

1. Train 205 was moving at a slow speed out of the middle track, toward the inbound mainline track, in Automatic Train Operation (ATO), to begin service at the Silver Spring Station to Grosvenor/Strathmore Station.
2. The derailment occurred at a switch in a segment of track leading to the mainline track. The derailed train did not encroach upon the inbound or outbound (mainline) tracks.
3. There was wear on the side of the narrow end of the movable segment of rail in the switch (switch point) within acceptable limits of the WMATA Track Standards. There was no rail lubrication in this area.
4. The post-derailment inspection of Car 5186 found that the car leveling system, that ensures that the rail car rides level, was damaged during the derailment, so its condition prior to the derailment could not be determined.

PROBABLE CAUSE

There were several causal factors that may have contributed to the derailment of car 5186:

- dry, unlubricated rail
- side wear on the switch point
- the conformal contact of the wheel on the rail
- reduction in acceleration at the point of derailment

CONCLUSIONS

Car 5186 derailed due to: dryness of the rail, conformal contact of the wheel and the rail, low train speed combined with reduction in acceleration.

RECOMMENDATIONS

- ▶ Lubricate all switches similar to the switch at which the derailment occurred. This is an interim measure, until this type of switch can be provided with a guard rail, which would prevent similar derailments. There is an ongoing program to install guards on switches similar to the type involved in the derailment.
- ▶ Review the WMATA Track Standards for acceptable allowable switch point side-wear.
- ▶ Conduct a wheel/rail interface study against current WMATA track and car standards.
- ▶ Closely monitor track inspection cycles and reports from inspection personnel for trends and anomalies. Implement corrective action.
- ▶ Establish a policy to conduct a full wheel/rail interface study for each new series of rail cars that WMATA procures.

DEPARTMENT OF SYSTEM SAFETY and RISK PROTECTION
Interim Investigation Report
Derailment of Six Car Consist at West Falls Church Yard on 10/01/04



Front view of car 5139.



Rear view of car 5138.

10-1-04

Description of Accident:

On the night of October 1, 2004, the train operator was operating a six car consist through West Falls Church Yard to Storage Track 2. The train consisted of the following cars starting with the lead car and working consecutively rearward: 4045-4044, 5014-5015, 5139-5138.

The route provided by the tower operator took the train past Signal K99-304 around the inner yard loop to the storage tracks. Prior to entering the yard loop the second truck of car 5139 and the first truck of car 5138 derailed.

After these two trucks derailed, the train continued to travel approximately 1400 feet around the loop to the double crossover. At this point the first truck of 5139 derailed and the undercarriage of car 5139 came in contact with the third rail causing the third rail breakers to trip due to the shorted condition. The train stopped due to the loss of third rail power.

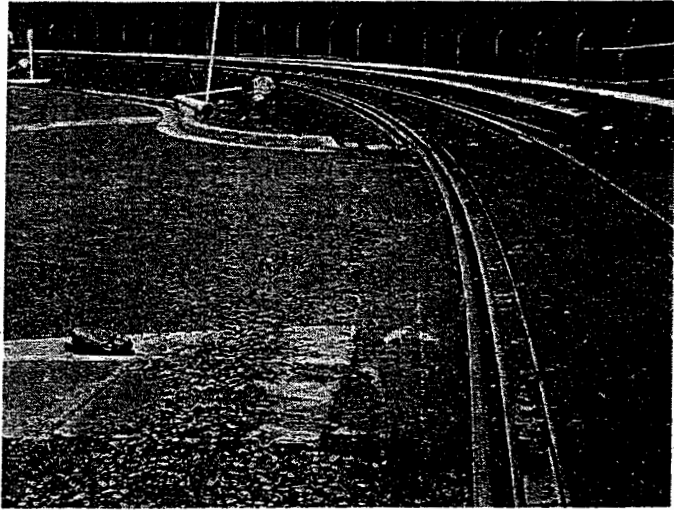
Findings:

No injuries were reported.

The train operator and tower operator were taken for drug and alcohol screening. The results are not available at this time.

The train operator stated that she did not notice anything wrong or unusual with the train until she had entered the interlocking and it "jerked" just before the power went down, 1400 feet after the POD. (i.e., point of derailment)

DEPARTMENT OF SYSTEM SAFETY and RISK PROTECTION
Interim Investigation Report
Derailment of Six Car Consist at West Falls Church Yard on 10/01/04



View of curb damage and flange grooves across the road crossing.



View of damage to the side of car 5139.

Conclusions:

There is no evidence at this time that the train operator or the tower operator contributed to the initial derailment of the second truck of car 5139 and the first truck of car 5138. However, the train operator's failure to stop at or shortly after the POD contributed to the significant damage to the cars and wayside equipment. The failure to stop also contributed to the second derailment occurrence in the crossover of the first truck of car 5139.

Based upon this and previous accidents with 5000 series cars there appears to be something different, from other series cars, in the way that the 5000 series cars negotiate tight spirals and curves.

Recommendations:

A formal panel of inquiry should be convened to investigate and analyze this accident, to see if there are any similarities to the previous 5000 series car derailments.

Report Prepared by: Jim Redding